Queensland Clinical Guidelines

Translating evidence into best clinical practice

Maternity and Neonatal **Clinical Guideline**

Perinatal substance use: maternal

Queensland Government

Document title:	Perinatal substance use: maternal
Publication date:	April 2016
Document number:	MN16.37-V1-R21
Document supplement:	The document supplement is integral to and should be read in conjunction with this guideline.
Amendments:	Full version history is supplied in the document supplement.
Amendment date:	New document
Replaces document:	MN10.10-V3-R15 (Neonatal abstinence syndrome) withdrawn
Author:	Queensland Clinical Guidelines
Audience:	Health professionals in Queensland public and private maternity and neonatal services
Review date:	April 2021
Endorsed by:	Queensland Clinical Guidelines Steering Committee Statewide Maternity and Neonatal Clinical Network (Queensland)
Contact:	Email: Guidelines@health.qld.gov.au URL: www.health.qld.gov.au/qcg

Disclaimer

This guideline is intended as a guide and provided for information purposes only. The information has been prepared using a multidisciplinary approach with reference to the best information and evidence available at the time of preparation. No assurance is given that the information is entirely complete, current, or accurate in every respect.

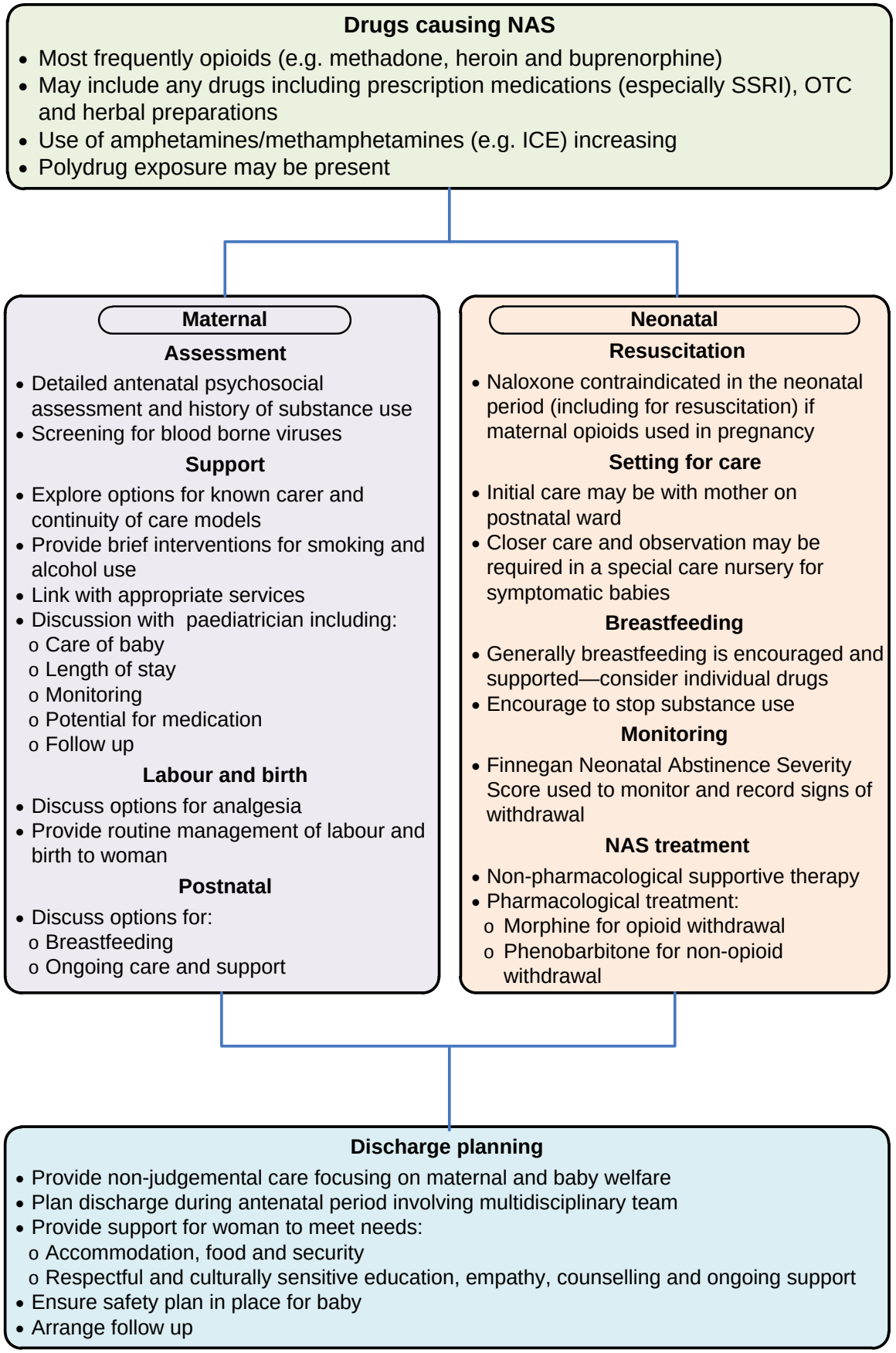
The guideline is not a substitute for clinical judgement, knowledge and expertise, or medical advice. Variation from the guideline, taking into account individual circumstances may be appropriate.

This guideline does not address all elements of standard practice and accepts that individual clinicians are responsible for:

- Providing care within the context of locally available resources, expertise, and scope of practice
- Supporting consumer rights and informed decision making in partnership with healthcare practitioners including the right to decline intervention or ongoing management
- Advising consumers of their choices in an environment that is culturally appropriate and which enables comfortable and confidential discussion. This includes the use of interpreter services where necessary
- Ensuring informed consent is obtained prior to delivering care
- Meeting all legislative requirements and professional standards
- Applying standard precautions, and additional precautions as necessary, when delivering care
- Documenting all care in accordance with mandatory and local requirements

Queensland Health disclaims, to the maximum extent permitted by law, all responsibility and all liability (including without limitation, liability in negligence) for all expenses, losses, damages and costs incurred for any reason associated with the use of this guideline, including the materials within or referred to throughout this document being in any way inaccurate, out of context, incomplete or unavailable.

Flow Chart: Perinatal substance use management



Abbreviations: NAS Neonatal Abstinence Syndrome**; OTC** Over the Counter**; SSRI** Selective Serotonin Re-uptake Inhibitors

Abbreviations

ADHD	Attention deficit hyperactivity disorder
CNS	Central nervous system
DoCs	Department of Communities, Child Safety and Disability Services
HBIG	Hepatitis B Immunoglobulin
HBsAg	Hepatitis B surface antigen
HBV	Hepatitis B virus
HCV	Hepatitis C virus
HIV	Human immunodeficiency virus
NAS	Neonatal abstinence syndrome
NRT	Nicotine replacement therapy
SIDS	Sudden infant death syndrome
SNRI	Serotonin noradrenaline reuptake inhibitors
SSRI	Selective serotonin reuptake inhibitors
SUDI	Sudden unexplained death of an infant

Table of Contents

List of Tables

1 Introduction

Substance use in pregnancy is common. Drugs crossing the placenta may lead to a range of health problems such as abnormal fetal growth and development.[1]

Population and demographic variations are reflected in different drug usage patterns between rural, remote and urban groups.[1] Patterns of drug use pre-pregnancy may carry into the antenatal period. Tobacco and alcohol are commonly used[2] and although their use in Australia is declining[1], the prevalence of their use by pregnant women continues to be of clinical concern for the woman and baby.[3]

Commonly used drugs include those classified as stimulants, depressants and hallucinogens. They include cannabis, opioids, heroin, amphetamines and methamphetamines and synthetic psychoactive drugs.[2] However there is also an increasing use of selective serotonin reuptake inhibitors (SSRI) in pregnant women to manage existing mental health issues.[4] Other substances used in alternative and complimentary therapies are also of concern as there is limited information about the effects of these drugs on the fetus.[5]

Illicit drug use has a strong association with mental health issues[1], and many substance-using women are polysubstance users. Coexisting mental health disorders may contribute to substance use or the effect of substance use in pregnancy and include anxiety, schizophrenia and personality disorders.[2]

Perception of risk by the woman can be a predictor of continued use. This supports the importance of education about maternal and fetal effects. However some women with substance use disorders have difficulty discontinuing use during pregnancy. Management following early screening and referral can be of benefit.[6]

1.1 Incidence

Table 1. Incidence

<table>
<tr><th>Aspect</th><th colspan="4">Consideration</th></tr>
<tr><td>Context</td><td colspan="4">• Prevalence reporting and comparison of substance use complicated by:
o Different definitions and screening, assessment and diagnostic tools used in different countries
o Variety and subtlety of clinical presentations
o Different population characteristics[7]
• Regional variations to the components of some newer drugs
• Generally prevalence of substance use higher in:
o Non-pregnant women than pregnant women
o Young pregnant women[6]</td></tr>
<tr><td rowspan="4">Queensland*</td><td colspan="4">Mental health/behavioural disorders due to drugs, alcohol or tobacco[8]</td></tr>
<tr><td>Year</td><td>Percentage</td><td>Number</td><td>Total Births</td></tr>
<tr><td>2010</td><td>0.577</td><td>358</td><td>62 033</td></tr>
<tr><td>2014</td><td>0.754</td><td>473</td><td>62 695</td></tr>
<tr><td rowspan="4">Australia**</td><td colspan="4">Drug taking behaviours before and after knowledge of pregnancy[1]</td></tr>
<tr><td colspan="2">Substance</td><td>Before</td><td>After</td></tr>
<tr><td colspan="2">Alcohol</td><td>56%</td><td>26%</td></tr>
<tr><td colspan="2">Tobacco</td><td>17.4%</td><td>10.6%</td></tr>
<tr><td colspan="2">Illicit substances</td><td>2.4%</td><td>1.6%</td></tr>
</table>

*Source: Perinatal Data Collection, Department of Health (Extracted 8 July 2015)[8]
**Source: Australian Institute of Health and Welfare 2015 (2013 data)[3]

1.2 Commonly used/misused substances

Table 2. Substances commonly used/misused

Opioids[5] (CNS depressants)	**Agonists[5]** • Codeine[9] • Fentanyl • Heroin (Diacetyl morphine/Diamorphine) • Hydromorphone • Morphine • Methadone • Meperidine • Oxycodone • Propoxyphene	**Antagonists** • Naltrexone	**Mixed agonist–antagonists** • Buprenorphine (Subutex)[9] • Butorphanol • Nalbuphine • Pentazocine
CNS stimulants	**Psycho stimulants** • Caffeine[5] • Cocaine[5,9,10] • Nicotine[5] • Dissociative anaesthetics • Phenylcyclidine (PCP) • Ketamine **Mild stimulants** • Ephedrine **Stronger stimulants[5]** • Ecstasy • Khat • Slimming tablets (Duromine, Tenuate Dospan, Ponderax)	**Serotonin–noradrenaline reuptake inhibitors (SNRIs)[4,9-11]** • Venlafaxine hydrochloride (Efexor) **Selective serotonin reuptake inhibitors (SSRIs)[4,9-11]** • Citalopram (Cipramil, Celapram, Talam) • Escitalopram oxalate (Lexapro, Esipram) • Fluoxetine (Prozac, Lovan) • Fluvoxamine maleate (Luvox, Voxam) • Sertraline (Zoloft, Zydep, Septrone)	**Amphetamines[5]** • Amphetamine (AMPH) • Dextroamphetamine • Methamphetamine **Amphetamine related** • Benzphetamine • Diethylpropion • Ephedrine[5] • Fenfluramine • Mazindol • Methcathinone • Methylphenidate (Ritalin) • Pemoline • Phendimetrazine • Phentermine • Phenylpropanolamine
CNS depressants	**Alcohol[5,9,10]** **Barbiturates[5]** **GHB (Gamma–hydroxybutrate)[5]** **Some solvents and inhalants[5]**	**Benzodiazepines[5,10]** • Alprazolam • Clonazepam • Diazepam • Flunitrazepam • Oxazepam • Temazepam	**Cannabinoids[9,10]** • Cannabis/Marijuana • Hashish
Hallucinogens	**Alkaloids** • Lysergic acid diethylamide (LSD)[5] • Psilocin • Psilocybin • Phencyclidine (PCP) • Dimethyltryptamine (DMT) • Diethyltryptamine (DET) **Phenylethylamines[5]** • Mescaline • Peyote	**Stimulant with hallucinogenic properties** • Entactogens • Methylenedioxyamphetamine (MDA) • 3-methoxy-4,5-methylenedioxyamphetamine (MMDA) • 3,4-methylene dioxyamphetamine (MDMA) (Ecstacy)[5] • 3,4-methyl-enedioxyamphetamine (MDEA)	**Inhalants** • Solvents/aerosols (glues, gasoline, paint thinner, cleaning solutions, nail polish remover, freon) **CNS depressants with hallucinogenic properties:** Cannabis[5] **Others** • Nitrites • Nitrous oxide • Hallucinogens

1.3 Opioids/opiates exposure

Opiates are alkaloid compounds derived from the opium poppy and include psychoactive compounds such as Morphine and Codeine. They are analgesic and can induce euphoria and in high doses–stupor, coma and respiratory depression. Whereas, opioids include alkaloids derived from the opium poppy as well as synthetic drugs interacting with the same receptors in the brain and include oxycodone, heroin and methadone. They are analgesic and produce euphoria.[12]

1.3.1 Pregnancy, fetal and neonatal exposure

Table 3. Opioid/opiate exposure potential outcomes–pregnancy, fetal and neonatal

Aspect	Potential outcomes
Pregnancy[13-15]	• Stillbirth • Preterm labour and rupture of membranes • Placental insufficiency • Placental abruption • Preeclampsia
Fetal[13-15]	• Fetal growth restriction • Readily absorbed from maternal circulation into placental tissue • Buprenorphine[16] o Released less readily into fetal circulation from placenta o Less maximal opioid effect and dissociation from receptors
Neonatal[13-15,17]	• Neonatal abstinence syndrome (NAS)–severity is not dose related • Opioid receptors concentrated in CNS and gastrointestinal tract • Negative association with gestational age birth weight, length, head circumference[15] • Onset of withdrawal signs depends on type of drug(s) used: o Methadone[2,15,18-20]: ▪ Usually occurs within 72 hours of birth and may last days to weeks o Buprenorphine[15,16,21-25]: ▪ Similar to Methadone exposure with less severe NAS ▪ May manifest later o Heroin ▪ Usually occurs within 24 hours of birth[20] • Predominant signs of opioid withdrawal in neonate[14,22,26]: o CNS irritability interferes with: ▪ Self-organisation and self-regulation ▪ Ability to communicate cues to caregivers o Autonomic over reactivity interferes with: ▪ Feeding including less rhythmic swallowing ▪ Sleeping and ability to be alert ▪ Gastrointestinal dysfunction–increased metabolism • Strabismus • Sudden infant death syndrome (SIDS) • Impaired bonding and emotional dysregulation in infancy[27] • Compromised postnatal growth and development[15] • Will require observation and management in hospital. Refer to Queensland Clinical Guideline *Perinatal substance use: Neonatal*[28]

1.3.2 Lactation and childhood

Table 4. Opioid/opiate exposure potential outcomes–lactation and childhood

Aspect	Potential outcomes
Lactation	• Small amounts may be transferred in breast milk however this does not appear detrimental to the baby • May provide milder withdrawal signs • May reduce the pharmacological treatment required[29] • Encourage breastfeeding unless other contraindication • Refer to Queensland Clinical Guidelines *Perinatal substance use: neonatal*[28,30]
Childhood[15,31,32]	• Increased lethargy • Impaired attachment relationships, emotional dysregulation • Addiction vulnerability • Methadone: o Reduced performance on learning and memory tasks • Buprenorphine: o Hyperactivity o Visual impairment/delayed visual development o Memory problems o Possible delay in general cognitive functioning o Anxiety o Aggression o Feelings of rejection o Disruptive/inattentive behaviour including Attention deficit hyperactivity disorder (ADHD) o Poor neurodevelopment

1.4 Psychostimulants exposure

Stimulants, also known as psychostimulants, act to increase neurotransmitters dopamine, noradrenaline and serotonin. They produce euphoria, wellbeing, energy, wakefulness and alertness. Concurrent administration with other drugs may alter the drug effect and toxicity profile.[12]

1.4.1 Amphetamines/Methamphetamines

Table 5. Amphetamines/Methamphetamines

Aspect	Potential outcomes
Pregnancy	• Health risks in pregnancy not clearly established • May contain other unknown substances with unpredictable effects[33] • Inconsistent reports of development of ischaemic lesions following inutero exposure[34] • May reduce blood flow to placenta increasing risk of miscarriage, preterm birth,[35] placental abruption, fetal growth restriction and stillbirth[26] • Consider the pregnancy high risk
Fetal	• Congenital anomalies including: o Cardiac o Cranial/oral clefts o Central nervous system (CNS) o Limbs o Abnormal brain development/microcephaly[15,32] • Negative association with gestational age[15,35], birth weight[11, 13, 16], length, head circumference[13,15,22,36]
Neonatal	• Lower one minute Apgar score[36] • May be excessively somnolent or feed poorly[35] • May develop NAS although may not require medication • Use close to birth may cause baby to be agitated and overactive • Neurobehavioural effects: decreased arousal, increased stress and poor quality of movement (dose-response relationship)[32] • May be dose-response relationship resulting in neurotoxic effects • Heavy use related to lower arousal, more lethargy and increased physiological stress observed as difficulty maintaining normal, regular respirations[14,22,37,38] • Impaired bonding and emotional dysregulation[39] • Compromised postnatal growth and development[31]
Lactation	• Amphetamines concentrated in breast milk 2.8 to7.5 times maternal plasma[33] • Encourage and support to discontinue substance use
Childhood	• Potential for severe morphological changes in brain (smaller subcortical volumes) associated with cognitive defects[40] • Long term neurotoxic effects on behaviour, cognitive skills and physical dexterity[26] • Behavioural disorders including aggression and ADHD[15] • Poor performance on sustained attention and delayed verbal memory[40] • Learning difficulties from deficits in attention, memory and motivation[15] • Difficulty achieving milestones[36]

1.4.2 Nicotine

Table 6. Nicotine

Aspect	Potential outcomes
Maternal[2]	• Miscarriage and preterm birth • Preterm rupture of membranes • Placental abruption • Non-pregnancy risks include: o Increased risk of cancer, cardiovascular and pulmonary diseases
Fetal	• Greater fetal exposure to nicotine results in higher risk of poor birth outcomes[41] o Spontaneous miscarriage o Preterm birth o Low birth weight[14,22] and small for gestational age (twice as likely as non-smokers)[41] o Decreased birth weight length and head circumference[14,22]
Neonatal	• Passive smoking risks include: o Increased incidence of SIDS[2,14,22,42], asthma, bronchitis and ear infections[42]
Childhood	• Increased risk of asthma and respiratory infections, childhood cancers, hypertension, obesity[41] • Excitability and hyper tonicity[14,22] • Conduct disorder, reduced intelligence quotient (IQ), aggression, antisocial behaviour, impulsivity, ADHD[14,22] o May be associated with cumulative psychosocial risk • Disturbed maternal-infant interaction • Excitability • Hypertonia • Stress abstinence disorder (e.g. unable to self sooth, abnormal sucking and gaze aversion) • Tobacco use and dependence[14] • Some risks may be subtle and transient[14]

1.4.3 SSRI/SNRI

Table 7. SSRI/SNRI

Aspect	Considerations and potential outcomes
Context	• SSRI/SNRIs are drugs of choice for the treatment of: o Depression and other mood and behavioural disorders (e.g. obsessive-compulsive disorder, panic disorder and anxiety disorders[43,44]) • Depression and other mood disorders occur in approximately 10% of pregnant women • Concerns regarding neonatal complications have resulted in a caution to women when used late pregnancy[43]
Maternal	• Occur as a result of either discontinuation (withdrawal) or toxicity (excess of 5-HT) • Discontinuation syndrome symptoms primarily subjective and may: o Occur within a few days of cessation probably due to a hypo-serotonergic state[43] o Include headache, dizziness, nausea, tiredness, anxiety and low mood • Toxicity syndrome symptoms are primarily objective and may include: o Mental state changes (agitation, confusion), neuromuscular hyperactivity (tremor, myoclonus, rigidity, hyperreflexia), and autonomic hyperactivity (fever, sweating, tachycardia, tachypnoea)
Fetal	• First trimester exposure increases risk of spontaneous abortion[45] • First trimester exposure to Paroxetine may be linked to cardiac malformations but evidence is inconclusive[46]
Neonatal	• There is evidence of adverse signs in babies born to mothers prescribed SSRIs during pregnancy[44] o Usually present within hours of birth o Mild and usually resolve within two weeks o Unclear whether neonatal withdrawal or neonatal toxicity (serotoninergic) or a combination of both[46] • Neonatal behavioural signs may occur in up to 30% of SSRI exposed babies[4,11,43] • Third trimester use linked to neonatal withdrawal or toxicity syndromes including respiratory, motor, CNS and gastrointestinal signs[26,46] o Subtle negative neonatal neurobehavioural outcomes • Persistent pulmonary hypertension in the newborn (PPHN)[29,46,47] (very rare), • Neonatal hypoglycaemia[11,34] • Hypoglycaemia[26] • Possible delayed motor development[48] • Serotonergic hyperstimulation (toxicity) and discontinuation syndrome difficult to differentiate [11]: o Signs due to toxicity likely to be present immediately from birth o Drug levels of SSRIs with short half-lives (Paroxetine) may be high enough at birth to cause toxicity, and decline rapidly enough to produce signs of withdrawal • Low incidence of low birth weight or preterm birth[48] • Exposed babies require observation in hospital for a minimum of two to three days[4,46] o Low incidence of admission to special care nursery[48]
Breastfeeding	• Minimal amounts found in breast milk[4] • Fluoxetine may accumulate and cause jitteriness[48] • Venlafaxine levels may be at higher end of accepted safe ranges[48] • Encourage breastfeeding[11]

1.4.4 Cocaine

Table 8. Cocaine

Aspect	Potential outcomes
Maternal	• Associated with: o Increased risk of intrauterine growth restriction o Placental abruption o Premature rupture of membranes o Preterm birth[34] • Risk of HIV and hepatitis if injected[49,50] • Effects may be explained by concurrent use of tobacco, cannabis or environmental factors[34]
Fetal	• Inconsistent evidence as effects may be associated with concurrent use of tobacco, cannabis or quality of environment[34] • Magnitude of any effects is dependent on dosage, gestational timing, duration of timing, duration of exposure and/or postnatal care[15]
Neonatal	• Crosses blood brain barrier[15] • Negative association with gestational age, birth weight, length and head circumference[14,15] • Neurobehavioural abnormalities most commonly occur on second or third postnatal days[26] • Early neurobehavioural deficits[14] include: o Orientation, state regulation, autonomic stability, attention, sensory and motor asymmetry, jitteriness[15] seizures, tachycardia, irritability, tremors, high pitched cry, excessive sucking and agitation[26,29], poor clarity of infant cues during feeding, delayed information processing, general cognitive delay[14], lower arousal, poor quality of movement, poor self-regulation, non-optimal reflexes[15] • Intraventricular haemorrhage[14]
Lactation	• Cocaine and metabolites have been detected in baby's urine for up to 60 hours following breastfeed • Discourage use when breastfeeding: o After individual dose, discontinue breastfeeding for twenty four hours o If woman a regular user, breastfeeding is not recommended[29]
Childhood	• Lower nonverbal perceptual reasoning • Attention problems • Disruptive behaviours[14,15] • Lower weight for height and weight curve trajectories[14] • Language deficits • Executive functioning abnormalities[15]

1.4.5 Ecstasy

Table 9. Ecstasy

Aspect	Potential outcomes
Ecstasy	• Crosses placenta • Miscarriage[5] • Preterm birth[15] • Poor infant mental and motor development (dose dependent)[5,15]

1.5 Depressant exposure

These drugs cause the body to slow down and relax and can cause drowsiness and slowed breathing and heart rate.[12]

1.5.1 Alcohol–maternal

Table 10. Alcohol–maternal

Aspect	Considerations and potential effects
Context	• 56% of women consumed alcohol while pregnant in 2013 • Proportion of women who knew they were pregnant and did not consume alcohol increased slightly between 2010 and 2013[1] from 49% to 53% (not statistically significant) • 26% of women continued to consume alcohol once they knew they were pregnant[51] • Physical and behavioural teratogen[52,53] and folate antagonist[54] • Adverse effects on brain and nervous system development in the fetus can occur from earliest stage and throughout[55] due to decreased folate, choline and Vitamin B12 levels[54] • Alcohol consumption reduces maternal folate transfer to fetus o Folate has protective and beneficial effects on CNS and behavioural development)[54] o Alcohol interferes with one carbon metabolism pathway including folate, choline (a derivative of homocysteine)[54]
Maternal	• Use common in pregnancy and lactation although may not be disclosed to health care providers • Provide information and education about no alcohol in pregnancy as the safest option[5 48]and the importance of Folate supplementation • Heavy alcohol use requires (with woman's agreement): o Thiamine injections o Inpatient treatment with Diazepam substitution and withdrawal • Outpatient support including follow up and ongoing support[2] • High levels may result in: o Miscarriage o Stillbirth o Preterm birth[5,53]
Lactation	• Alcohol enters breast milk and persists for several hours • Adversely affects lactation, infant behaviour (feeding and arousal) and psychomotor development of the breastfed baby[48,56] • More than two standard drinks per day linked to: o Decreased lactation-reduced milk ejection reflex, milk production and milk consumption by baby o Earlier cessation of breastfeeding o Altered sleep-wake behavioural patterns in the baby o Psychomotor deficits[48]

1.5.2 Alcohol–fetal/neonatal

Table 11. Alcohol–fetal/neonatal and childhood

Aspect	Considerations and potential effects
Fetal/neonatal	• Fetus at greatest risk in first three to six weeks of gestation especially if frequent high levels of alcohol consumed[48,53] • Risk to fetus is likely to be low if alcohol consumption was small[48] • Level of risk is difficult to predict and is influenced by maternal and fetal characteristics[48] • Outcomes thought to result from differences in: o Pattern and quantity of alcohol consumption (dose and frequency) o Timing of alcohol consumption in relation to fetal development o Maternal genetic ability to metabolise alcohol o Socio-behavioural risk factors (e.g. maternal age, duration of drinking, low socio-economic status, race, genetic differences, polydrug use[48,52,57]) • Teratogen[48] that may result in fetal alcohol spectrum disorders (FASD) and fetal alcohol syndrome[15] may result o Microcephaly, holoprosencephaly and associated abnormalities of corpus callosum, brainstem and cerebellum[52] o Features include neurodevelopmental and intellectual impairment and facial dysmorphic features[2], behavioural, cognitive and neural alterations[15]
Childhood	• Physical, mental, behavioural and/or learning disabilities[5] including: o Global deficits or delays o Attention problems o Deficits in executive functioning o Motor and visual spatial functioning delays o Problems associated with poor social skills o Sensory problems, pragmatic language problems, memory deficits and impaired response to common parenting problems[48,58]

1.5.3 Benzodiazepines

Table 12. Benzodiazepines

Aspect	• Potential outcomes
Maternal	• Health risks in pregnancy not well established • Progressive supervised withdrawal suggested[33,34]
Fetal	• Crosses placenta • Inconsistent reports of morphological problems[33]
Neonatal	• Possible risk of preterm birth, low birth weight and low Apgar score[34] • May be associated with NAS which may have delayed onset: o May be floppy and lethargic for one or two days (dose related) and be extremely sleepy[5] o Signs of withdrawal including excessive irritability and poor feeding may be present for several days ▪ More likely if woman is a polydrug user • Requires: o Observation in hospital for 5–7 days using Finnegan score[34] to assist with identifying signs of NAS o Education to parents about signs of withdrawal and need to present for care if discharged from hospital o Outpatient review within four weeks of age • Treatment includes: o Supportive care o Phenobarbitone may be required if treatment threshold is reached (Finnegan score of eight or more) ▪ Loading dose likely to be more beneficial[20] • Research on the longer-term effects on the child exposed to benzodiazepines is largely lacking[33]
Lactation	• Transferred into breast milk[29] • Assess breastfeeding decisions on an individual basis

1.5.4 Cannabis

Table 13. Cannabis

Aspect	Potential outcomes
Maternal	• More likely to use other substances in pregnancy and lactation • Moderate to heavy users: o May show deficits in self-care, ability to drive a motor vehicle, quality of parenting, family relationships, ability to study or maintain employment[2] • May cause financial hardship, increase rate of mental health disorders such as psychosis, depression and suicide[2]
Neonatal	• Mild withdrawal signs • Delayed state regulation[14] • Sleep disturbances • Shorter high pitched cry • Altered responses to visual stimuli • Increased startles and tremors[15]
Lactation	• Not recommended when breastfeeding o Tetrahydrocannabinol (THC)—primary ingredient in marijuana—accumulates in breast milk • Smoke exposure detrimental to baby's health and increases risk of Sudden unexplained death in infancy (SUDI) and SIDS[59]
Childhood	• Reading, spelling difficulty • Early tobacco and marijuana use[14] • Evidence of neurodevelopmental delay or deficit • Executive function impairment • Attention deficits[15] and memory problems, difficulty concentrating o Cognitive deficit o Visual dysfunction o Impulsivity, increased hyperactivity o Depression • Sleeping problems at age around three years • Reduced height at 6 years of age[5,29,34]

1.6 Hallucinogens exposure

Hallucinogens change perception. They affect all senses and may cause hallucinations—making a person see, hear or feel something that is not there[12].

Table 14. Hallucinogens

Aspect	Potential outcomes
Hallucinogens	• Varies depending on drug • Miscarriage • Increased risk of birth defects[5]

2 Antenatal screening

Psychosocial, drug and alcohol and blood borne virus screening are undertaken at first contact with the woman in the antenatal period and throughout pregnancy as indicated.

2.1 Psychosocial

Table 15. Psychosocial screening and management

Aspect	Good practice point
Screening	• Screen women for risk of postnatal depression, psychological distress, other possible mental health issues and exposure to domestic violence • Use validated tools in the Pregnancy Health Record[60]
Management	• Respond to: o Parental mental health o Preparedness for baby o Home environment support o Child safety concerns including other children • Refer to appropriate health and community services following multidisciplinary assessment including social worker and primary care provider (e.g. GP) • Ensure mental health issues are managed appropriately due to strong association with substance use[34] • Respect the pregnant and breastfeeding woman's autonomy: o Fully inform them of risks and benefits for themselves and fetus • Be responsive to multiple needs including: o Child care needs o Co-morbid mental and concurrent medical conditions o Blood borne and other infectious diseases o Poor diet • Provide support for psychosocial issues including: o Relationships with partner/other people living in same household o Homelessness o Poverty o Violence[33] • Provide care and treatment without discrimination or stigmatization o Use non-judgemental, respectful, non-stigmatising and empathetic manner o Be sensitive to age, culture and language differences o Provide verbal and literacy level appropriate information • Respond sensitively to disclosure of information[33]

2.2 Blood borne viruses

Table 16. Blood borne virus screening and management

Aspect	Good practice point
Assessment	• Ask woman about intravenous drug use and discuss risk of transmission of viruses including hepatitis B virus (HBV), hepatitis C virus (HCV) and human Immunodeficiency virus (HIV)[2] o Past or present intravenous drug use increases risk of HCV[61] • Screen all women for HBV, HCV and HIV o HBV surface antigen positive women provide passive immunity to baby reducing risk of vertical transmission o HCV may be transmitted during birth with increased risk in presence of HIV co-infection[34] • Re-screen women with continued high risk drug behaviour • If exposed to HBV during pregnancy undertake urgent serology to test for immunity o If uninfected woman is anti-HBs negative and then has high risk exposure: ▪ Administer HBV vaccine and hepatitis B Immunoglobulin (HBIG) within 72 hours ▪ Complete HBV vaccination course ▪ Test for HBV surface antigen (HBsAg) at three months post exposure[62] • Provide support for women seropositive for HBV, HCV and HIV
HBV positive	• Refer woman to infectious diseases specialist or hepatologist for ongoing management including advice, interpretation of additional investigations (e.g. eAg, liver function tests and HBV viral load) • Ensure sexual and or household contacts receive counselling, testing, follow-up and vaccination where required • Vaginal birth does not increase the risk of vertical transmission • Obtain consent from woman antenatally for administration of HBIG and HBV vaccine to baby within twelve hours of birth[62]
HCV positive	• No increased risk of obstetric or perinatal complications • Risk of mother to child transmission is low • Refer woman for management and monitoring in postnatal period by infectious diseases specialist or hepatologist • Further research required before recommendation on mode of birth can be made[62]
HIV positive	• Refer to infectious diseases specialist for treatment during pregnancy[62] • May be transmitted to baby during pregnancy, birth or via breastfeeding • Elective caesarean section (CS) reduces risk of transmission • Antiviral therapy to woman and baby reduces risk of transmission[62]

2.3 Substance use

Table 17. Substance use screening and management

Aspect	Good practice point
Screening	• Screen/question all pregnant women about their substance and alcohol use (past and present) at the initial history taking visit and throughout antenatal period[2,33,63] • Use validated screening tools • Include in drug screening/questioning the use of prescription medications including opioid replacement therapies and over the counter medications (e.g. paracetamol, herbal and other complimentary therapies and other substances including illicit drugs, inhalants and non-prescribed benzodiazepines[34]) • Efficacy of urine drug screening in pregnant women unclear o Self-disclosure may be more reliable in trusting professional relationship[34]
Management	• Ensure access to treatment and prevention programs including: o Enrolment in an opioid treatment program (Methadone or Buprenorphine) o Education regarding safety of opioid replacements in pregnancy and lactation • Implement appropriate secondary prevention initiatives including education and treatment programs to improve maternal and fetal health[64]: o Relapse prevention and supportive counselling o Smoking cessation program[33] • Provide brief interventions to substance using women: o Pregnant substance using adolescent women have been shown to reduce use after single session standardised brief intervention[65] • Provide support and education including written information • Refer to other services as appropriate[33,34] including drug and alcohol services and adult mental health services • Identify risk factors: o Maternal report of drug use o Late presentation for antenatal care or no care o Previous unexplained fetal demise o Precipitous labour o Placental abruption[26]
Amphetamines	• Advise woman of potential health risks to herself and her baby o Encourage reduction or cessation of amphetamine use o Provide harm reduction advice[51] o Pharmacotherapy is not recommended for treatment of dependence[33] o Focus treatment on psychosocial interventions[33] • Monitor mental health • Advise woman regarding breastfeeding o Refer to Table 23.
SSRIs	• Individual risk-benefit analysis: o Balance treatment for depression versus mild transient withdrawal by the baby[4] o Discuss risks and benefits to woman and baby, including risk of neonatal behavioural syndrome with pregnant women[4,11] • Maintaining treatment reduces risk of relapse • Consider maternal dose reduction in late third trimester to reduce the risk of neonatal effects • Advise woman regarding breastfeeding o Refer to Table 23.
Benzodiazepine	• Advise woman regarding breastfeeding o Refer to Table 23.

2.4 Alcohol and tobacco

Table 18. Alcohol and tobacco screening and management

Aspect	Good practice point
Alcohol	• Complete alcohol screening and brief intervention as per Pregnancy Health Record[60] o Ask about alcohol consumption o Assess readiness to stop alcohol o Advise about the risks of alcohol in pregnancy and that no alcohol in pregnancy is safest option o Assist and arrange for education and further support including: ▪ Written resources for woman and partner ▪ Referral to local support service ▪ Referral to Indigenous Health Clinic (if applicable) o Ask again at every opportune visit • For women who report alcohol use o Test for impaired folate mediated one metabolism[54] ▪ Measure red cell and plasma folate, vitamin B12 and homocysteine o Advise: ▪ Increase choline intake by increasing milk consumption and eating at least two cooked eggs daily ▪ Pregnancy multivitamin containing at least 0.5 mg Folic Acid[48] ▪ Consider nutritional supplementation[66] including additional Folic Acid[67], Choline or Vitamin B12[54]
Tobacco	• Complete tobacco screening and brief intervention as per Pregnancy Health Record[60] o Ask about smoking status o Assess quitting stage o Advise about the benefits of quitting for the woman and her partner, her pregnancy, baby, breastfeeding and family o Assist and arrange for education and further support including: ▪ Written resources for woman and partner ▪ *Quitline* number ▪ Referral to Indigenous Health Clinic (if applicable) o Ask again at every opportune visit for smokers and recent quitters o Discuss resources to support quitting including general practitioner o Cessation is recommended rather than 'cutting down' (harm reduction) as this is not supported by evidence that it provides protection to fetus[34]
Nicotine replacement therapy (NRT)	• Limited evidence regarding safety in pregnancy[34] • Positive and negative impacts on pregnancy, baby and smoking cessation[42] • Considered less harmful than cigarette smoke because of removal of other toxins and lower dose of nicotine[2] • Consider when woman is otherwise unable to quit after two or more weeks of psychosocial interventions (e.g. cognitive behavioural therapy, counselling and group support) • Unlikely to cause hazard to fetus in first trimester • Discuss risks and benefits with woman • Pulsatile NRT—gum, lozenge, inhaler or sublingual tablet preferred because of smaller daily nicotine dose delivered[2,34] • Larger or combination therapy may be required • If NRT patches used, advise woman to remove patch before going to bed to protect fetus from ongoing nicotine exposure[2] • Monitor blood nicotine levels to assess level of drug delivery • Discontinue use early in pregnancy once cessation achieved[34]

3 Management and care

The outcome for the baby is dependent on the quality of antenatal care.[34]

3.1 Model of care

Table 19. Model of care

Aspect	Good practice point
Context	• Providing coordinated assessment and management including development of care plan has a positive impact and informs the development of a coordinated discharge plan[34] • Coexisting mental health disorders may contribute to substance use or the effect of substance use in pregnancy[2] • Psychosocial interventions are a useful adjunct to pharmacological treatment by reducing physiological withdrawal symptoms[68] • Avoiding judgemental language facilitates openness and trust[34]
Model of care	• Offer multidisciplinary and where appropriate, multi-agency approach to care • Include and make referrals to services that provide management of medical, adult mental health, psychosocial, pregnancy and drug and alcohol issues[2] • Referral to available infant mental health or child and youth mental health services if: o Significant psychosocial complexity and intensive parent-infant relationship support required o Baby is at risk of non-organic failure to thrive and emotional neglect • Involve paediatricians in antenatal counselling of parents regarding neonatal outcomes and plan of care[2] • Provide usual antenatal care • Provide comprehensive care preferably through continuity of care and carers[33,69] that includes as appropriate: o Alcohol and drug use support and liaison with community alcohol and drug agencies o Enrolment in an opioid treatment program (Methadone or Buprenorphine) o Education regarding safety of opioid replacements in pregnancy and lactation o Relapse prevention and supportive counselling o Smoking cessation program[33] including referral to *Quitline*
Engagement	• Reassure woman she will be treated in non-judgemental, compassionate manner[34] • Establish systematic communication strategies between members of the pregnancy care team • Involve woman's partner, family and other support persons[2] • Access to antenatal care by woman may be intermittent • Allocate case manager to oversee care and liaise with other health care team members: o Provide contact details to woman and other team members o Ensure all members are aware of case manager's role o Participate and facilitate regular case conferences o Ensure formal handover of care in the intrapartum and postpartum period • Ensure close liaison with pharmacotherapy prescriber and/or dosing point[34] • Consider child protection issues and refer appropriately[70] o Complete and submit *Suspected child in need of protection* form to Department of Communities, Child Safety and Disability Services (DoCs)[71,72]

3.2 Pregnancy

Table 20. Pregnancy management

Aspect	Good practice point
Education	• Provide education and support regarding dental health including dental check up[2] • Provide information regarding importance of a healthy diet and healthy eating suggestions[73] o Discuss the importance of folate supplementation: ▪ At least 0.4 mg Folic acid daily to prevent neural tube defects ▪ Folic acid 5 mg daily if increased risk of neural tube defect or malabsorption [2,48] • Counsel woman (and partner where appropriate) regarding: o Expected length of stay depending on substance use o Finnegan scoring and parental involvement o Expectations regarding care of baby, signs of NAS, assisting with Finnegan scoring, techniques of pacification, and circumstances requiring baby to be admitted to special care nursery (SCN)
Fetal growth	• Increased risk of fetal growth restriction • Assess fetal growth by routine measurement of symphysis-fundal height • If inadequate growth, implement usual obstetric protocols for biophysical monitoring[34]
Anaesthetic assessment	• Consider anaesthetic review in third trimester to discuss: o Optimum modes of analgesia for labour, birth and postpartum o Venous access • Potential crisis situations[34]
Late presentations[34]	• Women presenting for the first time in third trimester or labour are at increased risk of pregnancy complications due to inadequate antenatal care • Preferred management: o Admit to hospital (regardless of drugs used) o Undertake comprehensive assessment including history of drug and alcohol use o Undertake psychosocial and blood borne virus screening ▪ Refer to Table 15. Psychosocial screening and management and Table 17. Substance use screening and management o Liaise with GP and other community health providers o Develop detailed management plan including for discharge o Initiate or refer for drug and alcohol treatment or counselling if indicated and woman agrees • If presenting in labour: o Urgently assess level of opioid tolerance and dependence as this: ▪ Impacts on analgesia in labour ▪ Influences management of baby at risk of NAS

3.3 Labour

Refer to Queensland Clinical Guidelines *Normal birth* [74] and *Intrapartum fetal surveillance*[75]

Table 21. Labour

Aspect	Good practice point
Preparation	• Usual antenatal preparations and child birth education
Analgesia	• Options for opioid dependent women [refer to Table 22. Pain]
Timing and mode of birth	• Consider risk factors including HIV and vertical transmission of blood borne viruses • Advise woman to present early in labour to minimise need for self-medication and monitor drug use • Women with complex or unstable drug or alcohol use: o Allow time prior to elective (CS) or induction of labour (IOL) to assess and stabilise o Consider IOL or elective CS early in week to allow close observation of baby for signs of NAS when staff more readily available[34]
Women on opioid treatment program	• Follow local protocols with regard to: o Notifying usual dosing clinic/community pharmacy and hospital pharmacy of woman's admission o Arrangements for take-away doses o Relevant information confirmation of identification, last dose and current prescription • Take drug history and ascertain recent opioid use • Observe for signs of withdrawal[34]

3.4 Pain management

Table 22. Pain management

Aspect	Consideration
General principles	• Discuss, plan and document analgesic requirements may be increased in drug dependent women due to opioid tolerance • Offer both pharmacological and non–pharmacological options • Continuity of care by known carer reduces interventions and improves women's birthing outcomes • Discuss options antenatally including: o Transcutaneous nerve stimulation (TENS) machine o Water o Paracetamol o Opioids o Entonox • Use simple analgesia for low severity of pain (e.g. Paracetamol[34,76] one gram six hourly with not greater than four grams being taken in total combination over a 24 hour period[77]) o Other non-steroidal anti-inflammatory drugs (NSAIDs) are **contraindicated** in the third trimester[78] • Offer regional anaesthesia and epidural if required
Women on Methadone or Buprenorphine	• Refer women antenatally for anaesthetic review[79-81] • Pain management challenges[34,79,81] include: o Increased pain sensitivity o Inadequate analgesia o Difficult intravenous access ▪ May be an indication for a central venous line[34] o Anxiety about experiencing pain because of history of substance use[81] • Administer usual Methadone dose in liquid form[34] • Opioids : o Safe and effective o May require higher doses and more frequent administration for analgesia[81] ▪ Withdrawal symptoms may be precipitated and analgesic effect reduced by Buprenorphine[77] o Titrate to response[34] • Consider regional anaesthesia if non–pharmacological means are ineffective • Seek specialist advice, planning and documentation for pain management: o Prior to labour commencing or operative birth o Post operatively where required[34,79,81] • Consult with drug and alcohol team for difficult to manage pain after surgical intervention[34]
Intractable pain	• Exclude pathological causes of pain (e.g. pyelonephritis and sacroiliac joint abscess[34])
Anaesthetic agents to avoid	• Ketamine is contraindicated for women using or suspected of using psychostimulants o Catecholamine effects may result (e.g. hypertension and tachycardia[34])

3.5 Breastfeeding

Table 23. Breastfeeding and substance use

Aspect	Consideration
Context	• Undertake individual risk-benefit analysis[81] • Generally breastfeeding is not contraindicated unless woman is a polysubstance user[34] but may require advice regarding time from substance use to breastfeeding or expressing breast milk for baby[48] • Advise woman that not using alcohol, tobacco and or other substances is preferable to not breastfeeding • Refer to Queensland Clinical Guidelines *Perinatal substance use: neonatal*[28] and Establishing b*reastfeeding*[30]
Cautions/ contraindications	• Breastfeeding is contraindicated in HIV positive woman even if being treated and has a low viral load[29,61] • Breastfeeding not recommended if persistent maternal use of heroin or stimulants (e.g. amphetamines, cocaine and alcohol[29])
Hepatitis C	• Hepatitis C positive is **not** a contraindication to breastfeeding[34] o Transmission risk not increased o Consider expressing and discarding milk if nipples cracked and bleeding[61]
Benzodiazepines	• Short acting benzodiazepines may be used for a limited time but long acting should be avoided[2,45] • Advise not to breastfeed immediately after taking short acting benzodiazepines[2,34,45]
Amphetamines	• Advise: o Not to breastfeed for 24 hours after using amphetamines o To express and discard milk after drug use o To have supplementary feeding plan[34]
Alcohol	• Advise: o To limit alcohol to two standard drinks in a day o Not to consume immediately before feeding o Consider expressing breast milk in advance[48]
Codeine	• Codeine use is contraindicated in breastfeeding women[81] o May be dose-response relationship between maternal Codeine use and neonatal toxicity[82]

3.6 Formula feeding

Table 24. Formula feeding

Aspect	Consideration
Formula feeding	• May be primary source of nutrition where woman chooses or is not available to breastfeed • Provide education : o Regarding suitable formula and formula preparation, transport and storage of formula; appropriate warming of feeds o Cleaning of bottles and other equipment[83]

3.7 Postnatal care

Table 25. Postnatal care

Aspect	Consideration
Follow up other medical problems	• Refer for ongoing surveillance and management of medical conditions, (e.g. liver disease and sexually transmitted diseases[81])
Contraception	• Discuss reliable and easy to use methods • Provide relevant information and referrals[34] • Discuss future pregnancy planning if substance use is continuing to facilitate planned rather than unplanned pregnancies and minimise harm to unborn baby
Management of mood disorders	• Continue postnatal surveillance and referral for treatment of postpartum mood and anxiety disorders[81]
Drug treatment programs	• Assess continued substance use and support and encourage attendance at drug treatment programs[34] • Tobacco use: continue support in postpartum period as tobacco use rates rebound substantially compared to use in pregnancy[33]
Primary care	• Link with GP for ongoing primary care for woman and baby[81]
Timing of discharge	• Support woman to remain in hospital with baby experiencing NAS as patient or border depending on facility capacity o Facility accommodation for relatives may be option once woman fit for discharge • Ensure formal handover of responsibilities from hospital to community services • Provide postnatal home visiting by midwife/child health nurse and drug and alcohol services if available, to provide ongoing support particularly to women who may not engage well with community services[34] • Active engagement of woman by community services to ensure wellbeing of woman and baby and identify any ongoing care and developmental issues[34]
Parent education	• Safe sleeping including smoke free environment and risk minimisation if continuing substance use • Assessment and management of baby • Substance use and care of baby including safety plan • Refer to Queensland Clinical Guideline *Perinatal substance use: neonatal*[28] • Advice about planning for next pregnancy including substance use, folate supplementation and nutrition

References

1. Australian Institute of Health and Welfare. Specific population groups. 2013 [cited 08/07/2015]. Available from: http://www.aihw.gov.au/alcohol-and-other-drugs/ndshs-2013/.

2. Royal Australian and New Zealand College of Obstetricians and Gynaecologists. Substance use in pregnancy. College Statement- C-Obs 55. 2013.

3. Australian Institute of Health and Welfare National Perinatal Epidemiology and Statistics Unit and AIHW. National core maternity indicators. Cat. No.PER 58. 2013; Canberra:AIHW.

4. Royal Australian and New Zealand College of Psychiatrists. Guidance on the use of SSRIs and Venlafaxine (SNRI) in late pregnancy. 2005.

5. Australian Drug Foundation. Alcohol, other drugs and pregnancy. 2014.

6. McHugh R, Widgerson S, Greenfield S. Epidemiology of substance use in reproductive-age women. Obstet Gynecol Clin N Am 2014; 41:177-189.

7. Crome I, Kumar M. Epidemiology of drug and alcohol use in young women. Seminars in Fetal & Neonatal Medicine. 2007; 12:98-105.

8. Department of Health (Queensland)-Health Statistics Branch. Perinatal statistics 2010-2014. 2015.

9. Burgos A, Burke B. Neonatal abstinence syndrome. Neo Reviews. 2009; 10(5):e222-9.

10. Kuschel C. Managing drug withdrawal in the newborn infant. Semin Fetal Neontal Med. 2007; 12(2):127-33.

11. Levinson-Castiel R, Merlob P, Linder N, Sirota L, Klinger G. Neonatal abstinence syndrome after inutero exposure to selective serotonin reuptake inhibitors in term infants. Arch Pediatr Adolesc Med. 2006; 160(2):173-6.

12. Australian Drug Information Network. Alcohol and drug search strategy. [cited 30/09/2015]. Available from: www.adin.com.au/glossary.

13. Jones H, Dengler E, Garrison A, O'Grady K, Saeshore C, Horton E, et al. Neonatal outcomes and their relationship to maternal buprenorphine dose during pregnancy. Drug and Alcohol Dependence. 2014; 134:414-17.

14. Minnes S, Lang A, Singer L. Prenatal tobacco, marijuana, stimulant, and opiate exposure: outcomes and practice implications. Addiction Science and Clinical Practice. 2011; July.

15. Ross E, Graham D, Money K, Stanwood G. Developmental consequences of fetal exposure to drugs: what we know and what we still must learn. Neuropsychopharmacology. 2015; 40:61-87.

16. Gaalema D, Scott T, Heil S, Coyle M, Kaltenbach K, Badger G, et al. Differences in the profile of neonatal abstinence syndrome signs in Methadone-versus Buprenorphine-exposed neonates. Addiction. 2012; 107(Supplement1):53-62.

17. Delsing C, van den Wittenboer E, Liu A, Peek MJ, Quinton A, Mongelli M, et al. The relationship between maternal opiate use, amphetamine use and smoking on fetal growth. Australian and New Zealand Journal of Obstetrics and Gynaecology. 2011; 51:446-451.

18. Berghella V, Lim P, Hill M, Cherpes J, Chennat J, Kaltenbach K. Maternal methadone dose and neonatal withdrawal. Am J Obstet Gynecol. 2013; 189(2):312-317.

19. Cleary B, Donnelly J, Strawbridge J, Gallagher P, Fahey T, Clarke M, et al. Methadone dose and neonatal abstinence syndrome—systematic review and meta-analysis. Addiction. 2010; 105:2071-84.

20. Osborn D, Jeffery H, Cole M. Opiate treatment for opiate withdrawal in newborn infants. Cochrane Database of Systematic Reviews. 2010; CD002059. DOI: 10.1002/14651858.CD002059.pub3.(10).

21. Association of State and Territorial Health Officials. Neonatal abstinence syndrome: How States can help advance the knowledge base for primary prevention and best practices of care. Arlington. 2014.

22. Jensen C. Improving Outcomes for infants with NAS. Clinical Advisor. 2014; June.

23. McGlone L, Hamilton R, McCulloch D, MacKinnon J, Bradnam M, Mactier H. Visual outcome in infants born to drug-misusing mothers prescribed Methadone in pregnancy. Br J Ophthalmol. 2014; 98:238-45.

24. Minozzi S, Amato L, Bellisario C, Ferri M, Davoli M. Maintenance agonist treatments for Opiate-dependent pregnant women. Cochrane Database of Systematic Reviews. 2013; Issue 12(Art. No.: CD006318. DOI:10.1002/14651858.CD006318.pub3.).

25. Patel P, Abdel-Latif M, Hazelton B, Wodak A, Chen J, Emsley F, et al. Perinatal outcomes of Australian Buprenorphine-exposed mothers and their newborn infants. Journal of Paediatrics and Child Health. 2013; 46:746-53.

26. Hudak M, Tan R Neonatal drug withdrawal. Pediatrics. 2012; 129(2):e540-60.

27. Simmat-Durand L, Genest L, Lejeune C. Early childhood consequences of polydrug use during pregnancy. Journal of Neonatal Nursing. 2014; 20:189-196.

28. Queensland Clinical Guidelines. Perinatal substance use: neonatal . Guideline No. MN16.38-V1-R21. Queensland Health. 2016.

29. Anderson M, Opperman M. Recreational drugs. In: Schaefer C, Peters P, Miller R, editors. Drugs during pregnancy and lactation 3rd edition. USA: Elsevier; 2015.

30. Queensland Clinical Guidelines. Breastfeeding initiation. Guideline No. MN 10.19-V2-R15. Queensland Health 2010.

31. Benke M, Smith V C, American Academy of Pediatrics. Prenatal Substance Abuse: Short- and long-term effects on the exposed fetus. Pediatrics. 2013; 131(3):e1009-e1024.

32. SOGC. Substance Use in Pregnancy Clinical Practice Guideline JOGC. 2011; 33(4):367-384.

33. World Health Organisation. Guidelines for the identification and management of substance use and substance use disorders in pregnancy. 2014.

34. Commonwealth of Australia. National clinical guidelines for the management of drug use during pregnancy, birth and the early development years of the newborn. 2006.

35. Oei J, Abdel-Latif M, Clark R, Craig F, Lui K. Short-term outcomes of mothers and infants exposed to antenatal Amphetamines. Arch Dis Child Fetal Neonatal Ed. 2009; 95:F36-F41.

36. Good M, Solt I, Acuna J, Rotmensch S, Kim M. Methamphetamine use during pregnancy Obstetrics and Gynecology. 2010; 116(2):330-334.

37. La Grasse L, Wouldes T, Newman E, Smith L, Shah R, Derauf C, et al. Prenatal methamphetamine exposure and neonatal neurobehavioral outcome in the USA and New Zealand. Neurotoxicology and Teratology. 2011; 33:166-175.

38. Smith M, LeGasse L, Derauf C GP, Rizwan S, Arria A, Huestis M, et al. Prenatal Methamphetamine use and neonatal neurobehavioral outcome. Neurotoxicol Teratol. 2008; 301(20-28).

39. Shah R, Diaz S, Arria A, La Grasse L, Derauf C, Newman E, et al. Prenatal Methamphetamine Exposure and Short-Term Maternal and Infant Medical Outcomes. Am J Perinatol. 2012; 29(5):391-400.

40. Chang L, Smith L, LoPresti C, Yonekura M, Kuo J, Walot I, et al. Smaller subcortical volumes and cognitive deficits in children with prenatal Methamphetamine exposure. Psychiatry Research: Neuroimaging. 2004; 132:95-106.

41. Australian Institute of Health and Welfare. A Picture of Children's Health 2012. 2012.

42. Coleman T, Chamberlain C, Davey M, Cooper S, Leonardi-Bee J. Pharmacological interventions for promoting smoking cessation during pregnancy. Cochrance Database of Systematic Reviews 2012; Art. No.: CD010078. DOI: 10.1002/14651858.CD010078.(9).

43. Moses- Kolko E, Bogen D, Perel J, Bregar A, Uhl K, B L, et al. Neonatal signs after late inutero exposure to serotonin reuptake inhibitors: literature review and implications for clinical applications. JAMA. 2005; 293(19).

44. Sanz E, De-las-Cuevas C, Kiuru A, Bate A, Edwards R. Selective serotinon reuptake inhibitors in pregnant women and neonatal withdrawal syndrome: a database analysis. Lancet. 2005; 365(9458):482-72.

45. Austin M-P, Highet N, Guidelines Expert Advisory Committee. Clinical practice guidelines for depression and related disorders – anxiety, bipolar disorder and puerperal psychosis – in the perinatal period. A guideline for primary care health professionals. Melbourne. 2011:beyondblue: the national depression initiative.

46. Jefferies A, Canadian Paediatric Society Fetus and Newborn Committee. Selective Serotonin Reuptake Inhibitors in pregnancy and infant outcomes. Position Statement. 2014.

47. Tuccori M, Testi A, Antonioli L, Fornai M, Montagani S, Ghisu N. Safety concerns associated with the use of serotonin reuptake inhibitors and other serotonergic/noradrenergic antidepressants during pregnancy: a review. Clin Ther. 2009; 31(Pt1):1426-53.

48. National Health and Medical Research Council. Australian guidelines to reduce health risks from drinking alcohol. 2009; Canberra:Commonwealth of Australia.

49. Australian Society for HIV Medicine. National Hepatitis B Testing Policy. Commonwealth of Australia. 2012:ACT.

50. Australian Society for HIV Medicine. National HIV Testing Policy. Commonwealth of Australia. 2014:ACT.

51. Australian Institute of Health and Welfare. National Drug Strategy Household Survey detailed report 2013. Drug statistics series no. 28. Cat. no. PHE 183. Canberra. 2014:AIHW.

52. Canadian Paediatric Society. Fetal alcohol syndrome: Position statement. Paediatr Child Health. 2002; 7(3).

53. O'Leary C. Fetal alcohol syndrome: Diagnosis, epidemiology, and developmental outcomes. J. Paediatr. Child Health. 2004; 40:2-7.

54. Muralidharan P, Sarmah S, Zhou F, J M. Fetal Alcohol Spectrum Disorder (FASD) Associated Neural Defects: Complex Mechanisms and Potential Therapeutic Targets. Brain Sciences. 2013; 3(2):964-991.

55. American Academy of Pediatrics. Fetal Alcohol Syndrome and Alcohol-Related Neurodevelopmental Disorders. Pediatrics. 2000; 106(2):358-362.

56. Giglia R, Binns C. Alcohol and lactation: A systematic review. Nutrition & Dietetics. 2006; 63:103-116.

57. Henderson J, Gray R, Brocklehurst P. Systematic review of effects of low–moderate prenatal alcohol exposure on pregnancy outcome. BJOG. 2007; 114:243-252.

58. American Academy Pediatrics. Committee on drugs. neonatal drug withdrawal. Pediatrics. 1998; 101(6):1079-88.

59. Department of Health (Queensland). Guideline: Safe infant sleeping, co-sleeping and bed-sharing QH-GDL-362:2013. 2013.

60. State of Queensland (Queensland Health). Pregnancy Health Record. 2012.

61. Palasanthiran P, Starr M, Jones C, M G. Management of perinatal infections. Australian Society for Infectious Diseases; 2014.

62. Australian Society for HIV Medicine. Antenatal testing and blood-borne viruses 2012 [cited 2016, January 01]. Available from: (www.ashm.org.au).

63. Yonkers K, Gotman N, Kershaw T, Forray A, Howell H, B R. Screening for prenatal substance use. Obstet Gynecol. 2011; 116(4):827-833.

64. De Bortoli L, Coles J, Dolan M. Linking illicit substance misuse during pregnancy and child abuse: what is the quality of the evidence? Child and Family Social work. 2014; 19:136-148.

65. Whicher E, Utkau F, Schirmer G, Exam S, Davis P, Abou-Saleh M. Pilot project to evaluate the effectiveness and acceptability of single-session brief counseling for the prevention of substance misuse in pregnant adolescents. Addictive Disorders & Their Treatment. 2012; 11(1):43-49.

66. Murawski N, Moore E, Thomas J, Riley E. Advances in Diagnosis and Treatment of Fetal Alcohol Spectrum Disorders. Alcohol Research. 37(1):97-108.

67. Wang L-L, Zhang Z, Yang R, Xinrong P, Xu Y, Wang J, et al. Ethanol exposure induces differential microRNA and target gene expression and teratogenic effects which can be suppressed by folic acid supplementation. Human Reproduction. 2009; 24(3):562-579.

68. Minozzi S, Amato L, Vecchi S, Davoli M. Psychosocial treatments for drugs and alcohol abusing adolescents. Cochrane Database of Systematic Reviews. 2011; Issue 3(Art. No.: CD008283. DOI: 10.1002/14651858.CD008283.pub2.).

69. O'Connor A, Lewis L, Mclaurin R, Barnett L. Maternal and neonatal outcomes of Hepatitis C positive women attending a midwifery led drug and alcohol service: A West Australian perspective. Midwifery. 2015; 31:793-797.

70. National Council on Crime and Delinquency. The structured decision making system for child protective services. Queensland child protection guide. 2015; National council on crime and deliquency:Queensland.

71. Department of Health (Queensland). Guideline: Responding to an unborn child high risk alert. QH-GDL-949:2015.

72. Department of Health (Queensland). Guideline: Reporting a reasonable/ reportable suspicion of child abuse and neglect. QH-GDL-948:2015.

73. Royal Australian College of Obstetricians and Gynaecologists. Vitamin and mineral supplementation and pregnancy College Statement. 2015.

74. Queensland Clinical Guidelines. Normal birth. Guideline No. MN12.25-V1-R17. Queensland Health. 2012.

75. Queensland Clinical Guidelines. Intrapartum fetal surveillance Guideline No. MN 15.15-V4-R20. Queensland Health. 2015.

76. Lintzeris N, Clark N, Winstock A, Dunlop A, Muhleisen P, Gowing L, et al. National clinical guidelines and procedures for the use of buprenorphine in the treatment of opioid dependence. National Drug Strategy. 2006.

77. Handbook AM. 2015 [cited 13/01/2016]; Adelaide(Australian Medicines Handbook Pty Ltd). Available from: https://amhonline.amh.net.au.

78. Kennedy D. Analgesics and pain relief in pregnancy and breastfeeding. Australian Prescriber. 2011; 34(1):8-10.

79. Cassidy B, Cyna A. Challenges that Opioid-dependent women present to the obstetric anaesthetist. Anaesth Intensive Care. 2004; 32(494-501).

80. Department of Health (Queensland). Guideline: Care and treatment order for child: information booklet. 2015.

81. Wong S, Ordean A, Kahan M. SOGC Clinical Practice Guideline No. 256 Substance Use in Pregnancy. J Obstet Gynaecol Can. 2011; 33(4):367-384.

82. Madadi P, Ross C, Hayden M, Carleton B, Gaedigk A, Leeder J, et al. Pharmacogenetics of neonatal Opioid toxicity following maternal use of Codeine during breastfeeding: a case–control study. Clinical Pharmacology and Therapeutics. 2009; 85(1):31-35.

83. State of Queensland Health (Children's Health Hospital and Health Service). Child and Youth Health Practice Manual. 2014.

Acknowledgements

Queensland Clinical Guidelines gratefully acknowledge the contribution of Queensland clinicians and other stakeholders who participated throughout the guideline development process particularly:

Working Party Clinical Leads

Dr Paul Woodgate, Neonatologist, Mater Health Service

Ms Sam Drew, Clinical Midwifery Consultant, Mater Health Service

Dr Karen Whitfield, Pharmacist, Royal Brisbane and Women's Hospital

QCG Program Officer

Ms Stephanie Sutherns, Clinical Nurse Consultant

Working Party Members

Tanya Capper, Clinical Midwifery Facilitator, School of Nursing and Midwifery, Central Queensland University

Lindsay Cochrane, Staff Specialist, Obstetrics & Gynaecology, Metro North

Debby Collins, Clinical Facilitator, Neonates, Special Care Nursery, Metro South

Vanessa Collins, Social Work, Maternity/Special Care Nursery and Paediatrics, Redcliffe

Jan Cullen, Director of Paediatrics, Meadowbrook

Jennifer Deacon, Consultant Paediatrician, Child Development Service, Southport

Hazel Dobinson, General Paediatrics, Nambour

Anndrea Flint, Neonatal Nurse Practitioner Candidate, Maternity/SCN, Redcliffe

Tina Gray, CN SCN, Special Care Nursery, Hervey Bay

Shivanand Hebbandi, Senior Staff Specialist, Paediatrics, Redland Hospital

Elisabeth Hoehn, Medical Director, Queensland Centre for Perinatal and Infant Mental Health, Brisbane

Timothy Hong, Neonatologist, Newborn Care Unit, Gold Coast

Anne Illingsworth, Clinical Nurse Consultant, Special Care Nursery, Townsville

Victoria Kain, Senior Lecturer, Griffiths University, Brisbane

Leith Lester, Biochemist, Perinatal Research Centre, Brisbane

Katri Malinen, Advanced Pharmacist, Women's and Children's, Townsville

Fiona McKinnon, O&G, Ipswich

Alecia Staines, Consumer Representative, Maternity Coalition, Toowoomba

Karen Stansfield, RM, Neonatal and Postnatal, Sunshine Coast Private Hospital, Buderim

Rhonda Taylor, Clinical Midwifery Consultant, Birth Suite, Townsville

Kirsty Tinsley, Senior Health Promotion Officer , Preventive Health Branch, Brisbane

David Tudehope, Professorial Researcher, Mater Research Institute-UQ, Brisbane

Queensland Clinical Guidelines Team

Associate Professor Rebecca Kimble, Director

Ms Jacinta Lee, Manager

Ms Lyndel Gray, Clinical Nurse Consultant

Ms Stephanie Sutherns, Clinical Nurse Consultant

Dr Brent Knack, Program Officer

Steering Committee

Funding

This clinical guideline was funded by Queensland Health, Health Innovation and Research Branch.