

2019

Breastfeeding and Substance Use: Evidence-based Practices Guidance Document



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Breastfeeding and Substance Use Evidence-Based Practices Health Care Provider Guidance Document

The number of infants born prenatally exposed to substances has increased significantly in Indiana and across the United States. Mothers of these infants, who want to breastfeed, are unsure whether they can breastfeed their infant safely. Hospital staff and medication providers need accurate information on when breastfeeding is safe, which depends on several factors related to the use of substances. Eligibility guidance for breastfeeding while using substances during the perinatal period needs to be examined to determine best practice in promoting breastfeeding when eligible and attachment when breastfeeding is and is not recommended. Continued education and follow-up throughout pregnancy and the infant's first twelve months will enhance outcomes.

Note: This is a companion piece to the *Breastfeeding and Safe Sleep Guidance Document* that can be found at <https://www.in.gov/laboroflove/files/breastfeeding-safe-sleep-guidance-document.pdf>.

Intended Audience: Physicians, Nurses, Breastfeeding consultants, home visitors and all who support the woman to successfully breastfeed her infant.

Recommendations:

1. A standard policy should be in place for prenatal, in-hospital and post-discharge health care providers related to best practices in breastfeeding when moms are using prescribed and/or illicit substances for the health and safety of Indiana's infants.
2. Guidelines should be established for providers regarding methods on how to counsel women on how to breastfeed successfully when it is safe, and for promoting attachment for all babies even when breastfeeding is determined unsafe because of the substances being used.
3. Social and emotional factors should be evaluated as they may impact the breastfeeding woman to determine appropriate patient-centered care plans

4. Families across Indiana should have accurate information and necessary resources to achieve success in both breastfeeding and medication assisted therapy (MAT) follow-up care during pregnancy and after hospital discharge.

5. Women who are on MAT and breastfeeding their baby should be counseled to avoid abruptly weaning. Abrupt weaning can lead to withdrawal symptoms in the infant which could be severe and may need additional monitoring. Consultation with the infant's primary care provider is recommended before weaning fully.

Rationale:

Research on the importance of breastfeeding is well established. Infants who have been prenatally exposed to a substance are at-risk for short-term and long-term effects from their exposure. Breastfeeding, when appropriate, can help to mitigate potential risks and improve outcomes for both infants and their mothers. Among other documented long-term benefits, we know that in the short term, breastfeeding can lessen the severity of Neonatal Abstinence Syndrome (NAS) in the infant, result in fewer pharmacological interventions, and breastfeeding can shorten the hospital stay of the infant¹. Determining eligibility for breastfeeding within this population will improve maternal and infant health outcomes across Indiana. Many factors with women using substances need to be considered when guiding women to breastfeed, and practitioners need to be aware of the benefits and the transfer of certain substance(s) into breastmilk, as well as how they relate to the absorption of the substance by the infant.

Prenatal Care

The Centers for Disease Control and Prevention (CDC) estimates that one-third of reproductive-age women enrolled in Medicaid and more than one-quarter of those with private insurance filled a prescription for an opioid pain medication each year between 2008 and 2012 (Ailes et al., 2015). The prevalence of Opioid Use Disorder (OUD) during

¹ Wu D, Carre C (July 28, 2018). The Impact of Breastfeeding on Health Outcomes for Infants Diagnosed with Neonatal Abstinence Syndrome: A Review. *Cureus* 10(7): e3061. DOI 10.7759/cureus.3061

pregnancy more than doubled between 1998 and 2011 to 4 per 1,000 deliveries (Maeda, Bateman, Clancy, Creanga, & Leffert, 2014).

Perinatal period evaluation

When a pregnant woman seeks prenatal care and help with her substance use disorder (SUD), conduct a careful, empathetic, and nonjudgmental interview with her that lets her know that all new patients are asked the same questions about substance use. Because polysubstance use is common, a validated screening instrument for other substance use may also be given to the patient for self-completion and reviewed by a healthcare professional.

The World Health Organization (WHO) Guidelines for the Identification and Management of Substance Use and Substance Use Disorders in Pregnancy recommends that healthcare professionals ask all pregnant women about their use of alcohol and other substances (i.e., past, present, prescribed, licit, and illicit use) as early as possible in the pregnancy and at every follow-up visit (WHO, 2014). Healthcare professionals need to determine whether any of their pregnant patients are currently taking (or have recently taken) methadone, buprenorphine or other long-acting opioids (Breen et al., 2003; Chasnoff, 2003; Kraus et al., 2011). As required by Indiana PL 292, each health care provider shall use a validated and evidence based verbal screening tool (see Appendix A) for screening tools) to assess a substance use disorder in pregnancy for all pregnant women who are seen by the health care provider:

- As early as possible at the onset of prenatal care; and
- Throughout the pregnancy, including during the first, second, and third trimester.

A complete substance use history is essential to establishing a safe and appropriate treatment plan that the woman and the healthcare professionals can agree on (Federation of State Medical Boards [FSMB], 2013). This history combines interviews and results from standardized assessment instruments. Ideally, the history would include (SAMHSA, 2015):

- The nature of the patient’s SUD;
- Underlying or co-occurring medical or psychiatric diseases or conditions;
- The effect of opioid use on the patient’s physical and psychological functioning;
- Outcomes of past treatment episodes;
- Drug use and substance use treatment histories, including Medically Assisted Treatment (MAT);
- Presence or absence and adequacy of maternal family and community support systems; and
- Plans for postpartum care and substance use treatment for the mother and pediatric care for the child

Breastfeeding is to be encouraged and supported for women on opioid agonist therapy as both breastfeeding and skin-to-skin contact can reduce the severity and duration of NAS (American Society of Addiction Medicine (ASAM); Public Policy Statement).² NAS can complicate or discourage breastfeeding (difficulty with latch/suck, sleepiness, tremors, etc.); these are expected breastfeeding behaviors with NAS and an International Board Certified Lactation Consultant (IBCLC) should be involved.³

Plasma concentrations of methadone in infants are low (less than 3% of maternal trough concentrations) during the neonatal period and up to 6 months postpartum., and all authors have concluded that women on stable doses of methadone maintenance therapy, regardless of maternal methadone dose, be encouraged to breastfeed if desired (ABM Protocol #21). The amount of buprenorphine found in human milk is small, up to 2.4% of maternal weight-adjusted dose, and it is unlikely to have short-term negative effects on the developing infant (ABM protocol). In most studies, breastfed infants had noticeably less

² <https://www.asam.org/advocacy/find-a-policy-statement/view-policy-statement/public-policy-statements/2017/01/19/substance-use-misuse-and-use-disorders-during-and-following-pregnancy-with-an-emphasis-on-opioids>

³ 410 IAC 39-4-1 (c) (7)

severe NAS and were less likely to require pharmacological intervention than the formula-fed infants. Reducing the pharmacotherapy dosage can be considered if the mother chooses when she is living in a safe and stable environment (Jones et al., 2014). The best time to begin initiating discontinuation of medication-assisted treatment is *after* the infant is consistently sleeping through the night, has completed breastfeeding, and the dyad has multiple indicators of life stability (Jones et al., 2014).

Breastfeeding should be encouraged in women who:

- Are engaged in substance use treatment; provision of maternal consent to discuss progress in treatment with substance use provider;
- Are compliant with medication assisted treatment;
- Plan to continue in substance use treatment in the postpartum period;
- Are abstinent from non-prescribed drug use for 30 days prior to delivery;
- Can maintain sobriety demonstrated in an outpatient setting.
- Have a negative urine toxicology test at delivery; and
- Engaged in prenatal care and compliant (Breastfeeding Medicine, Vol. 10, Number 3, 2015)

Mothers who are using Marijuana:

According to the American College of Obstetricians and Gynecologists, mothers who are using marijuana should be counseled to avoid further use while breastfeeding.⁴ Advise them about the possible long-term neurobehavioral effects on their infant (See Marijuana contract, Appendix B). The American Academy of Pediatrics has recommended that marijuana should not be used during pregnancy and that the woman should be encouraged to abstain from using any marijuana products while breastfeeding. The lack of long-term follow-up data on infants exposed to varying amounts of marijuana via human milk, coupled with concerns over negative neurodevelopmental outcomes in children with in-

⁴ <https://www.acog.org/-/media/Departments/Tobacco-Alcohol-and-Substance-Abuse/Marijuana-Info-ONLINE.pdf?dmc=1&ts=20190923T2057100870>

utero exposure, should prompt extremely careful consideration of the risks versus benefits of breastfeeding in the setting of moderate or chronic marijuana use. (ABM Protocol #21) Mothers who choose to continue with marijuana use while breastfeeding should be counseled additionally on safe sleep practices, supportive caregivers when mom is intoxicated, risks of smoking inhalation to the baby, and receive referrals for help quitting marijuana usage. Ultimately the decision regarding whether to breastfeed while using marijuana must be a decision between the woman and her physician.

Mothers who are Hepatitis A, B or C positive:

These women can breastfeed unless they have cracked or bleeding nipples. If nipples are cracked or bleeding, the mother can pump and discard her milk until her nipples are not cracked or bleeding (Centers for Disease Control and Prevention, 2015). The mother can continue to offer the unaffected breast and/or supplement as needed. Perinatal transmission of Hepatitis A is rare (AAP Red Book) and there are no documented cases of Hepatitis C transmission via breast milk.

Mothers who are using opiates:

Information is lacking on the safety of breastfeeding when moderate to high doses of opioids are used for long periods of time. Management of mothers who use chronic opioid therapy for pain should be closely supervised by a chronic pain physician who is familiar with pregnancy and breastfeeding. Judicious amounts of oral narcotic pain medications, when used in a time-limited situation for an acute pain problem, are generally compatible with continued breastfeeding if supervision and monitoring of the breastfeeding infant are adequate. (ABM 36, 37). For additional information, the book “Medications and Mother’s Milk” authored by Dr. Thomas Hale and Hilary E Rowe is the best resource.

Breastfeeding **MAY BE** contraindicated or require more caution in:

- Women relapsing to illicit drug use or legal substance misuse in the 30-90-day period prior to delivery

- Not engaged in prenatal care
- Positive maternal urine toxicology screen for THC (see Marijuana contract).
- Not engaged in substance use treatment or engaged in treatment and failure to provide consent for contact with counselor.
- Any behavioral or other indicators that the woman is actively abusing substances
- Presumptive positive or positive point of care screen for substances other than THC or those that are prescribed.
 - Women should be encouraged to pump and save milk until a confirmatory result has been received because of the danger of a false positive.

Breastfeeding **IS** contraindicated in patients with:

- Positive confirmatory maternal urine toxicology for substances other than those that are prescribed;
- No plans for postpartum substance use treatment or pediatric care;
- Chronic alcohol use; and
- Women with an HIV diagnosis.

Breastfeeding and Perinatal Substance Use

Dr. Thomas Hale, the author of “Medications and Mother’s Milk” (along with Hilary E Rowe, PharmD), has created clinical practice guidelines as well that categorize medications based on several factors. His book provides this information clearly and should serve as a reference at any time a practitioner is advising women using medications, substances, and with substance use disorder treatment programs. Hospitals can use the information in these resources as well as the below descriptions and table as references for common substances that are being tested in hospitals, and as guidance when making decisions on eligibility for breastfeeding based on evidence-based research by lactation researchers and professionals.

Comments:

Dr. Hale provides further details in his book which is frequently updated, including considerations when choosing the appropriate substance to prescribe or counseling women on the appropriateness of using substances while breastfeeding. It is important when recommending a medication to read all the information in Medications & Mothers' Milk. In addition to this, any person can call the Infant Risk Center to discuss challenges with polypharmacy questions when a mother is using more than one medication/substance.

Hale's Lactation Risk Categories:

- **L1 Compatible:** Drug which had been taken by a large number of breastfeeding mothers without any observed increase in adverse effects on the infant. Controlled studies in breastfeeding women fail to demonstrate a risk to the infant and the possibility of harm to the breastfeeding infant is remote; or the product is not orally bioavailable in an infant.
- **L2 Probably Compatible:** Drug which has been studied in a limited number of breastfeeding women without an increase in adverse effects in the infant. And/or, the evidence of a demonstrated risk which is likely to follow us of this medication in a breastfeeding woman is remote.
- **L3 Probably Compatible:** There are no controlled studies in breastfeeding women; however, the risk of untoward effects to a breastfed infant is possible, or controlled studies show only minimal non-threatening adverse effects. Drugs should be given only if the potential benefit justifies the potential risk to the infant. (New medications that have absolutely no published data are automatically categorized in this category, regardless of how safe they may be.)
- **L4 Potentially Hazardous:** There is positive evidence of risk to a breastfed infant or the breastmilk production, but the benefits from use in breastfeeding mothers

may be acceptable despite the risk to the infant (e.g. if the drug is needed in a life-threatening situation or for a serious disease for which safer drugs cannot be used or are ineffective.)

- **L5 Hazardous:** Studies in breastfeeding mothers have demonstrated that there is significant and documented risk to the infant based on human experience, or it is a medication that has a risk of causing significant damage to the infant. The risk of using the drug in breastfeeding women clearly outweighs any possible benefit from breastfeeding. The drug is contraindicated in women who are breastfeeding an infant.

Consider that drugs may transfer into human milk if they: attain high concentrations in maternal plasma; are low in molecular weight (<800) or low in protein binding; pass into the brain easily. Dr. Hale's book remains the most trusted resource.

General considerations include:

1. Adult dosage of medication and Relative Infant dose: Use the smallest adult dosage to treat conditions therapeutically
2. Chronic use vs Occasional Use: consider allowing to pump and dispose of milk of occasional user until out of milk
3. Compliant vs Non-compliant: consider if in treatment or risk factors for relapse/non-compliance with MAT
4. Length of time for medication use: short-term vs long-term
5. Prescribed medication vs illicit use: illicit use of medications/substances is a high-risk behavior that needs to be evaluated when determining eligibility for breastfeeding.
6. Route of medication: can affect how the baby absorbs the medication or transfer into the milk

Relative Infant Dose:

The Relative Infant Dose (RID) is calculated by dividing the infant's dose via the milk in "mg/kg/day" by the maternal dose in "mg/kg/day" :

This weight-normalizing method indicates approximately how much of the "maternal dose" the infant is receiving. Many authors now use this preferred method because it gives a better indication of the relative dose transferred to the infant. Hale reports RID ranges to give an estimate of all the RIDs published by various authors. Note: Authors may use different methods to calculate RID.

A chart has been developed that tracks the Hale lactation risk categories, the relative infant dose and other factors for commonly used drugs. The Hale chart can be found in Appendix E. In addition, the ABM Clinical Protocol #21 can be found in Appendix F.

Psychosocial aspects in decisions regarding breastfeeding with NAS

Breastfeeding has many benefits for the infant born with Neonatal Abstinence Syndrome (NAS). Among other benefits, we know that in the short term, breastfeeding can lessen the severity of NAS in the infant, result in fewer pharmacological interventions, and breastfeeding can shorten the hospital stay of the infant.⁵ Related infant behaviors and states in the infant that may contribute to a mother's ambivalence about breastfeeding include an infant's hypertonicity and uncontrolled movements, which can cause position and latch difficulty, the infant's poor sleep/wake control, as well as the infant's poor suckle coordination. Furthermore, infants affected by NAS have psychological/behavioral problems, poor coordination (suck/swallow/breathe), increased uncoordinated movements, and nasal stuffiness, all which may contribute to increased difficulty with breastfeeding. In addition, to the infant's symptoms, there may be psychosocial issues for the mother, which further complicate her desire to breastfeed. These are described below,

⁵ Favara, M.T., et al. Maternal breast milk feeding and length of treatment in infants with neonatal abstinence syndrome. *Journal of Perinatology* (2019) 39:876-882

followed by recommendations for healthcare workers to consider when working with the mother-infant dyad with substance use.

Psychosocial aspects affecting breastfeeding

Abuse history

The correlation between abuse and breastfeeding is complex. One large Norwegian study found that women with histories of abuse (including emotional, physical, or sexual abuse) were less likely to initiate breastfeeding and more likely to stop breastfeeding by 4 months. (Sorbo, 2015) This included both childhood abuse as well as more recent abuse as adults. A Canadian study found that general adverse childhood experiences may not affect initiation of breastfeeding, however, they contribute to early cessation of breastfeeding. (Ukah, 2016.) One study found 4 significant factors that positively impacted breastfeeding: 1) a mother's intent to breastfeed prenatally; 2) a mother's history of childhood maltreatment; 3) mother's attendance at breastfeeding education class prenatally; and 4) mother having a partner. Similarly, they found 4 factors that negatively impacted breastfeeding: 1) a mother's history of Post-Traumatic Stress Disorder (PTSD); 2) a mother's history of Major Depressive Disorder (MDD); 3) mother's education status (less than high school education); and 4) mothers who are African American. (Eagen-Turkko, 2017). In addition to these findings, they found a correlation between Edinburgh Postnatal Depression Screening (EPDS) and breastfeeding cessation by 4 months. This complex study implies that childhood trauma alone does not necessarily decrease breastfeeding rates; however, trauma that leads to psychiatric sequelae such as PTSD or MDD may have significant negative impacts on a mother's ability to breastfeed. Furthermore, other contributors to breastfeeding success include mother's attachment history (Akman, 2008) as well as mother's psychosocial factors such as self-efficacy, psychological adjustment, body image, motivation and confidence. (de Jager, 2015). These factors contribute to the success of breastfeeding over a 6-month period.

Sexual Abuse:

In the general population, 12-35% of women have experienced some form of sexual abuse, however, approximately 45% (almost half) of women with SUD have a history of sexual abuse. (Jansson, 2017) Survivors of sexual abuse show increased rates of PTSD, cognitive and emotional disturbances, identity disorders, re-victimization, suicidality and suicide completion, higher levels of psychological stress and depression during pregnancy and postpartum, and greater subjective pain during delivery. It is therefore not surprising that this might also affect a mother's success in breastfeeding her infant. Specifically, breastfeeding and skin-to-skin contact can reactivate the PTSD. One study found that childhood sexual abuse did not lead to lower rates of breastfeeding, but rather to increased complications with breastfeeding such as mastitis, pain, and dissociation with breastfeeding. (Elfgen, 2017). In this study, childhood sexual abuse (CSA) appeared to be related to increased breastfeeding problems, while most women with CSA intended to breastfeed. Women with CSA may require more support from healthcare workers during pregnancy and breastfeeding.

Interaction between NAS, maternal SUD, and sexual abuse is complex, not often considered, and not addressed much in current literature. In order to promote successful breastfeeding, health care providers must understand the complexity of the mother-infant dyad when the mother has experienced sexual abuse as well as having a Substance Use Disorder (SUD). Health care providers need to recognize that some aspects of routine care can affect a mother with a history of sexual abuse and SUD. It is therefore beneficial to screen early. If breastfeeding does not work for the mother, she may need "permission" to formula- feed baby.

Case Examples:

1. Case Study Overview: In Jansson's paper, they describe a mother who experienced both SUD and Abuse. Within the first 24hrs of giving birth, she was tearful and pumping/bottle feeding. Staff had documented things like, "showing signs of PPD,"

and that the mother was “not serious” about breastfeeding. Pt did ask for help from lactation consultants, but due to the infant’s rigid movements and NAS, the staff and the mother would often get frustrated and baby would get a bottle. By two weeks, this mother-infant dyad had discontinued breastfeeding. (Jansson, 2017)

2. Case example: One mother had given birth to an infant with NAS. The mother in this case was also being weaned from benzodiazepines while continuing to take buprenorphine as prescribed. The nursing staff told her that she could not breastfeed her infant because she was still taking benzodiazepines. At the time of birth, she was almost done with her benzodiazepine weaning schedule and her benzodiazepines would be completely discontinued within a month. She was not told that she could pump during the month that she was completing her benzodiazepine wean in order to keep her milk supply going so that she could then begin to breastfeed her infant once she was benzodiazepine-free.
3. Case Example: One mother presented to clinic one month postpartum. She explained that every time she breastfed her infant, she became tearful and felt sad. She could not understand this correlation as she loved her infant and wanted the best for him. Upon further exploration, she realized that her infant’s suckling her breast reminded her of the sexual abuse perpetrated by her older brother when she was young girl. Once this was realized, she felt that the best decision for her and for her relationship with her infant was to discontinue breastfeeding.

Recommendations for health care workers:

- Identify symptoms of depression through EPDS or other measure.
 - Excessive crying
 - Despondent
 - Irritable
 - Poor appetite
 - Sleeping too much/too little
 - Excessive feelings of guilt

- Lack of interest in /attachment to her baby
 - Suicidal
- Identify symptoms of PTSD:
 - Nightmares
 - Flashbacks
 - Avoidance of certain people (including infant), places, or situations
 - Emotionally 'numb'
- Identifying possible indicators of sexual abuse:
 - feeding infant only pumped breast milk,
 - conflicting statements and actions regarding the desire to breastfeed then being unable to put infant to breast
 - maternal discomfort with her body, especially touching her breasts.
- Adaptations in approaches when assisting these mothers:
 - limited breast exposure,
 - asking permission to touch their breast,
 - recognizing maternal discomfort with medical procedures
 - minimizing male nursing support
 - limiting staff from being in rooms when it is night or dark
- Alternative feeding supplements including donor breast milk and/or formula may be needed until the patient is comfortable with breastfeeding. Encourage her, if she is comfortable, to express milk to maintain milk supply by pumping or hand expression.
- Use active listening and sensitive exploration verses unintended nontherapeutic communication implying "it's your fault".
- Sexual abuse should be considered a root cause for breastfeeding difficulties especially when mothers have a history of SUD
- Staff should be aware of the correlation between sexual abuse, SUD, and breastfeeding
- Make no assumptions about what the mother would like to do:

- Ask her comfort level or thoughts on breastfeeding
- Ask if she would like help with breastfeeding and how you can help her
- Ask if she needs anything to make her more comfortable with breastfeeding
- Validate her responses to these questions

If mother decides to breastfeed, recommendations for improved success of breastfeeding:

- Help mom with the feelings that come with breastfeeding
- Use relaxation and guided imagery to help mother enjoy her breastfeeding experience more.
 - Apps that can be helpful for relaxation include the following:
 - -Calm
 - -Stop, Breathe and Think
 - -Simply Being—guided meditation for relaxation and presence
- Encourage patience with infant, especially if NAS symptoms interfere with breastfeeding.
- Help mother manage any frustrations with difficulties of breastfeeding: relaxation techniques, soothing music, skin-to-skin contact with infant, words of encouragement.
- Help mother understand that infant’s difficulty with breastfeeding is not a rejection of her.
- Educate mother about the NAS specifics: poor feeding, vomiting, rigidity, tremors, and congestion, which all contribute to difficulty with breastfeeding.
- Educate mother about pumping if breastfeeding is desirable later, but not possible at first.

If mother cannot breastfeed, help her with the psychosocial aspects of mother-infant dyads who don’t breastfeed.

- Attachment: Help mom attach to her infant through their 5 senses: touch, smell, sound, sight, and taste. Validate her experience in this.
- Skin-to-skin contact: Encourage mother to have skin-to-skin contact with her infant as much as possible to reduce the symptoms of NAS. Validate the positive effects this has on her infant as well as on her (infant soothes, she relaxes).
- Guilt/shame: Mother may feel guilty about her baby having NAS and mother may have guilt over not breastfeeding.
 - Minimize guilt over NAS: Substance Use Disorders are a disease, like diabetes or cancer. Nobody chooses to be addicted. It is not a failure of will or morality. She did not do this to her infant willingly. Help her move forward by being there for her child to improve NAS symptoms with attachment and skin-to-skin contact.
 - Minimize guilt over formula bottle-feeding: a mother’s decision to breastfeed is a complex one and has many conscious and unconscious facets. Encourage her to maximize other attachment behaviors and enjoy her baby. There are many ways to be a good mother. There are many ways to nurture your child when breastfeeding is not chosen or an option. All mothers should feel empowered in their decisions for their children.”

Discharge Planning

Comprehensive standardized peri-partum and post-partum care and expectations help to ensure that women with substance use disorders have appropriate resources and supports post discharge. Nurses, social workers, case managers, and other appropriate hospital staff can use this information to aid discharge planning. There are three components to high quality discharge planning:

- Education;
- Identification of ongoing social and mental health support as well as treatment for substance use disorder; and

- Establishment of a feeding plan.

Note: A checklist for education and support services is included as Appendix C.

Education

Prior to discharge, all new mothers and their support person should receive information and resources on the following topics:

Outpatient pediatric follow-up plan;

- Newborn safe sleep;
- Family Planning/ Contraception plan; and
- Information regarding the role and actions of the Department of Child Services (DCS).
- Breastfeeding anticipatory guidance
- Stress-reduction techniques and safe handling of the baby

Identification of ongoing social and mental health support as well as treatment for substance use disorder

For greater success toward reaching health and parenting goals, all women with substance use disorder need a plan for ongoing social and mental health support as well as treatment for substance use disorder. The plan will vary depending on the patient's circumstances, local resources and the mother's stage of her treatment. The following items should be addressed in the plan:

- Smoking cessation assistance
- Inpatient rehabilitation
- Evaluation by mental health or addiction specialist
- Intensive outpatient program
- Counseling

- Outpatient addiction counseling
- Medication Assisted Treatment (MAT) provider
- Plan to attend community support group meetings
- Recovery coach
- Relapse prevention plan
- Home health
- Parenting classes
- Transportation assistance
- Housing assistance
- Lactation assistance
- Legal aid
- Other

Feeding Plan

The third component of high-quality discharge planning is a focused set of questions and/or actions that support getting appropriate resources related to breastfeeding. A checklist that includes necessary actions is included as Appendix D.

References:

- Ailes et al., 2015. Opioid Prescription Claims Among Women of Reproductive Age. January 23, 2015 / 64(02);37-41. Retrieved from https://www.cdc.gov/mmwr/preview/mmwrhtml/mm6402a1.htm?s_cid=mm6402a1_w
- Akman, i., et al. 2008. Breastfeeding duration and postpartum psychological adjustment: Role of maternal attachment styles. *Journal of Paediatrics and Child Health*. 44: 369.
- American Society of Addiction Medicine (ASAM). (2015). ASAM national practice guideline for the use of medications in the treatment of addiction involving opioid use. Chevy Chase, MD: ASAM. Retrieved from <https://www.asam.org/docs/default-source/practice-support/guidelines-and-consensus-docs/asam-national-practice-guideline-supplement.pdf?sfvrsn=24>
- American Society of Addiction Medicine, Inc. Public Policy Statement on Substance Use, Misuse, and Use Disorders During and Following Pregnancy, with an Emphasis on Opioids. January 18, 2017. Retrieved from <https://www.asam.org/advocacy/find-a-policy-statement/view-policy-statement/public-policy-statements/2017/01/19/substance-use-misuse-and-use-disorders-during-and-following-pregnancy-with-an-emphasis-on-opioids>
- Breen, C. L., Harris, S. J., Lintzeris, N., Mattick, R. P., Hawken, L., Bell, J., ... Mendoza, E. (2003). Cessation of methadone maintenance treatment using buprenorphine: Transfer from methadone to buprenorphine and subsequent buprenorphine reductions. *Drug and Alcohol Dependence*, 71(1), 49–55.
- Centers for Disease Control and Prevention. Opioid pain killers widely prescribed among reproductive age women [press release]. January 2015. Available at www.cdc.gov/media/releases/2015/p0122-pregnancy-opioids.html (accessed February 23, 2015).
- Chasnoff, I. J. (2003). Prenatal substance exposure: Maternal screening and neonatal identification and management. *NeoReviews*, 4(9), e228–e235. Retrieved from <http://neoreviews.aappublications>.

[org/content/4/9/e228?ssortype=1&ssortype_redirect_count=1&nfstatus=401&nftoken=00000000-0000-0000-0000000000000000&nfstatusdescription=ERROR%3a+No+local+token](https://doi.org/10.1002/per.1228?ssortype=1&ssortype_redirect_count=1&nfstatus=401&nftoken=00000000-0000-0000-0000000000000000&nfstatusdescription=ERROR%3a+No+local+token)

- Chasnoff, I. J., McGourty, R. F., Bailey, G. W., Hutchins, E., Lightfoot, S O., Pawson, L. L., ... Campbell, J. (2005). The 4P's Plus screen for substance use in pregnancy: Clinical application and outcomes. *Journal of Perinatology*, 25(6), 368–374.
- De Jager, E. et al. 2013. Psychosocial correlates of exclusive breastfeeding: A systematic review. *Midwifery*. 29:506.
- De Jager, E. et al. 2015. A longitudinal study of the effect of psychosocial factors on exclusive breastfeeding duration. *Midwifery*. 31:103.
- Eagen-Torkko, M., et al. 2017. Prevalence and Predictors of Breastfeeding After Childhood Abuse. *JOGNN*. 46: 465.
- Elfgren, C. et al. 2017. Breastfeeding in Women Having Experienced Childhood Sexual Abuse. *Journal of Human Lactation*. 33(1): 119.
- Favara, M.T., et al. Maternal breast milk feeding and length of treatment in infants with neonatal abstinence syndrome. *Journal of Perinatology* (2019) 39:876–882
- Federation of State Medical Boards of the United States (FSMB). (2013, July). Model policy on the use of opioid analgesics in the treatment of chronic pain. Dallas, TX: FSMB.
- Islam, M.J., et al. 2018. Does the type of maltreatment matter? Assessing the individual and combined effects of multiple forms of childhood maltreatment on exclusive breastfeeding behavior. *Child Abuse and Neglect*. 86:290.
- Jalal, M. et al. 2017. The relationship between psychological factors and maternal social support to breastfeeding process. *Electronic Physicians*. 9(1): 3561.
- Jansson, L.M., Velez, M.L., and Butz, A.M. 2017. The Effect of Sexual Abuse and Prenatal Substance Use on Successful Breastfeeding. *JOGNN*. 46: 480.
- Kraus, M. L., Alford, D. P., Kotz, M. M., Levounis, P., Mandel, T. W., Meyer, M., ... Wyatt, S. A. (2011, December). Statement of the American Society of Addiction Medicine Consensus Panel on the use of buprenorphine in office-based treatment of opioid addiction. *Journal of Addiction Medicine*, 5(4), 254–263.

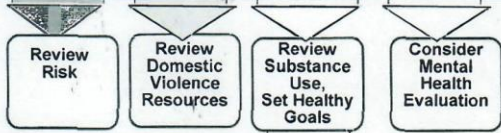
- Maeda, et al. (2014). Opioid Abuse and Dependence during Pregnancy: Temporal Trends and Obstetrical Outcomes. *Perioperative Medicine* 2014. Retrieved from <http://anesthesiology.pubs.asahq.org/article.aspx?articleid=1936522>.
- McQueen, K., Taylor, C., and Murphy-Oikonen. Systematic Review of Newborn Feeding Method and Outcomes Related to Neonatal Abstinence Syndrome. *JOGNN* 2019; Vol. 48, Issue 4
- Reece-Stremtan, S., Marinelli, K. A., & Academy of Breastfeeding Medicine (ABM). (2015). ABM Clinical Protocol #21: Guidelines for breastfeeding and substance use or substance use disorder, Revised 2015. *Breastfeeding Medicine*, 10(3), 135–141. Retrieved from <http://www.bfmed.org/Media/Files/Protocols/Guidelines%20for%20Breastfeeding%20and%20Substance%20Use%20or%20Use%20Disorder.pdf>
- Ryan SA, Ammerman SD, O'Connor ME; AAP Committee on Substance Use and Prevention; AAP Section on Breastfeeding. Marijuana Use During Pregnancy and Breastfeeding: Implications for Neonatal and Childhood Outcomes. *Pediatrics*. 2018;142(3):e20181889
- Sorbo, M.F., et al. 2015. Past and recent abuse is associated with early cessation of breast feeding: results from a large prospective cohort in Norway. *BMJ Open* 5:e009240.
- Ukah, U.V., et al. (2016). The Impact of a History of Adverse Childhood Experiences on Breastfeeding Initiation and Exclusivity: Findings from a National Population Health Survey. *Breastfeeding Medicine*. 11(10): 544.
- World Health Organization. (2014). Guidelines for the identification and management of substance use and substance use disorders in pregnancy. Retrieved from https://apps.who.int/iris/bitstream/handle/10665/107130/9789241548731_eng.pdf;jsessionid=44B3EDEA8D95C76CE7258EB7DD2411FB?sequence=1
- Wu D, Carre C (July 28, 2018). The Impact of Breastfeeding on Health Outcomes for Infants Diagnosed with Neonatal Abstinence Syndrome: A Review. *Cureus* 10(7): e3061. DOI 10.7759/cureus.3061

5Ps Screening Tool

**Institute for Health and Recovery
Integrated Screening Tool**

Women's health can be affected by emotional problems, alcohol, tobacco, other drug use, and domestic violence. Women's health is also affected when those same problems are present in people close to us. By "alcohol," we mean beer, wine, wine coolers, or liquor.

Parents Did any of your parents have a problem with alcohol or other drug use?	YES <input type="checkbox"/>				NO <input type="checkbox"/>
Peers Do any of your friends have a problem with alcohol or other drug use?	YES <input type="checkbox"/>				NO <input type="checkbox"/>
Partner Does your partner have a problem with alcohol or other drug use?				YES <input type="checkbox"/>	NO <input type="checkbox"/>
Violence Are you feeling at all unsafe in any way in your relationship with your current partner?		YES <input type="checkbox"/>			NO <input type="checkbox"/>
Emotional Health Over the last few weeks, has worry, anxiety, depression, or sadness made it difficult for you to do your work, get along with people, or take care of things at home?					YES <input type="checkbox"/> NO <input type="checkbox"/>
Past In the past, have you had difficulties in your life due to alcohol or other drugs, including prescription medications?				YES <input type="checkbox"/>	NO <input type="checkbox"/>
Present In the past month, have you drunk any alcohol or used other drugs? 1. How many days per month do you drink? _____ 2. How many drinks on any given day? _____ 3. How often did you have 4 or more drinks per day in the last month? _____				YES <input type="checkbox"/>	NO <input type="checkbox"/>
Smoking Have you smoked any cigarettes in the past three months?				YES <input type="checkbox"/>	NO <input type="checkbox"/>



Advise for Brief Intervention

	Y	N	NA
Did you State your medical concern?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Did you Advise to abstain or reduce use?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Did you Check patient's reaction?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Did you Refer for further assessment?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

At Risk Drinking	
Non-Pregnant	Pregnant/ Planning Pregnancy
> 7 drinks / week	Any Use is Risky Drinking
> 3 drinks / day	

For the best health of mothers and babies, we strongly recommend that pregnant women, or those planning to become pregnant, do not use alcohol, illegal drugs or tobacco. Safe levels of usage have not been determined.

Date: _____
 Language: _____
 Race: _____
 Ethnicity: _____



The American College of
Obstetricians and Gynecologists
WOMEN'S HEALTH CARE PHYSICIANS

COMMITTEE OPINION

Committee on Health Care for Underserved Women
Number 538 October 2012, reaffirmed 2014

The 4 P's Screening Tool

- **Parents:** Did any of your parents have a problem with alcohol or other drug use?
- **Partner:** Does your partner have a problem with alcohol or drug use?
- **Past:** In the past, have you had difficulties in your life due to alcohol or other drugs, including prescription medications?
- **Present:** In the past month have you drunk any alcohol or used other drugs?

Scoring: Any “yes” should trigger further questions.

Ewing H. A practical guide to intervention in health and social services with pregnant and postpartum addicts and alcoholics: theoretical framework, brief screening tool, key interview questions, and strategies for referral to recovery resources. Martinez (CA): The Born Free Project, Contra Costa County Department of Health Services; 1990.

T-ACE Screening Tool for Alcohol

(T) Tolerance: How many drinks does it take to make you high?

(A) Have people annoyed you by criticizing your drinking?

(C) Have you ever felt you ought to cut down on your drinking?

(E) Eye Opener: Have you ever had a drink the first thing in the morning to steady your nerves or get rid of a hangover?

Scoring: Any woman who answers more than two drinks is scored two points. Each “yes “ to the additional three questions scores one point. A score of two or more is considered a positive screen and the woman should be referred for further assessment.

Recommended by American College of Obstetricians and Gynecologists (ACOG) specifically developed for use with pregnant women.

Appendix B: THC Contract



MATERNAL CONTRACT TO STOP USING THC WHILE BREASTFEEDING/PUMPING

PATIENT IDENTIFICATION

MARIJUANA AND BREASTFEEDING: The American Academy of Pediatrics says that mothers who are breastfeeding their babies **should not use marijuana**.

Breastfeeding has many health benefits for both baby and mother. The use of mother's own breastmilk is the gold standard of nutrition. It is highly recommended for the preterm and NICU hospitalized newborn. THC, an active ingredient in marijuana, gets into breast milk and may affect your baby's development.

Because THC is stored in body fat, it stays in your body for a long time. A baby's brain and body contain a lot of fat. Since your baby's brain and body may store THC for a long time, mothers should not use marijuana while pregnant or breastfeeding.

You have said you want to breastfeed or pump for your baby and when you were admitted you had a positive urine drug screen for THC.

This information is to tell you the risks of using THC when pumping and breastfeeding. We recommend you stop using marijuana and any other form of THC while you are pumping and breastfeeding.

MYTHS ABOUT MARIJUANA
MYTH: Marijuana is safe to use while pregnant or breastfeeding.
FACT: You cannot eat or use some foods/herbs and medicines while pregnant or breastfeeding. This is because they might harm the baby. This includes marijuana.
MYTH: Since it is legal in some states, it must be safe.
FACT: Using marijuana during pregnancy may harm your baby. Being legal does not make it safe. It is illegal in Indiana
MYTH: Since it is natural, it must be safe.
FACT: Not all natural substances or plants are safe. Tobacco and poisonous berries are not safe. Marijuana contains THC, which may harm a baby.
MYTH: Since some people use marijuana as a medicine, it must be safe.
FACT: Marijuana can be recommended by a doctor in special cases. A doctor decides whether the benefits are greater than the risks. It is unsafe to use any medicines while pregnant or breastfeeding that are not recommended by a doctor. This includes marijuana.

I have been educated on the recommendation to stop using THC while pumping and breastfeeding. I understand that current research shows THC may be harmful to the developing newborn. I understand the information I have received and have had the opportunity to discuss the risks involved with using THC.

A note will be made in the electronic record documenting this education and your decision.

Printed Name: _____

Signature: _____ Date/Time: _____

Witness Printed Name: _____

Witness Signature: _____ Date/Time: _____



Appendix C: Lactation Discharge Planning/Readiness Checklist

Patient: _____

Feeding Plan established:

- Exclusive Breastfeeding
 - Breastfeeding and bottle-feeding expressed milk
 - Bottle-feeding expressed milk
 - Breastfeeding and supplementing with fortified expressed milk
 - Breastfeeding and supplementing with Pasteurized Donor Human Milk (PDHM)
 - Breastfeeding and supplementing with formula
 - Exclusive formula feeding
-

If Mother has decided to breastfeed:

- Mother taught how to hand express breast milk
 - Personal use breast pump has been obtained for mother's home use
 - Mother has received one on one lactation discharge education from lactation consultant staff
 - Follow-up lactation phone call set up for 36-48 hours post discharge.
 - Mother's phone # and date for phone call to occur _____
 - Follow-up lactation outpatient visit scheduled.
 - Date and time of scheduled appointment _____
 - Reminder call concerning upcoming appointment made
 - Education and information training completed on the benefits of skin to skin time, baby wearing, infant massage, and stress reduction techniques.
 - Discussion completed r/t importance of gradual weaning (when weaning)
 - Lactation Resources list given to mother (to include but not be limited to):
-

- Hospital based private breastfeeding Facebook page
- Hospital and community-based breastfeeding support group information
- Local WIC office/drop in center information
- Baby Friendly approved breastfeeding website list
- Milk Bank www.milkbank.org

Appendix D: Discharge Plan for Women with Substance Use Disorder

Name: _____

The purpose of this form is to standardize peri-partum and post-partum care and expectations for all women with substance use disorders. Nurses, social workers, case managers, and other appropriate hospital staff can use this to aid discharge planning. This checklist is designed to outline recommendations known to help in maintaining or establishing postpartum recovery.

Referral to these services and supports should be the standard of care.

Prior to discharge, all new mothers should receive the following education. Please document plan or initial box to indicate education completed.

	Date Provided	Notes
Outpatient pediatric follow-up plan		
Newborn safe sleep ed.		
Family Planning/ Contraception plan DCS Patient Letter https://www.in.gov/laboroflove/files/DCS%20Patient%20Handout.pdf		

For the best chance of success in getting healthy and parenting their child, all women with substance use need a plan for ongoing social and mental health support as well as treatment for substance use disorder. The plan will vary depending on the patient's circumstances, local resources and the mother's stage of her treatment. Please document plan or indicate N/A.

	Resource Identified
Smoking cessation assistance	
Inpatient rehabilitation	
Evaluation by mental health or addiction specialist	
Intensive outpatient program	
Counseling	
Outpatient addiction counseling	
MAT (Medication Assisted Treatment) provider	
Plan to attend community support group meetings	
Recovery coach	
Relapse prevention plan	
Home health	
Parenting classes	
Transportation assistance	
Housing assistance	
Lactation assistance	
Legal aid	
Other	

Appendix E: Hale Treatment Chart

Drug	Hale L1-L5	RID	Tmax	T ½	Infant monitoring	Comments
AMPHETAMINES						
Amphetamine	L3	2.46-7.25%		2-4.5 hours for immediate release	Insomnia, irritability, anorexia, slow weight gain, poor sleep	Insomnia, irritability, anorexia, slow weight gain, poor sleep
Methamphetamine	L5	1.9-2.1		4-13.6 hours	CNS stimulation	AVOID lactation until removal from maternal serum
COCAINE-Crack						
<i>COCAINE-Crack</i>	L5		5 min-1hr	5min-1hr	agitation, irritability, CNS stimulation	AVOID lactation until removal from maternal serum
OPIATES/OPIOIDS						
Morphine (opiate)	L3	9.09-35%	0.5-1hr	1.5-2h	Monitor for sedation, decreased respiration, pallor, constipation, weight gain	Consider method and adult dosage to calculate infant dosage
Hydromorphone-Dilaudid (Opioid)	L3	0.67%	Less than 1 hour for oral immediate release	2-3h IV and oral immediate release. 11 hours oral extended release	Sedation, decreased respiration, pallor, constipation, weight gain	
Codeine Tylenol #3, #4 (opiate)	L4	0.6-8.1%	0.5-1 hour	2.9h	Sedation, decreased respiration, apnea, pallor, constipation, weight gain	Consider alternatives due to active metabolite

Drug	Hale L1-L5	RID	Tmax	T ½	Infant monitoring	Comments
Heroin- 6MAM (opioid)	L5		0.5-1 hour	2-6 min heroin; 2 hours morphine metabolite	CNS depression	Rapidly converted to morphine metabolite
Hydrocodone (opioid)	L3	2.2-3.7%	1.3 hours	3.8 hours	Sedation, decreased respiration, apnea, pallor, constipation, weight gain	
Mecconin- derivative of opium/Heroin						
Oxymorphone (opioid)	L3		1.9 hours	7.8 hours oral	Sedation, decreased respiration, apnea, pallor, constipation, poor feeding	Caution in prolonged use
Oxycodone(opioid)	L3	1-8%	1-2 hours	2-4 hours	Sedation, decreased respiration, apnea, pallor, constipation, weight gain	Concern with doses over 30mg/day
Meperidine- Demerol (opioid) Metabolite- Normeperidine	L4	1.1-13.3%	30-50 minutes (IM)	2-4hours; active metabolite 15-30 hours	Sedation, decreased respiration, apnea, pallor, constipation, poor feeding	Poor sucking, other narcotics preferred
METHADONE (opioid) Metabolite-EDDP	L2	1.9-6.5%	0.5-1 hour	13-55 hours	Sedation, decreased respiration, apnea, pallor, constipation, poor feeding	Monitor for NAS if exposed in utero
BUPRENORPHINE (opioid)	L2	0.09-1.9%	1-hour IM; 15-30 minutes SL;	2-3 hours IV;37 hours SL; 26h transdermal	Sedation, decreased respiration, apnea, pallor, constipation, poor feeding	Low weight gain, decreased milk

Drug	Hale L1-L5	RID	Tmax	T ½	Infant monitoring	Comments
Metabolite- Norbuprenorphine			3 days transdermal			
BUPRENORPHINE+ NALOXONE	L3	0.09- 1.9%		26-37 hours (buprenorphine)/ 64 min (Naloxone)	Sedation, decreased respiration, apnea, pallor, constipation, poor feeding	Low weight gain, decreased milk
PROPOXYPHENE -Darvon (opioid) Metabolite- Norpropoxyphene	L2		2 hours	6-12 hours		Not used anymore
Fentanyl (opioid)	L2	2.9-5%	7-8 min (IV)	2-4 hours IV	Sedation, decreased respiration, apnea, pallor, constipation, weight gain	Note this is if for prescribed Fentanyl; studies show low infant doses with Fentanyl patch use after 1 month (opioid withdrawal was noted in study after prenatal use of patch)
TRAMADOL	L3	2.86%	2 hours	7 hours	Sedation, decreased respiration, apnea, pallor, constipation, poor feeding	Metabolite similar to codeine, use cautiously while breastfeeding for short period
COTININE - tobacco/nicotine	L3-		2-4 hours	2 hours non- patch	Vomiting, diarrhea, rapid heartbeat	Enroll in smoking cessation program

Drug	Hale L1-L5	RID	Tmax	T ½	Infant monitoring	Comments
ETHYL GLUCURONIDE- metabolite of ethanol	L4	16%	30-90 min	0.24 hours	Sedation, poor feeding, decreased milk supply, altered milk taste	Counsel for chronic vs occasional use; heavy vs limited
BENZODIAZEPINES						
Midazolam	L2	0.63%	0.2-3 hour (oral)	3 hours	Sedation, decreased respiration, poor feeding, weight gain	
Oxazepam	L2	0.28-1%	3 hours	8 hours	Sedation, decreased respiration, poor feeding, weight gain	
Alprazolam	L3	8.5%	1-2 hours	12-15 hours	Sedation, decreased respiration, poor feeding, weight gain	
Temazepam	L3		2-4 hours	9.5-12.4 hours	Sedation, decreased respiration, poor feeding, weight gain	
Lorazepam	L3	2.6- 2.9%	2 hours	12 hours		Shorter half-life, no active metabolite
Diazepam	L3	0.88- 7.14%	1-2 hours	43 hours	Sedation, decreased respiration, poor feeding, weight gain	
BARBITURATES						

Drug	Hale L1-L5	RID	Tmax	T ½	Infant monitoring	Comments
Butalbital	L3		40-60 min	35 hours	Sedation, decreased respiration, pallor, not waking at regular intervals to feed	Other analgesics preferred
Amobarbital	none					
Pentobarbital	none					
Secobarbital	none					
Phenobarbital	L4	24%	8-12 hours	53-140 hours	Sedation or irritability, not waking to feed, apnea, weight gain	
CANNABINOIDS						
Marijuana	L4			25-57 hours	Sedation, poor feeding, weight gain, potential neurobehavioral or psychomotor delays.	Potential impact on fetal growth; potential impact on milk production; consider chronic vs occasional, heavy vs light

Resources:

<https://www.infantrisk.com>

<https://www.infantrisk.com/apps>

<https://toxnet.nlm.nih.gov/newtoxnet/lactmed.htm>

<https://mothertobaby.org/>

Infant Risk Call Center: The phone number for the call center is 1-800-352-2519. The Center is open from 8AM to 5PM Central Standard Time to answer your questions.

Milk Bank:

Appendix F: ABM Clinical Protocol #21:

ABM Clinical Protocol #21: Guidelines for Breastfeeding and Substance Use or Substance Use Disorder, Revised 2015

Sarah Reece-Stremtan,^{1,2} Kathleen A. Marinelli,^{3,4} and The Academy of Breastfeeding Medicine

A central goal of The Academy of Breastfeeding Medicine is the development of clinical protocols for managing common medical problems that may impact breastfeeding success. These protocols serve only as guidelines for the care of breastfeeding mothers and infants and do not delineate an exclusive course of treatment or serve as standards of medical care. Variations in treatment may be appropriate according to the needs of an individual patient.

Purpose

THE CHOICE OF BREASTFEEDING by a pregnant or newly postpartum woman with a history of past or current illegal/illicit drug abuse or legal substance use or misuse is challenging for many reasons. The purpose of this protocol is to provide literature-based guidelines for the evaluation and management of the woman with substance use or a substance use disorder who is considering breastfeeding.

Background

Illicit drug use and legal substance use/abuse remain a significant problem among women of childbearing age. The 2013 National Survey on Drug Use and Health revealed that among pregnant women 15–44 years of age in the United States, 5.2% had used illicit drugs in the past month, 9.4% reported current alcohol use, 2.3% reported binge drinking, 0.4% reported heavy drinking during the pregnancy, and 15.4% reported cigarette use in the past month.¹

The healthcare provider presented with a pregnant or recently postpartum woman with a history of current or past illegal drug abuse or legal drug use or misuse who desires to breastfeed often faces multiple significant challenges. Substance use disorders frequently engender behaviors or conditions that independently signify risk for the breastfed infant, in addition to the drug exposure per se. These mothers may have coexisting risk factors such as low socioeconomic status (although substance use crosses all socioeconomic lines), low levels of education, poor nutrition, and little to no prenatal care. Multiple drug use is common, in addition to the

use of other harmful legal substances, including tobacco and alcohol. Illicit drugs are frequently mixed and extended with dangerous adulterants that can pose additional threats to the health of the mother and the infant. Drug users are at high risk for infections such as human immunodeficiency virus and/or hepatitis B and C. Psychiatric disorders that require pharmacotherapeutic intervention are more prevalent with substance use, making breastfeeding an even more complicated choice, as breastfeeding may not be recommended for women taking some psychotropic medications.

Despite the myriad factors that may make breastfeeding a difficult choice for women with substance use disorders, drug-exposed infants, who are at a high risk for an array of medical, psychological, and developmental issues, as well as their mothers, stand to benefit significantly from breastfeeding. Although many of the factors listed above may pose a risk to the infant, the documented benefits of human milk and breastfeeding must be carefully and thoughtfully weighed against the risks associated with the substance that the infant may be exposed to during lactation. Confounding many efforts to examine longer-term developmental outcomes in infants exposed to some substances is the lack of data evaluating infants who were not exposed during pregnancy but only during lactation.

Ideally, women with substance use disorders delivering an infant and desiring to breastfeed are engaged in comprehensive healthcare and substance abuse treatment during pregnancy, but this is not always the case. Substance abuse treatment for these women is often not available, not gender specific, and not comprehensive, forcing the mother's healthcare provider

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⁴University of Connecticut School of Medicine, Farmington, Connecticut.

during and after pregnancy to rely on maternal self-report and a “best guess” at adequacy of services, compliance to treatment, length of “clean” time, community support systems, etc. In a recent retrospective study in the United Kingdom, significantly lower rates of breastfeeding initiation occurred in mothers who used illicit substances or opioid maintenance therapy during pregnancy (14% versus 50% of the general population).² In Norway, among opioid-dependent women on opioid maintenance therapy, 77% (compared with 98% in the general population) initiated breastfeeding after delivery.³

The specific terms used to describe use and misuse of various legal and illegal substances continue to evolve and may vary from country to country and among different organizations. The 5th edition of the *Diagnostic and Statistical Manual of Mental Disorders* combines the previous categories of substance abuse and substance dependence into the category single substance use disorder, which is measured on a continuum from mild to severe.⁴

Of important note is that we would like to make it clear that drugs of any type should be avoided in pregnant and breastfeeding women, unless prescribed for specific medical conditions. The casual use of drugs—legal, illegal, illicit, dose appropriate or not—still may have ramifications for the developing fetus and infant that we have yet to determine, and hence, in general, drugs of all types should be avoided unless medically necessary.

Specific Substances

Perhaps the most critical challenge facing the healthcare provider for the woman with a substance use disorder who wishes to breastfeed is the lack of research leading to evidence-based guidelines. Table 1 gives two online Web sites, one in English and one in both English and Spanish, that are kept updated and are easily accessible for current information on drugs and breastfeeding. There have been several comprehensive reviews of breastfeeding among substance-using women, essentially concluding that breastfeeding is generally contraindicated in mothers who use illegal drugs.^{5–8} (III) (Quality of evidence [levels of evidence I, II-1, II-2, II-3, and III] is based on the U.S. Preventive Services Task Force Appendix A Task Force Ratings⁹ and is noted throughout this protocol in parentheses.) Yet, research on individual drugs of abuse remains lacking and difficult to perform. Pharmacokinetic data for most drugs of abuse in lactating women are sparse and based on small numbers of subjects and case reports.⁷ Most illicit drugs are found in human milk, with varying degrees of oral bioavailability.⁷ Phencyclidine hydrochloride has been

detected in human milk in high concentrations,¹⁰ as has cocaine,¹¹ leading to infant intoxication.¹² There is little to no evidence to describe the effects of even small amounts of other drugs of abuse and/or their metabolites in human milk on infant development aside from those discussed further below.

Methadone

For pregnant and postpartum women with opioid dependence in treatment, methadone maintenance has been the treatment of choice in the United States, Canada,¹³ and many other countries. In contrast to other substances, concentrations of methadone in human milk and the effects on the infant have been studied. The concentrations of methadone found in human milk are low, and all authors have concluded that women on stable doses of methadone maintenance should be encouraged to breastfeed if desired, irrespective of maternal methadone dose.^{3,14–22} (II-1, II-2, II-3) Previously, no apparent effects of methadone exposure prenatally and in human milk were reported on infant neurobehavior at 30 days.¹⁹ Recently an ongoing longitudinal follow-up study of methadone-exposed infants with 200 methadone-exposed and nonexposed, demographically matched families has shown neurocognitive delays in methadone-exposed 1-month-old infants compared with nonexposed infants. When retested at 7 months, methadone-exposed infants were similar to nonexposed, comparison infants. At 9 months of age, 37.5% of this sample of methadone-exposed infants showed clinically significant motor delays (≥ 1.5 standard deviation) compared with low but typical development in the comparison group.²¹ Exposed infants typically have high environmental risk profiles, which continue at birth, posing ongoing risk to the developing child.

The current thought is that environmental risk factors combine with prenatal exposures to promote epigenetic changes in gene expression and methylation patterns that have both immediate and long-term implications related to developmental programming.²² Note that these findings relate to infants exposed to methadone both prenatally and after birth via breastfeeding, and there is little information available on infants with chronic methadone exposure via breastfeeding alone.

In addition, about 70% of infants born to women prescribed methadone during pregnancy will experience neonatal abstinence syndrome (NAS),²³ the constellation of signs and symptoms often presenting following in utero opioid exposure. Infants with significant NAS can experience difficulties with attaching and sucking/swallowing during breastfeeding that can impact their ability to breastfeed.

TABLE 1. ONLINE WEB SITES WITH UPDATED BREASTFEEDING AND DRUG INFORMATION

Web site	URL	Language
U.S. National Library of Health, National Institute of Health, U.S. Department of Health and Human Services, “LactMed”	http://toxnet.nlm.nih.gov/newtoxnet/lactmed.htm	English
e-Lactancia Association for Promotion and Cultural and Scientific Research of Breastfeeding Under a Creative Commons International License	http://e-lactancia.org/ (Also contains medical prescriptions, phytotherapy, homeopathy and other alternative products, cosmetic and medical procedures, contaminants, maternal and infant diseases and more)	English Spanish

However, given that there is increasing evidence supporting the conclusion that there is a reduction in the severity and duration of treatment of NAS when mothers on methadone maintenance therapy breastfeed, breastfeeding for these dyads should be encouraged.^{3,17-19} (II-1, II-3) Unfortunately, the rate of breastfeeding initiation in this cohort is generally low, less than half that reported in the U.S. general population.²⁴ A small recent qualitative study demonstrated that lack of support from the healthcare community and misinformation about the dangers of breastfeeding while on methadone therapy are significant, yet modifiable, barriers to breastfeeding success in these women.²⁵ Given the benefits to these mothers and infants to remain on methadone maintenance therapy and breastfeed, it is important for us to provide robust ongoing support for this vulnerable group.

Buprenorphine

Buprenorphine is a partial opioid agonist used for treatment of opioid dependency during pregnancy in some countries and increasingly in the United States. Multiple small case series have examined maternal buprenorphine concentrations in human milk. All concur that the amounts of buprenorphine in human milk are small and are unlikely to have short-term negative effects on the developing infant.²⁶⁻³¹ In one study, 76% of 85 maternal-infant pairs breastfed, with 66% still breastfeeding 6-8 weeks postpartum. The breastfed infants had less severe NAS and were less likely to require pharmacological intervention than the formula-fed infants, similar to methadone discussed above, although this did not reach statistical significance with the size of the sample studied.³¹

Other opioids

Use of opioids in the United States has increased substantially over the last decade. A retrospective cross-sectional analysis of NAS in hospital births in the years from 2000 to 2009 found an increase in incidence from 1.2 to 3.39 per 1,000 births. Antepartum maternal opioid use was also found to have risen from 1.19 to 5.63 per 1,000 hospital births from 2000 to 2009; any use of opioids was included in data collection.³² A recent Centers for Disease Control and Prevention *Morbidity and Mortality Weekly Report* highlighted data demonstrating that approximately one-third of women of reproductive age filled a prescription for opioids each year between 2008 and 2012.³³

When use of narcotics during pregnancy is determined to be consistent with an opioid use disorder rather than a modality for short-term pain relief, consideration of initiation of maintenance methadone or buprenorphine as previously discussed is strongly encouraged,^{13,34,35} and these mothers should be supported in breastfeeding initiation. (III) Short courses of most other low-dose prescription opioids can be safely used by a breastfeeding mother,^{36,37} but caution is urged with codeine, as *CYP2D6* ultra-rapid metabolizers may experience high morphine (metabolite) blood levels, and there has been a single case report of a breastfeeding neonatal death after maternal use.³⁸ (III) Information is lacking on the safety of breastfeeding when moderate to high doses of opioids are used for long periods of time. There is also a lack of information available about transitioning mothers from short-acting opioids to opioid maintenance therapy while breastfeeding rather than during pregnancy.

Marijuana

Uniform guidelines regarding the varied use of marijuana by breastfeeding mothers are difficult to create and cannot hope to cover all situations. The legality of possessing and using marijuana varies greatly from country to country; in the United States, there are increasing numbers of states where it is legal for "medicinal use" with a prescription, and a few states where it is legal for "recreational use," but under federal law, it remains illegal in all states. Therefore, basing recommendations on marijuana use and concurrent breastfeeding from a purely legal standpoint becomes inherently complex, problematic, and impossible to apply uniformly across all settings and jurisdictions. As laws shift and marijuana use becomes even more common in some areas, it becomes increasingly important to carefully weigh the risks of initiation and continuation of breastfeeding while using marijuana with the risks of not breastfeeding while also considering the wide range of occasional, to regular medical, to heavy exposure to marijuana.

In addition to the potential legal risk, the health risks to the infant from the mother's marijuana use must be carefully considered. Δ^9 -Tetrahydrocannabinol (THC), the main compound in marijuana, is present in human milk up to eight times that of maternal plasma levels, and metabolites are found in infant feces, indicating that THC is absorbed and metabolized by the infant.³⁹ It is rapidly distributed to the brain and adipose tissue and stored in fat tissues for weeks to months. It has a long half-life (25-57 hours) and stays positive in the urine for 2-3 weeks,⁴⁰ making it impossible to determine who is an occasional versus a chronic user at the time of delivery by urine toxicology screening. Evidence regarding the effects of THC exposure on infant development via breastfeeding alone is sparse and conflicting,^{41,42} and there are no data evaluating neurodevelopmental outcomes beyond the age of 1 year in infants who are only exposed after birth. Also notable in this discussion of risk is that the potency of marijuana has been steadily increasing, from about 3% in the 1980s to 12% in 2012, so data from previous studies may no longer even be relevant.⁴³ Additionally, current concern over marijuana use during lactation stems from possible infant sedation and maternal inability to safely care for her infant while directly under its influence; however, this remains a theoretical problem and has not been well established in the literature.⁴⁴

Human and animal evidence examining the behavioral and neurobiological effects of exposure to cannabinoids during pregnancy and lactation shows that the endocannabinoid system plays a crucial role in the ontogeny of the central nervous system and its activation, during brain development. As Campolongo et al.⁴⁵ concluded, cannabinoid exposure during critical periods of brain development can induce subtle and long-lasting neurofunctional alterations. Several preclinical studies highlight how even low to moderate doses during particular periods of brain development can have profound consequences for brain maturation, potentially leading to long-lasting alterations in cognitive functions and emotional behaviors.⁴⁵ Exposure to second-hand marijuana smoke by infants has been associated with an independent two times possible risk of sudden infant death syndrome (SIDS)⁴⁶ (III); because breastfeeding reduces risk of SIDS, this needs to be additionally considered. Thus careful

contemplation of these issues should be fully incorporated into the care plans of the lactating woman in the setting of THC use. Breastfeeding mothers should be counseled to reduce or eliminate their use of marijuana to avoid exposing their infants to this substance and advised of the possible long-term neurobehavioral effects from continued use. (III)

Alcohol

Use of alcohol during pregnancy is strongly discouraged, as it can cause fetal alcohol syndrome, birth defects, spontaneous abortion, and premature births, among other serious problems.^{47,48} (III) Many women who significantly decrease or eliminate their alcohol intake during pregnancy may choose to resume consuming alcohol after giving birth, with approximately half of breastfeeding women in Western countries reported to consume alcohol at least occasionally.⁴⁹ Alcohol interferes with the milk ejection reflex, which may ultimately reduce milk production through inadequate breast emptying.⁵⁰ (III) Human milk alcohol levels generally parallel maternal blood alcohol levels, and studies evaluating infant effects of maternal alcohol consumption have been mostly mixed, with some mild effects seen in infant sleep patterns, amount of milk consumed during breastfeeding sessions, and early psychomotor development.⁵⁰ (III) Possible long-term effects of alcohol in maternal milk remain unknown. Most sources advise limiting alcohol intake to the equivalent of 8 ounces of wine or two beers, and waiting 2 hours after drinking to resume breastfeeding.^{5-7,35} (III) To ensure complete elimination of alcohol from breastmilk, mothers may consult a normogram devised by the Canadian Motherisk program to determine length of time needed based on maternal weight and amount consumed.⁵¹ (III)

Tobacco

Approximately two-thirds as many pregnant women as nonpregnant women smoke tobacco, with decreasing numbers of women smoking as pregnancy progresses.¹ Many mothers quit during pregnancy, but postpartum relapse is common, with about 50% resuming tobacco use in the first few months after birth.⁵²⁻⁵⁴ Data on the epidemiology of breastfeeding mothers who smoke cigarettes remains complex, and smoking in many series has been found to be associated with reduced rates of breastfeeding.^{55,56} Nicotine and other compounds are known to transfer to the infant via milk, and considerable transfer of chemicals via second-hand smoke also occurs when infants are exposed to environmental tobacco smoke. Increases in the incidence of respiratory allergy in infants and in SIDS are just two significant well-known risks of infant exposure to environmental tobacco smoke.⁸ (III) Most sources endorse promotion of breastfeeding in the setting of maternal smoking while vigorously supporting smoking cessation.⁵⁷ (III) Some smoking cessation modalities (nicotine patch, nicotine gum, and possibly bupropion) are compatible with breastfeeding and can be encouraged in many circumstances.^{6,7,58} (III)

Recommendations

General (Circumstances favorable with consideration)

Infants of women with substance use disorders, at risk for multiple health and developmental difficulties, stand to

benefit substantially from breastfeeding and human milk, as do their mothers. A prenatal plan preparing the mother for parenting, breastfeeding, and substance abuse treatment should be formulated through individualized, patient-centered discussions with each woman. This care plan should include instruction in the consequences of relapse to drug or excessive alcohol use during lactation, as well as teaching regarding potential for donor milk, formula preparation, and bottle handling and cleaning should breastfeeding be or become contraindicated. In the perinatal period each mother–infant dyad should be carefully and individually counseled on breastfeeding prior to discharge from maternity care. This evaluation must consider several factors, including (III)

- drug use and substance abuse treatment histories, including medication-assisted treatment with methadone or buprenorphine
- medical and psychiatric status
- other maternal medication needs
- infant health status (to include ongoing evaluation for NAS and impact on ability to breastfeed)
- the presence or absence and adequacy of maternal family and community support systems
- plans for postpartum care and substance abuse treatment for the mother and pediatric care for the child.

Optimally, the woman with a substance use disorder who presents a desire to breastfeed should be engaged in treatment pre- and postnatally. Maternal written consent for communication with her substance abuse treatment provider should be obtained prior to delivery if possible. (III)

Any discussion with mothers who use substances with sedating effects should include counseling on safely caring for her infant and instruction on safe sleep practices. (III)

Encourage women under the following circumstances to breastfeed their infants (III):

- Engaged in substance abuse treatment; provision of maternal consent to discuss progress in treatment and plans for postpartum treatment with substance abuse treatment counselor; counselor recommendation for breastfeeding
- Plans to continue in substance abuse treatment in the postpartum period
- Abstinence from drug use for 90 days prior to delivery; ability to maintain sobriety demonstrated in an outpatient setting
- Toxicology testing of maternal urine negative at delivery
- Engaged in prenatal care and compliant.

Opioids/narcotics

- Encourage stable methadone- or buprenorphine-maintained women to breastfeed regardless of dose
- Management of mothers who use chronic opioid therapy for pain should be closely supervised by a chronic pain physician who is familiar with pregnancy and breastfeeding (III):

- a. Length of time on these medications, total dose, and whether the medications were used during pregnancy should all help inform the decision of whether breastfeeding may be safely undertaken in certain cases.

- b. Judicious amounts of oral narcotic pain medication, when used in a time-limited situation for an acute pain problem, are generally compatible with continued breastfeeding if supervision and monitoring of the breastfeeding infant are adequate.^{36,37}
- Rapidly increasing narcotic dosing in a breastfeeding mother should prompt further evaluation and reconsideration of the safety of continued breastfeeding.

Nicotine

- Counsel mothers who smoke cigarettes after giving birth to reduce their intake as much as possible, and not to smoke around their infant, to reduce infant exposure to second-hand smoke. Smoking cessation and nicotine replacement modalities such as nicotine patches and gum may be useful for some mothers. (III)
- Give mothers who smoke tobacco additional support, as maternal smoking appears to be an independent and associated risk factor for noninitiation and early cessation of breastfeeding, to help ensure its success. (III)

Alcohol

- Counsel mothers who wish to drink occasional alcohol that alcohol easily transfers into human milk. Recommendations from the American Academy of Pediatrics, the World Health Organization, and others advise waiting 90–120 minutes after ingesting alcohol before breastfeeding, or expressing and discarding milk within that time frame.^{5,6,7,35} (III)

Cannabis (THC)

- Information regarding long-term effects of marijuana use by the breastfeeding mother on the infant remains insufficient to recommend complete abstinence from breastfeeding initiation or continuation based on the scientific evidence at this time. However, extrapolation from in utero exposure and the limited data available helps to inform the following recommendations (III):
 - a. Counsel mothers who admit to occasional or rare use to avoid further use or reduce their use as much as possible while breastfeeding, advise them as to its possible long-term neurobehavioral effects, and instruct them to avoid direct exposure of the infant to marijuana and its smoke.
 - b. Strongly advise mothers found with a positive urine screen for THC to discontinue exposure while breastfeeding and counsel them as to its possible long-term neurobehavioral effects.
 - c. When advising mothers on the medicinal use of marijuana during lactation, one must take into careful consideration and counsel on the potential risks of exposure of marijuana and benefits of breastfeeding to the infant.
 - d. The lack of long-term follow-up data on infants exposed to varying amounts of marijuana via human milk, coupled with concerns over negative neurodevelopmental outcomes in children with in utero exposure, should prompt extremely careful consideration of the risks versus benefits of breastfeeding in the setting of moderate or chronic marijuana use.

A recommendation of abstaining from any marijuana use is warranted.

- e. At this time, although the data are not strong enough to recommend not breastfeeding with any marijuana use, we urge caution.

General (Circumstances contraindicated or requiring more caution)

Counsel women under any of the following circumstances not to breastfeed (III):

- Not engaged in substance abuse treatment, or engaged in treatment and failure to provide consent for contact with counselor
- Not engaged in prenatal care
- Positive maternal urine toxicology screen for substances other than marijuana at delivery [see (b) above]
- No plans for postpartum substance abuse treatment or pediatric care
- Women relapsing to illicit drug use or legal substance misuse in the 30-day period prior to delivery
- Any behavioral or other indicators that the woman is actively abusing substances
- Chronic alcohol use.

Evaluate carefully women under the following circumstances, and determine appropriate advice for breastfeeding by discussion and coordination among the mother, maternal care providers, and substance abuse treatment providers (III):

- Relapse to illicit substance use or legal substance misuse in the 90–30-day period prior to delivery
- Concomitant use of other prescription medications deemed to be incompatible with lactation
- Engaged later (after the second trimester) in prenatal care and/or substance abuse treatment
- Attained drug and/or alcohol sobriety only in an inpatient setting
- Lack of appropriate maternal family and community support systems
- Report that they desire to breastfeed their infant in order to either retain custody or maintain their sobriety in the postpartum period.

In the United States, women who have established breastfeeding and subsequently relapse to illegal drug use are counseled not to breastfeed, even if milk is discarded during the time period surrounding relapse. There are no known pharmacokinetic data to establish the presence and/or concentrations of most illicit substances and/or their metabolites in human milk and effects on the infant, and this research is unlikely to occur given the ethical dilemmas it presents. The lack of pharmacokinetic data for most drugs of abuse in recently postpartum women with substance use disorders precludes the establishment of a “safe” interval after use when breastfeeding can be reestablished for individual drugs of abuse. Additionally, women using illicit substances in the postnatal period may exhibit impaired judgment and secondary behavioral changes that may interfere with the ability of the mother to care for her infant or to breastfeed adequately. Passive drug exposures may pose additional risks to the infant. Therefore, any woman relapsing to illicit drug use or legal substance misuse after the establishment of lactation should be

provided an appropriate human milk substitute (donor milk, formula) and intensified drug treatment, along with guidance on how to taper milk production to prevent mastitis. (III)

The woman with a substance use disorder who has successfully initiated breastfeeding should be carefully monitored, along with her infant, in the postpartum period. Ongoing substance abuse treatment, postpartum care, psychiatric care when warranted, and pediatric care are important for women with substance use disorders. Lactation support is particularly important for infants experiencing NAS and their mothers. Communication among all care providers involved with the health, welfare, and substance abuse support of the mother and the child should provide an interactive network of supportive care for the dyad. (III)

Recommendations for Future Research

1. Long-term randomized controlled trials or paired cohort evaluations of infants exposed to methadone or buprenorphine via human milk, including infant developmental assessments
2. Further evaluations of maternal milk and plasma and infant plasma pharmacokinetic data regarding prescription opioids and lactation, especially for mothers who were on chronic high-dose medications during pregnancy that are continued when breastfeeding
3. Long-term controlled evaluations of infants exposed to marijuana via human milk, to include infants and later neurodevelopmental outcomes, including those exposed to marijuana in a controlled manner, such as with legalized medical marijuana
4. Evaluation of nicotine replacement patches, gum, and vaporized cigarettes as substitutes for tobacco smoking in pregnant and lactating women, to determine if these can or should be widely recommended in place of tobacco products.

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References

1. Results from the 2013 National Survey on Drug Use and Health: National findings. Available at www.samhsa.gov/data/sites/default/files/NSDUHresultsPDFWHTML2013/Web/NSDUHresults2013.pdf (accessed February 18, 2015).
2. Goel N, Beasley D, Rajkumar V, et al. Perinatal outcome of illicit substance use in pregnancy—Comparative and contemporary socio-clinical profile in the UK. *Eur J Pediatr* 2011;170:199–205.
3. Welle-Strand GK, Skurtveit S, Jansson LM, et al. Breastfeeding reduces the need for withdrawal treatment in opioid-exposed infants. *Acta Paediatr* 2013;102:1060–1066.
4. *Diagnostic and Statistical Manual of Mental Disorders*, 5th ed. American Psychiatric Association, Washington, DC, 2013.
5. D'Apolito K. Breastfeeding and substance abuse. *Obstet Clin Gynecol* 2013;56:202–211.
6. Sachs HC; American Academy of Pediatrics Committee on Drugs. The transfer of drugs and therapeutics into human breast milk: An update on selected topics. *Pediatrics* 2013;132:e796–e809.
7. Rowe H, Baker T, Hale TW. Maternal medication, drug use, and breastfeeding. *Pediatr Clin North Am* 2013;60:275–294.
8. Eidelman AI, Schanler R; Section on Breastfeeding. Breastfeeding and the use of human milk. *Pediatrics* 2012;129:e827–e841.
9. Appendix A Task Force Ratings. Guide to clinical preventive services: Report of the U.S. Preventive Services Task Force, 2nd edition. Available at www.ncbi.nlm.nih.gov/books/NBK15430/ (accessed February 27, 2015).
10. Kaufman R, Petruca RA, Pitts FN, et al. PCP in amniotic fluid and breast milk: Case report. *J Clin Psychiatry* 1983;44:269–270.
11. Winecker RE, Goldberger BA, Tebbett IR, et al. Detection of cocaine and its metabolites in breast milk. *J Forensic Sci* 2001;46:1221–1223.
12. Chasnoff I, Lewis DE, Squires L. Cocaine intoxication in a breast fed infant. *Pediatrics* 1987;80:836–838.
13. Wong S, Ordean A, Kahan M, et al. Substance use in pregnancy. *J Obstet Gynaecol Can* 2011;33:367–384.
14. Wojnar-Horton RE, Kristensen JH, Yapp P, et al. Methadone distribution and excretion into breast milk of clients in a methadone maintenance programme. *Br J Clin Pharmacol* 1997;44:543–547.
15. McCarthy JJ, Posey BL. Methadone levels in human milk. *J Hum Lact* 2000;16:115–120.
16. Begg EJ, Malpas TJ, Hackett LP, et al. Distribution of R- and S-methadone into human milk during multiple, medium to high oral dosing. *Br J Clin Pharmacol* 2001;52:681–685.
17. Bogen DL, Perel JM, Helsel JC, et al. Estimated infant exposure to enantiomer-specific methadone levels in breastmilk. *Breastfeed Med* 2011;6:377–384.
18. Abdel-Latif ME, Pinner J, Clews S, et al. Effects of breast milk on the severity and outcome of NAS among infants of drug-dependent mothers. *Pediatrics* 2006;117:1163–1169.
19. Jansson LM, Choo R, Velez ML, et al. Methadone maintenance and breastfeeding in the neonatal period. *Pediatrics* 2008;121:106–114.
20. McQueen KA, Murphy-Oikonen J, Gerlach K, et al. The impact of infant feeding method on neonatal abstinence scores of methadone-exposed infants. *Adv Neonatal Care* 2011;11:282–290.
21. Logan BA, Brown MS, Hayes MJ. Neonatal abstinence syndrome: Treatment and pediatric outcomes. *Clin Obstet Gynecol* 2013;56:186–192.
22. Jansson LM, Choo R, Velez ML, et al. Methadone maintenance and long-term lactation. *Breastfeed Med* 2008;3:34–37.
23. Kocherlakota P. Neonatal abstinence syndrome. *Pediatrics* 2014;134:e547–e561.
24. Wachman EM, Byun J, Philipp BL. Breastfeeding rates among mothers of infants with neonatal abstinence syndrome. *Breastfeed Med* 2010;5:159–164.
25. Demirci JR, Bogen DL, Kliensky Y. Breastfeeding and methadone therapy: The maternal experience. *Subst Abuse* 2014 April 4 [Epub ahead of print]. doi: 10.1080/08897077.2014.902417.
26. Ilett KF, Hackett LP, Gower S, et al. Estimated dose exposure of the neonate to buprenorphine and its metabolite norbuprenorphine via breastmilk during maternal buprenorphine substitution treatment. *Breastfeed Med* 2012;7:269–274.
27. Grimm D, Pauly E, Poschl J, et al. Buprenorphine and norbuprenorphine concentrations in human breastmilk samples

- determined by liquid chromatography-tandem mass spectrometry. *Ther Drug Monit* 2005;27:526–530.
28. Marquet P, Chevral J, Lavignasse P, et al. Buprenorphine withdrawal syndrome in a newborn. *Clin Pharmacol Ther* 1997;62:569–571.
 29. Johnson RE, Jones HE, Jasinski DR, et al. Buprenorphine treatment of pregnant opioid dependent women: Maternal and neonatal outcomes. *Drug Alcohol Depend* 2001;63:97–103.
 30. Gower S, Bartu A, Ilett KF, et al. The wellbeing of infants exposed to buprenorphine via breast milk at 4 weeks of age. *J Hum Lact* 2014;30:217–223.
 31. O'Connor AB, Collett A, Alto WA, et al. Breastfeeding rates and the relationship between breastfeeding and neonatal abstinence syndrome in women maintained on buprenorphine during pregnancy. *J Midwifery Womens Health* 2013;58:383–388.
 32. Patrick SW, Schumacher RE, Benneyworth BD, et al. Neonatal abstinence syndrome and associated health care expenditures. *JAMA* 2012;307:1934–1940.
 33. Centers for Disease Control and Prevention. Opioid pain killers widely prescribed among reproductive age women [press release]. January 2015. Available at www.cdc.gov/media/releases/2015/p0122-pregnancy-opioids.html (accessed February 23, 2015).
 34. ACOG Committee on Health Care for Underserved Women; American Society of Addiction Medicine. ACOG Committee Opinion No. 524: Opioid abuse, dependence, and addiction in pregnancy. *Obstet Gynecol* 2012;119:1070–1076.
 35. World Health Organization. Guidelines for the identification and management of substance use and substance use disorders in pregnancy. 2014. Available at www.who.int/substance_abuse/publications/pregnancy_guidelines/en/ (accessed February 18, 2015).
 36. Montgomery A, Hale TW; The Academy of Breastfeeding Medicine. ABM Clinical Protocol #15: Analgesia and anesthesia for the breastfeeding mother, revised 2012. *Breastfeed Med* 2012;7:547–553.
 37. Hendrickson RG, McKeown NJ. Is maternal opioid use hazardous to breast-fed infants? *J Toxicol* 2012;50:1–14.
 38. Madadi P, Koren G, Cairns J, et al. Safety of codeine during breastfeeding. Fatal morphine poisoning in the breastfed neonate of a mother prescribed codeine. *Can Fam Physician* 2007;53:33–35.
 39. Perez-Reyes M, Wall ME. Presence of $\Delta 9$ -tetrahydrocannabinol in human milk. *N Engl J Med* 1982;307:819–820.
 40. Hale TW, Rowe HE. *Medications and Mothers' Milk*, 16th ed. Hale Publishing LP, Plano, TX, 2014.
 41. Astley SJ, Little RE. Maternal marijuana use during lactation and infant development at one year. *Neurotoxicol Teratol* 1990;12:161–168.
 42. Tennes K, Avitable N, Blackard C, et al. Marijuana: Prenatal and postnatal exposure in the human. *NIDA Res Monogr* 1985;59:48–60.
 43. Volkow ND, Baler RD, Compton WM, et al. Adverse health effects of marijuana use. *N Engl J Med* 2014;370:2219–2227.
 44. Hill M, Reed K. Pregnancy, breast-feeding, and marijuana: A review article. *Obstet Gynecol Surv* 2013;68:710–718.
 45. Campolongo P, Trezza V, Palmery M, et al. Developmental exposure to cannabinoids causes subtle and enduring neurofunctional alterations. *Int Rev Neurobiol* 2009;85:117–133.
 46. Klonoff-Cohen H, Lam-Kruglick P. Maternal and paternal recreational drug use and sudden infant death syndrome. *Arch Pediatr Adolesc Med* 2001;155:765–770.
 47. American Academy of Pediatrics. Joint Call to Action on Alcohol and Pregnancy. 2012. Available at www.aap.org/en-us/advocacy-and-policy/aap-health-initiatives/fetal-alcohol-spectrum-disorders-toolkit/Pages/Joint-Call-to-Action-on-Alcohol-and-Pregnancy.aspx (accessed February 18, 2015).
 48. Carson G, Cox LV, Crane J, et al. Alcohol use and pregnancy consensus clinical guidelines. *J Obstet Gynaecol Can* 2010;32(8 Suppl 3):S1–S32.
 49. Haastrup MB, Pottegard A, Damkier P. Alcohol and breastfeeding. *Basic Clin Pharmacol Toxicol* 2014;114:168–173.
 50. Lactmed. Alcohol Monograph. Available at <http://toxnet.nlm.nih.gov/> (accessed February 11, 2015).
 51. Koren G. Drinking alcohol while breastfeeding. Will it harm my baby? *Can Fam Physician* 2002;48:39–41.
 52. Yang I, Hall L. Smoking cessation and relapse challenges reported by postpartum women. *MCN Am J Matern Child Nurs* 2004;39:375–380.
 53. Levitt C, Shaw E, Wong S, et al. Systematic review of the literature on postpartum care: Effectiveness of interventions for smoking relapse prevention, cessation, and reduction in postpartum women. *Birth* 2007;34:341–347.
 54. Texas Tech University Health Sciences Center, Infant Risk Center. Tobacco Use. Available at www.infantrisk.com/content/tobacco-use (accessed February 20, 2015).
 55. Horta BL, Victora CG, Menezes AM, et al. Environmental tobacco smoke and breastfeeding duration. *Am J Epidemiol* 1997;146:128–133.
 56. Myr R. Promoting, protecting, and supporting breastfeeding in a community with a high rate of tobacco use. *J Hum Lact* 2014;20:415–416.
 57. Dorea JG. Maternal smoking and infant feeding: Breastfeeding is better and safer. *Matern Child Health J* 2007;11:287–291.
 58. Heydari G, Masjedi M, Ahmady AE, et al. A comparative study on tobacco cessation methods: A quantitative systematic review. *Int J Prev Med* 2014;5:673–678.

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Appendix G: Surgeon General's Advisory on THC

U.S. Surgeon General's Advisory: Marijuana Use and the Developing Brain

I, Surgeon General VADM Jerome Adams, am emphasizing the importance of protecting our Nation from the health risks of marijuana use in adolescence and during pregnancy. Recent increases in access to marijuana and in its potency, along with misperceptions of safety of marijuana endanger our most precious resource, our nation's youth.

KNOW THE RISKS. TAKE ACTION. PROTECT OUR FUTURE.



Background

Marijuana, or cannabis, is the most commonly used illicit drug in the United States. It acts by binding to cannabinoid receptors in the brain to produce a variety of effects, including euphoria, intoxication, and memory and motor impairments. These same cannabinoid receptors are also critical for brain development. They are part of the endocannabinoid system, which impacts the formation of brain circuits important for decision making, mood and responding to stress¹.

Marijuana and its related products are widely available in multiple forms. These products can be eaten, drunk, smoked, and vaped². Marijuana contains varying levels of delta-9-tetrahydrocannabinol (THC), the component responsible for euphoria and intoxication, and cannabidiol (CBD). While CBD is not intoxicating and does not lead to addiction, its long-term effects are largely unknown, and most CBD products are untested and of uncertain purity³.

Marijuana has changed over time. The marijuana available today is much stronger than previous versions. The THC concentration in commonly cultivated marijuana plants has increased three-fold between 1995 and 2014 (4% and 12% respectively)⁴. Marijuana available in dispensaries in some states has average concentrations of THC between 17.7% and 23.2%⁵. Concentrated products, commonly known as dabs or waxes, are far more widely available to recreational users today and may contain between 23.7% and 75.9% THC⁶.

The risks of physical dependence, addiction, and other negative consequences increase with exposure to high concentrations of THC⁷ and the younger the age of initiation. Higher doses of THC are more likely to produce anxiety, agitation, paranoia, and psychosis⁸. Edible marijuana takes time to absorb and to produce its effects, increasing the risk of unintentional overdose, as well as accidental ingestion by children⁹ and adolescents¹⁰. In addition, chronic users of marijuana with a high THC content are at risk for developing a condition known as cannabinoid hyperemesis syndrome, which is marked by severe cycles of nausea and vomiting¹¹.

This advisory is intended to raise awareness of the known and potential harms to developing brains, posed by the increasing availability of highly potent marijuana in multiple, concentrated forms. These harms are costly to individuals and to our society, impacting mental health and educational achievement and raising the risks of addiction and misuse of other substances. Additionally, marijuana use remains illegal for youth under state law in all states; normalization of its use raises the potential for criminal consequences in this population. In addition to the health risks posed by marijuana use, sale or possession of marijuana remains illegal under federal law notwithstanding some state laws to the contrary.

Marijuana Use during Pregnancy

Pregnant women use marijuana more than any other illicit drug. In a national survey, marijuana use in the past month among pregnant women doubled (3.4% to 7%) between 2002 and 2017 ¹². In a study conducted in a large health system, marijuana use rose by 69% (4.2% to 7.1%) between 2009 and 2016 among pregnant women ¹³. Alarmingly, many retail dispensaries recommend marijuana to pregnant women for morning sickness ¹⁴.

Marijuana use during pregnancy can affect the developing fetus. THC can enter the fetal brain from the mother's bloodstream and may disrupt the endocannabinoid system, which is important for a healthy pregnancy and fetal brain development ¹. Moreover, studies have shown that marijuana use in pregnancy is associated with adverse outcomes, including lower birth weight ¹⁵. The Colorado Pregnancy Risk Assessment Monitoring System reported that maternal marijuana use was associated with a 50% increased risk of low birth weight regardless of maternal age, race, ethnicity, education, and tobacco use ¹⁶.

The American College of Obstetricians and Gynecologists holds that “[w]omen who are pregnant or contemplating pregnancy should be encouraged to discontinue marijuana use. Women reporting marijuana use should be counseled about concerns regarding potential adverse health consequences of continued use during pregnancy” ¹⁷. In 2018, the American Academy of Pediatrics recommended that “...it is important to advise all adolescents and young women that if they become pregnant, marijuana should not be used during pregnancy” ¹⁸.

Maternal marijuana use may still be dangerous to the baby after birth. THC has been found in breast milk for up to six days after the last recorded use. It may affect the newborn's brain development and result in hyperactivity, poor cognitive function, and other long-term consequences ¹⁹, ²⁰, ²¹. Additionally, marijuana smoke contains many of the same harmful components as tobacco smoke ²². No one should smoke marijuana or tobacco around a baby.

Marijuana Use during Adolescence

Marijuana is also commonly used by adolescents⁴, second only to alcohol. In 2017, approximately 9.2 million youth aged 12 to 25 reported marijuana use in the past month and 29% more young adults aged 18-25 started using marijuana²³. In addition, high school students' perception of the harm from regular marijuana use has been steadily declining over the last decade²⁴. During this same period, a number of states have legalized adult use of marijuana for medicinal or recreational purposes, while it remains illegal under federal law. The legalization movement may be impacting youth perception of harm from marijuana.

The human brain continues to develop from before birth into the mid-20s and is vulnerable to the effects of addictive substances²⁵, ²⁶. Frequent marijuana use during adolescence is associated with changes in the areas of the brain involved in attention, memory, decision-making, and motivation. Deficits in attention and memory have been detected in marijuana-using teens even after a month of abstinence²⁷. Marijuana can also impair learning in adolescents. Chronic use is linked to declines in IQ, school performance that jeopardizes professional and social achievements, and life satisfaction²⁸. Regular use of marijuana in adolescence is linked to increased rates of school absence and drop-out, as well as suicide attempts²⁹.

Marijuana use is also linked to risk for and early onset of psychotic disorders, such as schizophrenia. The risk for psychotic disorders increases with frequency of use, potency of the marijuana product, and as the age at first use decreases³⁰. Adolescent marijuana use is often also associated with other substance use³¹, ³². In 2017, teens 12-17 reporting frequent use of marijuana showed a 130% greater likelihood of misusing opioids²³. Marijuana's increasingly widespread availability in multiple and highly potent forms, coupled with a false and dangerous perception of safety among youth, merits a nationwide call to action.

You Can Take Action

No amount of marijuana use during pregnancy or adolescence is known to be safe. Until and unless more is known about the long-term impact, the safest choice for pregnant women and adolescents is not to use marijuana. Pregnant women and youth--and those who love them--need the facts and resources to support healthy decisions. It is critical to educate women and youth, as well as family members, school officials, state and local leaders, and health professionals, about the risks of marijuana, particularly as more states contemplate legalization.

Science-based messaging campaigns and targeted prevention programming are urgently needed to ensure that risks are clearly communicated and amplified by local, state, and national organizations. Clinicians can help by asking about marijuana use, informing mothers-to-be, new mothers, young people, and those vulnerable to psychotic disorders, of the risks. Clinicians can also prescribe safe, effective, and FDA-approved treatments for nausea, depression, and pain during pregnancy. Further research is needed to understand all the impacts of THC on the developing brain, but we know enough now to warrant concern and action. Everyone has a role in protecting our young people from the risks of marijuana.

Information for Parents and Parents-to-be

You have an important role to play for a healthy next generation.

- Review the [facts](#) to understand the risks associated with marijuana use during pregnancy.
- Check out these [Frequently Asked Questions](#) about marijuana use and pregnancy.
- Learn about [marijuana safety for children and pregnant and breastfeeding women](#).
- Start a conversation with your kids: [Marijuana: Facts Parents Need to Know](#).
- Keep your adolescent from using marijuana and other drugs: [Keeping Youth Drug Free - PDF](#).
- Watch the [Message to Parents from NIH/NIDA](#)

Information for Youth:

You have an important role to play for a healthy next generation.

- Want to know how marijuana affects brain development? [Get the facts](#).
- Learn key techniques on how to resist peer pressure: [Above the Influence](#).
- Learn how to help friends stop using marijuana with [Letter to Teens](#)
- Get around-the-clock free advice and referrals: [Substance Abuse and Mental Health Administration \(SAMHSA\) National Helpline \(1-800-662-HELP \(4357\)\)](#).

Information for States, Communities, Tribes, and Territories:

You have an important role to play for a healthy next generation.

- Learn how communities and schools can act: [Preventing Marijuana Use among Youth & Young Adults](#).
- Find key messages for communities at www.samhsa.gov/marijuana.
- Get training and educational resources for your community: [Prevention Technology Transfer Centers](#).

Information for Health Professionals:

You have an important role to play for a healthy next generation.

- Learn how you can integrate marijuana education into prenatal care visits: [Marijuana Pregnancy & Breastfeeding Guidance - PDF](#).
- Get advice on talking with adolescents and parents about marijuana use from the American Academy of Pediatrics [guidance for clinicians](#).
- Read the [American College of Obstetricians and Gynecologists position on Marijuana use during pregnancy and lactation](#).

Footnotes

1. [↵](#) [↵](#) [↵](#) Brents L. K. (2016). Marijuana, the Endocannabinoid System and the Female Reproductive System. *The Yale journal of biology and medicine*, 89(2), 175–191.
2. [↵](#) National Center for Chronic Disease Prevention and Health Promotions, Centers for Disease Control and Prevention. Marijuana and Public Health: How is marijuana used? <https://www.cdc.gov/marijuana/faqs/how-is-marijuana-used.html>.
3. [↵](#) Bonn-Miller M.O., Loflin M.J.E., Thomas B.F., et al. Labeling Accuracy of Cannabidiol Extracts Sold Online. *JAMA*. 2017;318(17):1708-1709. doi:10.1001/jama.2017.11909.
4. [↵](#) Elsohly, M. A., Mehmedic, Z., Foster, S. (2016). Changes in Cannabis Potency Over the Last 2 Decades (1995-2014): Analysis of Current Data in the United States. *Biological Psychiatry*, 79(7), 613-619. doi:10.1016/j.biopsych.2016.01.004.
5. [↵](#) Jikomes, N., & Zoorob, M. (2018). The Cannabinoid Content of Legal Cannabis in Washington State Varies Systematically Across Testing Facilities and Popular Consumer Products. *Scientific reports*, 8(1), 4519. doi:10.1038/s41598-018-22755-2
6. [↵](#) Alzghari, S. K., Fung, V., Rickner, S. S., Chacko, L., & Fleming, S. W. (2017). To Dab or Not to Dab: Rising Concerns Regarding the Toxicity of Cannabis Concentrates. *Cureus*, 9(9), e1676. doi:10.7759/cureus.1676.
7. [↵](#) Freeman, T. P., & Winstock, A. R. (2015). Examining the profile of high-potency cannabis and its association with severity of cannabis dependence. *Psychological medicine*, 45(15), 3181–3189. doi:10.1017/S0033291715001178
8. [↵](#) Volkow N.D., Baler R.D., Compton W.M., Weiss S.R.B. Adverse Health Effects of Marijuana Use *N Engl J Med*. 2014 June 5; 370(23): 2219–2227. doi:10.1056/NEJMra1402309.
9. [↵](#) Richards, J.R., Smith N.E., Moulin, A.K. Unintentional Cannabis Ingestion in Children: A Systematic Review. *J Pediatr* 2017; 190:142-52.
10. [↵](#) Cao, D., Sahaphume, S., Bronstein, A.C., Hoyte, C.O., Characterization of edible marijuana product exposures reported to the United States poison centers. *Clinical Toxicology*, 54:9, 840-846, DOI: 10.1080/15563650.2016.1209761
11. [↵](#) Galli, J.A., Sawaya, R.A., Friedenber, F.K. Cannabinoid Hyperemesis Syndrome. *Curr Drug Abuse Rev*. 2011 Dec; 4(4): 241–249.
12. [↵](#) Volkow N.D., Han B., Compton W.M., McCance-Katz E.F. Self-reported Medical and Non-medical Cannabis Use Among Pregnant Women in the United States. *JAMA*. 2019 doi:10.1001/jama.2019.7982
13. [↵](#) Young-Wolff KC, Tucker L, Alexeeff S, et al. Trends in Self-reported and Biochemically Tested Marijuana Use Among Pregnant Females in California From 2009-2016. *JAMA*. 2017;318(24):2490–2491. doi:10.1001/jama.2017.17225.
14. [↵](#) Dickson, B. (2018). Recommendations From Cannabis Dispensaries About First-Trimester Cannabis Use. *Obstetrics & Gynecology*. 2018; 0029-7844. doi:10.1097/AOG.0000000000002619.
15. [↵](#) National Academies of Sciences, Engineering, and Medicine. 2017. *The health effects of cannabis and cannabinoids: Current state of evidence and recommendations for research*. Washington, DC: The National Academies Press.
16. [↵](#) Crume et al: Cannabis use during the perinatal period in a state with legalized recreational and medical marijuana: the association between maternal characteristics, breastfeeding patterns, and neonatal outcomes. *J Pediatr*. 2018;197:90-96.
17. [↵](#) American College of Obstetricians and Gynecologists: Marijuana use during pregnancy and lactation. Committee Opinion No. 722. *Obstet Gynecol*. 2017;130(4):e205-e209.
18. [↵](#) Ryan et al: Marijuana use during pregnancy and breastfeeding: implications for neonatal and childhood outcomes. *Pediatrics*. 2018; 142(3):e20181889.
19. [↵](#) Bertrand, K. A., Hanan, N. J., Honerkamp-Smith, G., Best, B. M., & Chambers, C. D. (2018). Marijuana Use by Breastfeeding Mothers and Cannabinoid Concentrations in Breast Milk. *Pediatrics*, 142(3). doi:10.1542/peds.2018-1076.
20. [↵](#) Metz TD, Stickrath EH: Marijuana use in pregnancy and lactation: a review of the evidence. *Am J Obstet Gynecol*. 2015;213(6):761-778.
21. [↵](#) Effects while pregnant or breastfeeding. (2017, March 02). Retrieved from <https://www.colorado.gov/pacific/marijuana/effects-while-pregnant-or-breastfeeding>.

22. [↵](#) Moir, D., et al., A comparison of mainstream and sidestream marijuana and tobacco cigarette smoke produced under two machine smoking conditions. *Chem Res Toxicol* 21: 494-502. (2008).
23. [↵](#) Substance Abuse and Mental Health Services Administration. (2018). Key Substance Use and Mental Health Indicators in the United States: Results from the 2017 National Survey on Drug Use and Health (HHS Publication No. SMA 18-5068, NSDUH Series H-53). Rockville, MD: Center for Behavioral Health Statistics and Quality, Substance Abuse and Mental Health Services Administration
24. [↵](#) Johnston, L. D., Miech, R. A., O'Malley, P. M., Bachman, J. G., Schulenberg, J. E., & Patrick, M. E. (2019). Monitoring the Future national survey results on drug use, 1975-2018: Overview, key findings on adolescent drug use. Ann Arbor: Institute for Social Research, The University of Michigan, 119 pp.
25. [↵](#) Pujol, J., Vendrell, P., Junqué, C., Martí-Vilalta, J. L., & Capdevila, A. (1993). When does human brain development end? Evidence of corpus callosum growth up to adulthood. *Annals of Neurology*, 34(1), 71-75. doi:10.1002/ana.410340113.
26. [↵](#) Levine, A., Clemenza, K., Rynn, M., & Lieberman, J. (2017). Evidence for the Risks and Consequences of Adolescent Cannabis Exposure. *Journal of the American Academy of Child & Adolescent Psychiatry*, 56(3), 214-225. doi:10.1016/j.jaac.2016.12.014.
27. [↵](#) Meruelo AD, Castro N, Cota CI, Tapert SF. Cannabis and alcohol use, and the developing brain. *Behav Brain Res*. 2017;325(Pt A):44–50. doi:10.1016/j.bbr.2017.02.025.
28. [↵](#) Meier M.H., Caspi A., Ambler A., et. al. Persistent cannabis users show neuropsychological decline from childhood to midlife. *Proc Natl Acad Sci USA*., 2012. Oct 2; 109(40) E2657-64 doi 10.1073/pnas. 1206820109. Epub 2012 Aug 27
29. [↵](#) Silins, E., Horwood, L. J., & Patton, G. C. (2014). Young adult sequelae of adolescent cannabis use: An integrative analysis. *The Lancet Psychiatry*, 1(4), 286-293. doi:10.1016/s2215-0366(14)70307-4.
30. [↵](#) Di Forti, M., Quattrone, D., & Freeman, T. (2019). The contribution of cannabis use to variation in the incidence of psychotic disorder across Europe (EU-GEI): A multicenter case-control study. *The Lancet Psychiatry*, 6(5), 427-436. doi:10.1016/S2215-0366(19)30048-3.
31. [↵](#) Lopez-Quintero C., Perez de los Cabos J., Hasin D.S. (2011). Probability and predictors of transition from first use to dependence on nicotine, alcohol, cannabis, and cocaine: results of the National Epidemiologic Survey on Alcohol and Related Conditions (NESARC). *Drug Alcohol Dependence*. 115(1-2):120-130.
32. [↵](#) Jones, C. M., & McCance-Katz, E.F. (2019). Relationship Between Recency and Frequency of Youth Cannabis Use on Other Substance Use. *Journal of Adolescent Health*, 64(3), 411-413. doi:10.1016/j.jadohealth.2018.09.017.

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