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Addiction treatment in the postpartum period: an opportunity for evidence-based personalized medicine

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Abstract

Substance use disorders (SUD) are becoming rapidly more prevalent in women and a leading cause of pregnancy associated deaths, with most deaths occurring during the 12 months after pregnancy. The postpartum period can be quite intense, especially for women seeking addiction recovery. There is a call to reconceptualize the obstetrical postpartum care model into one that extends specialised care and is tailored to an individual's specific needs. Although SUD treatment improves maternal and infant outcomes as well as decreases overdose risk, many women do not receive consistent SUD treatment during the postpartum period. Thus, SUD treatments should consider following the same guidance as obstetrics to reconceptualize how SUD treatment is delivered postpartum. Clinically, this translates into substantially modifying traditional siloed SUD treatment structures to meet the unique needs of this vulnerable patient population. At the same time, more research is urgently needed to inform these advancements in clinical care to ensure they are evidence-based and effective. In this article, we review the existing evidence as well as highlight opportunities for both clinicians and researchers to advance the integration of tailored approaches for postpartum women into personalised SUD medical and behavioural treatments.

Keywords

Addiction; pregnancy; postpartum; substance use disorder; opioid use disorder

Introduction

Addiction is a chronic disease for which manifestations extend across the life span, similar to other chronic diseases such as diabetes and hypertension. For women, this means addiction extends into the pregnancy and postpartum periods necessitating specialised treatments. Substance use disorders (SUD) are becoming rapidly more prevalent in women (Ali et al., 2020; Gabrielson et al., 2020). Consequently, substance use has become a leading cause of pregnancy associated deaths (Smid, Maeda, et al., 2020). However, most substance

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use related perinatal deaths occur after delivery, rather than during pregnancy (Smid et al., 2019). The postpartum period, or 'Fourth Trimester', includes the 3 to 12 months after the end of pregnancy, typically after birth of an infant. This time can be quite intense for women and families, with opportunities for joy while bonding with a new baby but also with many challenges such as sleep and mood disturbances. This whirlwind of changes can be overwhelming for many women, especially for women seeking addiction recovery (Wu et al., 2021).

Despite the known challenges for postpartum women, the healthcare generally focuses on the needs of the infant more than the needs of the woman through the perinatal period (Tully et al., 2017). Even during pregnancy, much of the prenatal care is focussed on the mother as a vessel for the infant rather than focussing on the mother/infant dyad in addition to the needs of the woman independent from her infant. Resultantly, many women are left with unmet needs during the postpartum period and are at risk of devastating consequences, such as suicide (Admon et al., 2021). There is a call to reconceptualize postpartum obstetrical care and replace the traditional single 4–6 week postpartum visit with a comprehensive woman-centered postpartum care model that extends specialised maternal care through the entire postpartum period (ACOG, 2018). Importantly, it is recommended that this reconceptualized postpartum care model be tailored to an individual's specific needs (e.g. more frequent provider visits for mood in the first 3 months for women with depression) and the unique aspects inherent to postpartum (e.g. childcare, telehealth option when preferred).

For women with SUD, we are witnessing devastating trends in morbidity and mortality during the postpartum period (Hall et al., 2020). Although SUD treatment improves maternal and infant outcomes as well as decreases overdose risk, many women experience lapses in their SUD treatment receipt (Schiff et al., 2018), discontinue SUD treatment (C. Wilder et al., 2015), or do not receive any SUD treatment at all during the postpartum period. Given the recent reconceptualization of postpartum care in obstetrics, obstetricians are uniquely positioned and are being called to take the lead in facilitating multidisciplinary collaboration among addiction specialists, psychiatrists, and behavioural health providers to improve consistent continuation of SUD treatment after birth and throughout the fourth trimester (Smid, Schauburger, et al., 2020). Guidance for the extended postpartum obstetrical care model can provide a framework to reconceptualize how SUD treatment is delivered postpartum. Clinically, this translates into a need to modify traditional SUD treatment structures: moving from siloed acute care to an integrated chronic disease model of addiction treatment, prioritising recovery-oriented treatment approaches rather than traditional abstinence-based approaches, and emphasising harm reduction (e.g. meeting people 'where they are'). However, more research is needed that focuses on how to effectively personalise SUD treatment regimens for postpartum women, specifically tailoring adaptable and efficient SUD treatments to target specific health needs of women during the dynamic postpartum period. In this article, we review the existing evidence that can guide how to address the unique aspects of the postpartum period within personalised SUD treatment. In doing so, we also highlight opportunities for both clinicians and researchers to advance the integration of tailored approaches for postpartum women into SUD treatments.

How can the postpartum period uniquely impact the recovery of women in SUD treatment?

The postpartum period involves a milieu of changes in physical health, sleep, mental health, family dynamics, and social environments (Tully et al., 2017). For many women with SUD, these changes are further compounded by low social support, mood changes, interpersonal violence, and substance use recurrence, as well as stigma and discrimination related to SUD (Cleveland et al., 2020; Goodman et al., 2020). Therefore, it is terrible, yet not surprising, that drug induced deaths have become a leading cause of death among postpartum women, especially in the 6–12 months after birth (Wallace et al., 2020). Less than 13% of pregnant and 10% of parenting women in need of SUD treatment receive it (Martin, Scialli, et al., 2020). Even if women are engaged in SUD treatment during pregnancy, many discontinue it postpartum (C. Wilder et al., 2015), leaving them at risk of life altering morbidity and mortality for themselves and their families (Nielsen et al., 2020). Given the robust benefits of engaging in SUD treatment, there is an urgent need for gender-informed SUD treatment capacity to be expanded (Hadland et al., 2020) and for existing SUD treatments to improve their capabilities to compassionately care for women through the vulnerable postpartum period (McCarthy et al., 2020). Additionally, it is imperative to prioritise research that will inform how to effectively personalise the combination of SUD treatment and recovery support components at an individual level (Volkow, 2020a).

A natural first step to achieving this goal of high quality, personalised SUD treatment tailored to a postpartum individual's needs is to consider common unique aspects of the early (i.e. within 3 months) and late (i.e. 3–12 months) postpartum periods that should be addressed in SUD treatment care models (Martin et al., 2019). Considering the immediate postpartum period (e.g. before and after hospital discharge), SUD treatment providers should be encouraged to collaborate with obstetrical, paediatric and social work teams prenatally to ensure everyone is consistent in their messaging and management of prevalent issues that can impact addiction recovery of women transitioning from pregnancy to postpartum (Krans et al., 2019). For example, for women in opioid use disorder (OUD) recovery receiving medication for opioid use disorder (MOUD), the anticipation and experience of pain and neonatal opioid withdrawal syndrome (NOWS) can be quite stressful (Buczowski et al., 2020). Providing person-centered, compassionate, recovery-oriented counselling about these topics prenatally through postpartum can reassure women (e.g. neuraxial anaesthesia effectiveness, first line NOWS treatments are non-pharmacologic), provide opportunities to debunk myths (e.g. receipt of pain medications while receiving MOUD, breastfeeding safety) and invite women to be an active member in the development of their postpartum care plans (e.g. pain management with anaesthesia, plan of safe care with social work).

In the latter portion of the postpartum period, the nature of challenges women in SUD treatment encounter may change. For example, many women face 'churn' of insurance coverage (Daw et al., 2017) which has rippling effects on ongoing SUD treatment within a chronic disease model; as an example, for women receiving MOUD, lapses can put them at risk of substance use recurrence, overdose and death (Schiff et al., 2018). Sleep quality is also often compromised due to infant sleep schedules, requiring interventions tailored

for the unique challenges of the postpartum period (i.e. setting daily routines). These sleep disruptions can exacerbate mood and anxiety symptoms (Okun et al., 2018; Thomas & Spieker, 2016) as well as the pre-existing poor sleep many people with SUD face (Finan et al., 2020) and can worsen stability in addiction recovery (Bertz et al., 2019; Burke et al., 2008). Cognitive behavioural therapy for insomnia (CBT-I) has been shown to improve sleep outcomes among postpartum women and individuals with SUD separately (Chakravorty et al., 2018; Kalmbach et al., 2020). However, more research is needed to develop and/or modify evidence-based adjunct behavioural and medication treatments for sleep within SUD treatment regimens for use specifically among postpartum women. Lastly, in order to facilitate consistent continuation of SUD treatment through the entire postpartum period, SUD treatment programs need to accommodate challenges that come with parenting through provision of services like childcare with both medical and behavioural health services as well as appointment flexibility to allow telehealth capabilities and rescheduling when conflicts with infant care (e.g. paediatrician appointments) arise.

How should behavioural health approaches to SUD treatment and recovery support be tailored to the needs of postpartum women?

Gold standard SUD treatment includes a range of integrated medical and behavioural therapies as well as recovery support services tailored to meet individuals' needs. Evidence-based behavioural therapies such as cognitive behavioural therapy (CBT), contingency management, and motivational interviewing, have been a cornerstone of SUD treatment for many years and remain a primary component of comprehensive SUD treatment (NIDA., 2018). The unique challenges that accompany the peripartum period, particularly among women with SUD, highlight the need for specialised behavioural health approaches tailored to meet the needs of these women. As an example, psychiatric comorbidities are common among pregnant and postpartum women with SUD (Arnaudo et al., 2017). Additionally, peripartum mood and anxiety disorders are prevalent, especially during the postpartum period, and contribute to adverse maternal and infant outcomes (Holbrook & Kaltenbach, 2012; McKee et al., 2020). Co-occurring mental illness and SUD can lead to more severe impairment (Margaret M. Benningfield et al., 2010), impact treatment outcomes such as substance use recurrence (Chapman & Wu, 2013) and treatment retention (Benningfield et al., 2012), and increase overdose risk (Fendrich et al., 2019). Evidence-based behavioural treatments among pregnant women have been used to help reduce substance use and improve foetal outcomes (Forray & Foster, 2015; Haug et al., 2014), though outcomes vary based on type of behavioural treatment and primary substance (Terplan et al., 2015; Ujhelyi Gomez et al., 2020). Effectiveness of behavioural therapies among postpartum women with SUD needs further investigation. However, based on studies among individuals in SUD treatment, those with SUD and psychiatric comorbidities should receive integrated behavioural interventions that are tailored to address both the substance use and mental health concerns for each individual (Vujanovic et al., 2017; Wolitzky-Taylor et al., 2011). In addition, polysubstance use is common, and interventions should also be tailored based on specific type of SUDs (Forray & Foster, 2015). For instance, contingency management has been shown to be the most promising behavioural intervention for stimulant use disorder

among pregnant women; however, for women with OUD, contingency management is a suggested adjunct to the gold standard MOUD (Forray & Foster, 2015).

Trauma history is another important consideration when tailoring behavioural health approaches for postpartum women in SUD treatment. Exposure to childhood maltreatment or adverse events is common among women with SUD and predicts perinatal mood and anxiety concerns (Choi & Sikkema, 2016; Stein et al., 2017). Women with SUD also experience high rates of intimate partner violence (IPV), lifetime traumatic events, and post-traumatic stress disorder (PTSD) (Jones et al., 2004; McHugo et al., 2005; Schneider et al., 2009). Lifetime and current trauma experiences add additional complexities to SUD treatment for postpartum women as trauma increases the risk of substance use recurrence and overdose (Cleveland et al., 2020). Evidence suggests that routine screening for trauma experiences and trauma-informed, integrated interventions that address both SUD and trauma history simultaneously improve treatment outcomes (Goodman et al., 2015; Marsden et al., 2019; Najavits et al., 1998); therefore, trauma experiences should be considered during SUD treatment planning for postpartum women.

Additionally, unique to the postpartum period, birth-related post-traumatic stress can occur. Childbirth can be a stressful or traumatic experience for women (Alcorn et al., 2010), especially for women with pre-existing trauma histories as labour and delivery can be triggering experiences (Goodman et al., 2015). Studies among postpartum women without SUD have shown that, in addition to trauma history, perceived control during birth experience and quality of provider interaction also predict PTSD following childbirth (Dekel et al., 2017; Patterson et al., 2019). More research is needed to better understand PTSD following childbirth among women with SUD, especially given the discrimination and stigma within healthcare settings that likely further impact a woman's birth experience (Volkow, 2020). Lastly, birth complications can contribute to birth-related post-traumatic stress (Dekel et al., 2017) which is of particular concern for women with OUD who have infants with neonatal withdrawal syndrome (NOWS). The possibility of infants developing NOWS can be incredibly distressing for many mothers and contributes to higher risk for comorbid mental health conditions, even among mothers whose infants do not develop NOWS (Corr et al., 2020; Faherty et al., 2018). These postpartum mothers will likely require additional support.

How should medication approaches to SUD treatment and recovery support be tailored to the needs of postpartum women?

The comprehensive SUD treatment model encompasses a multi-modal approach across multiple specialties, with medications highlighted as an integral component to an evidence-based SUD treatment program (NIDA, 2020). The two most common types of medications of utmost importance in SUD treatment are those specific to alleviating the symptoms of the addiction (e.g. MOUD, naltrexone or acamprosate for alcohol use disorder) as well as psychiatric medications that can stabilise mood (e.g. SSRIs). Many medications require meticulous management through the perinatal period; for example, obstetricians are well-trained in how to titrate insulin or levothyroxine for diabetes and hypothyroidism during

pregnancy and postpartum. However, evidence to guide perinatal medication dosage or regimen changes for other medications is limited. Additionally, methods are needed to tailor medication management at an individual level using quantifiable tools like biomarkers to proactively identify when a medication change is indicated to reduce harm (i.e. prior to a clinically significant mood exacerbation).

For MOUD, such an evidence base is in its infancy, but existing observational research does indicate that methadone (Bogen et al., 2013) and buprenorphine (Martin, Shadowen, et al., 2020) commonly will need increases in total daily doses as well as splitting of dosing frequency during pregnancy (McCarthy et al., 2018). Evidence focussed on perinatal buprenorphine management is less robust than methadone, but observational evidence indicates that during pregnancy increases in total daily dosages and splitting of dosing frequency are commonly needed to maintain stability (Bastian et al., 2017). The evidence base to guide postpartum dose changes is further lacking. Methadone rarely will need dose increases after delivery; current recommendations state that dose changes should be based on individuals' clinical presentations as there is significant variability in metabolism and drug effect across individuals, especially as women transition physiologically from pregnancy (Pace et al., 2014). Like methadone, buprenorphine dose changes after delivery vary widely between individuals, but unlike methadone, it is not uncommon for women to need increases in their total daily doses postpartum (Martin, Shadowen, et al., 2020). Reasons for this likely are complex, such as buprenorphine's anti-depressant effects (Serafini et al., 2018) and possible sex-based differences in effectiveness (Huhn et al., 2019), and should be investigated further. Overall, generic protocols to decrease MOUD dosages after delivery may result in decreased SUD treatment retention postpartum (C. M. Wilder et al., 2017). Such protocols are not personalised and not evidence based, thus should not be adopted by SUD treatment programs.

Given the known vulnerability of the postpartum period for women seeking SUD recovery, providers and patients should discuss the risks and benefits of SUD and psychiatric medication continuation through the 12 months after pregnancy. Such discussions need to incorporate best practices of shared-decision making and patient-centered approaches as well as a recovery-oriented focus. For example, stigma surrounding MOUD is prevalent in healthcare and communities (Volkow, 2020b) and inhibits people from accessing evidence-based SUD treatments. Stigma is associated with compromised outcomes among people in SUD treatment (Ashford et al., 2019). For pregnant and parenting women who use substances, discrimination and prejudice is further exacerbated (Cockroft et al., 2019). Compassionate discussions of these issues with a trusted healthcare provider can help address myths about MOUD 'replacing one drug for another' and equip patients with information and skills to talk with their friends or family about the role of MOUD in their recovery (Schmidt et al., 2019). These provider-patient discussions may empower women to continue MOUD through at least 12 months postpartum, a crucial window for consistent SUD treatment engagement to reduce harm that can occur with lapses in SUD treatment (Schiff et al., 2018). However, evidence to guide best practices for these provider-level discussions and structure of SUD treatment systems to best support such a recovery-oriented care model is lacking and is an area in need of further investigation.

How should SUD treatment wrap-around and recovery support services be tailored to the needs of postpartum women?

The standard of care for pregnant, postpartum and parenting women seeking SUD recovery includes evidence-based behavioural health and medical SUD treatments along with wrap-around services, such as housing, transportation, and childcare services (Klaman et al., 2017). Just as the risk factors for the development of the disease of addiction are multidimensional covering biologic or genetic, environmental and psychosocial areas, SUD treatment regimens should address women's diverse needs. Integration of onsite gender-specific support services into treatment programs can increase service utilisation and in turn improve SUD treatment outcomes (Elms et al., 2018). For example, services such as therapy sessions with childcare or a mom's recovery group can improve attendance and help parenting women given their unique needs (Greenfield et al., 2007). Further, postpartum women have found Peer Support Specialists to be valuable and have a strong, positive impact on their recovery (Fallin-Bennett et al., 2020). Lastly, treatment programs that have offered pregnant and postpartum women employment opportunities, patient navigation services, and regular meetings with social workers have found favourable outcomes during the postpartum period (Martinez & Allen, 2020).

However, a 'kitchen sink' approach, where all women are advised to engage in a plethora of services, is not sustainable for SUD treatment programs, not feasible for postpartum women (e.g. busy with multiple infant-related responsibilities), and not effective at optimising long-term health outcomes (Cleveland et al., 2020). Similar to how medication and behavioural health components of SUD treatment should strive to be personalised to the postpartum woman with evidence to guide individualised approaches, SUD treatment wrap-around services offered and recommended to postpartum women should also be tailored to individual needs. Evidence to guide this personalisation of the multimodal approach to piecing together the puzzle of treatment components specific for postpartum women is lacking. However, emerging evidence focussed on the roles of sex and gender in addiction risk (Becker & Chartoff, 2019; Martin, Ksinan, et al., 2020) and SUD treatment (Campbell et al., 2018; McHugh et al., 2018) can be used to start on these advancements in clinical care and research. Addressing these co-morbid conditions with known sex- and gender-based disparities in prevalence and negative health impacts, such as trauma and mood, is a critical first step in achieving individualised SUD treatment approaches, as incorporation of sex and gender into one's treatment plan is a vital component of personalised medicine (Mauvais-Jarvis et al., 2020).

An important example of how sex- and gender-based disparities can inform personalised SUD treatment wrap-around services is IPV. The intersection of IPV and substance use brings unique challenges to SUD treatment provision during the postpartum period and underscores the need for trauma-informed care (Engstrom et al., 2012; Martin et al., 2003; Schneider et al., 2009). Pregnant and postpartum women are more likely to experience IPV than women in different life stages (Agrawal et al., 2014), and those experiencing IPV have increased risks of overdose, suicide, and homicide during the pregnancy and postpartum periods (Cleveland et al., 2020; El-Bassel et al., 2019; Wallace et al., 2020). Among

women in SUD treatment, IPV can lead to increased substance use (El-Bassel et al., 2005), reduced engagement in SUD treatment and recovery-oriented services (Pallatino, Chang, & Krans et al., 2019), and decreased likelihood of treatment completion (Lipsky et al., 2010). Both the US Preventative Services Task Force and the American College of Obstetricians and Gynaecologists recommend ongoing IPV screening and referral to intervention for all reproductive age women, including during pregnancy and postpartum (ACOG, 2012; Curry et al., 2018; Lutgendorf, 2019). Routine IPV screening in a compassionate and non-judgemental manner is especially important for postpartum women with SUD as those with current or past IPV have complex SUD treatment needs. Providing integrated, tailored wrap-around IPV services such as safety resources, lactation support, contraception counselling, and family-focussed services for postpartum women who have experienced IPV can help address their unique needs (Andrews et al., 2011; Bailey et al., 2019; Gilbert et al., 2006; Miller-Graff et al., 2018). More research is needed to understand the impact of these services on SUD outcomes.

What are opportunities to advance the evidence base to better individualise SUD treatments for postpartum women?

There is an urgent need to improve the evidence base for sex- and gender-sensitive, trauma-informed, recovery-oriented individualised SUD treatment regimens for postpartum women and identify the best practices for translation into clinical care. Development and application of personalised medicine approaches specific to SUD will not be possible without first developing and validating assessments that go beyond DSM-5 criteria, which commonly combine individuals into heterogeneous groups that then lead to difficulty in distinguishing between effective and ineffective treatments (Kwako et al., 2019). Patient assessments should incorporate sex and gender, which are critical to treatment success, and should utilise a trauma-informed approach, though more work is needed to determine the best methods for operationalising and implementing trauma-informed approaches (Champine et al., 2019). Further, patient assessments that comprehensively evaluate strengths and barriers to achieving recovery goals in SUD treatment are needed (Volkow, 2020a). Specifically, assessments should incorporate translational science principles by evaluating the mechanisms underlying predictors of treatment success, such as neurobehavioral characteristics, and then inform tailored combinations of medical, behavioural and recovery support SUD treatment components (Vassileva & Conrod, 2019).

Moreover, patient assessments as well as measured treatment outcomes should consider a holistic definition of recovery beyond abstinence in which recovery is viewed as '*a process of change through which individuals improve their health and wellness, live a self-directed life, and strive to reach their full potential*' (Betty Ford Institute Consensus Panel, 2007; SAMHSA, 2019). In line with the push for advancement of recovery-oriented SUD treatment services, recovery-oriented outcomes that are clinically feasible to complement substance use-based measures (e.g. urine drug test) are critical for improving SUD treatment. One example of a potential recovery-oriented outcome is recovery capital, a strengths-based concept that refers to the sum of an individual's resources that can be drawn upon to initiate and maintain recovery from addiction (Granfield, 1999). Assessing

recovery capital during SUD treatment could be a useful complimentary tool to help track progress, individualise multimodal treatment plans, and promote a strengths-based approach to personalised SUD treatment.

In addition to more sophisticated patient assessments to guide SUD treatment regimen assignments, future clinical trials should also emphasise integration of patient-reported outcomes. Utilisation of patient-reported outcomes as measured endpoints in therapeutic research have been touted as critical in the advancement of medical treatments across diseases (Deshpande et al., 2011). However, their utilisation in SUD research is limited yet much needed (Dennis et al., 2020). Patient-reported outcomes specific to addiction, such as patient satisfaction with SUD medications and patient received recovery benefit with SUD behavioural health treatments, should be measured with traditional outcome measures (e.g. abstinence or decreased substance use). Adoption of this more comprehensive approach to intervention evaluation will ensure that the advancement of SUD treatments prioritise feasibility and acceptability alongside effectiveness, vital steps to ensure widespread utilisation of evidence-based SUD treatments and long-term positive outcomes for people seeking addiction recovery.

Conclusions

Amidst the opioid crisis and the rising morbidity and mortality due to SUD (Woolf & Schoomaker, 2019), there is an urgent call to not only expand SUD treatment capacity but also improve its effectiveness to support individuals in achieving long-term recovery (HHS, 2017). The major avenue touted to achieve this latter goal is to develop, critically evaluate and clinically apply personalised SUD treatment approaches (Volkow, 2020a). Given the devastating disparities being witnessed among postpartum women with SUD (Goldman-Mellor & Margerison, 2019), there is no reason why such advancements in clinical care and science should shy away from incorporating this patient population into these important efforts. In doing so, with the unique vulnerabilities and needs the postpartum period brings, individualising SUD treatment regimens for women requires that comprehensive assessments are implemented, and tailored management approaches are used. Overall, clinicians should further adopt, and researchers prioritise studying, sex- and gender-sensitive, trauma-informed, recovery-oriented, multidisciplinary postpartum SUD care models that emphasise compassion and de-stigmatize addiction while providing effective and efficient medical care and psychosocial support.

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