



Treating Tobacco Use Disorder in Pregnant Women in Medication-Assisted Treatment for an Opioid Use Disorder: A Systematic Review



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ABSTRACT

Smoking is associated with adverse effects on pregnancy and fetal development, yet 88–95% of pregnant women in medication-assisted treatment for an opioid use disorder smoke cigarettes. This review summarizes existing knowledge about smoking cessation treatments for pregnant women on buprenorphine or methadone, the two forms of medication-assisted treatment for opioid use disorder indicated for prenatal use. We performed a systematic review of the literature using indexed terms and key words to capture the concepts of smoking, pregnancy, and opioid substitution and found that only three studies met search criteria. Contingency management, an incentive based treatment, was the most promising intervention: 31% of participants achieved abstinence within the 12-week study period, compared to 0% in a non-contingent behavior incentive group and a group receiving usual care. Two studies of brief behavioral interventions resulted in reductions in smoking but not cessation. Given the growing number of pregnant women in medication-assisted treatment for an opioid use disorder and the negative consequences of smoking on pregnancy, further research is needed to develop and test effective cessation strategies for this group.

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1. Introduction

Approximately 16% of all pregnant women smoke cigarettes (Substance Abuse and Mental Health Services Administration, 2013). Smoking is a leading preventable risk factor for adverse pregnancy, fetal, and neonatal outcomes. Detrimental effects of smoking during pregnancy include increased rates of placental abruption, intrauterine growth restriction, preterm delivery, low birth weight, and stillbirth (Bada et al., 2002; Hammoud et al., 2005; Salihu & Wilson, 2007). Long-term effects in children born to smoking mothers may include problems with maternal–neonatal attachment, increased risk of sudden infant death syndrome, conduct problems, and an increased risk of developing tobacco and other substance use disorders later in life (Agrawal et al., 2010; Gaysina et al., 2013; Lotfipour et al., 2014; Magee et al., 2014; Salihu & Wilson, 2007; Zhang & Wang, 2013).

Alarming high rates of smoking (88–95%) occur in pregnant women concurrently treated with buprenorphine or methadone for an opioid use disorder (Chisolm et al., 2013; Jones et al., 2009). Medication-assisted treatment is recommended to help lessen illicit opioid use and improve pregnancy outcomes in women with an opioid use disorder (Center for Substance Abuse Treatment, 2005; National

Consensus Development Panel on Effective Medical Treatment of Opiate Addiction, National Institutes of Health, 1998). However, the importance of treating co-occurring tobacco use disorder cannot be underestimated, as the negative fetal effects of smoking are potentially more severe than those associated with opioid use (Bada et al., 2002).

Babies exposed to opioids, including buprenorphine or methadone, in utero are at risk for neonatal abstinence syndrome (NAS). This is a withdrawal syndrome characterized by central nervous system hyperirritability, autonomic dysfunction, and gastrointestinal abnormalities that may appear soon after birth (Kaltenbach, Berghella, & Finnegan, 1998) and is often associated with longer hospital stays and a higher cost of care (Patrick et al., 2012). Cigarette smoking can increase the duration and severity of neonatal abstinence syndrome resulting in longer hospital stays for these infants (Bakstad, Sarfi, Welle-Strand, & Ravndal, 2009; Choo, Huestis, Schroeder, Shin, & Jones, 2004; Jansson, Dipietro, Elko, & Velez, 2007, 2010; Jones et al., 2013). Moreover, babies born to heavy smokers (≥ 20 cigarettes per day) have lower birth weights and lengths compared to light smokers in medication-assisted treatment for opioid use disorder (Winklbaur et al., 2009).

In the general pregnant population, 20–45% of women spontaneously quit smoking upon becoming pregnant (Quinn, Mullen, & Ershoff, 1991; Solomon & Quinn, 2004; Woodby, Windsor, Snyder, Kohler, & Diclemente, 1999), while almost no pregnant women in medication-assisted treatment for an opioid use disorder quit spontaneously (Chisolm et al., 2013; Jones et al., 2009). The American College of

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Obstetricians and Gynecologists (ACOG) and the U.S. Department of Health and Human Services recommend that obstetrical providers ask all pregnant women about tobacco use and provide pregnancy-tailored counseling based on the “5 A’s” counseling model (Albrecht, Phelan, & Melvin, 2011; Fiore et al., 2008). Used as it was designed, the “5 A’s” is associated with improvement in cessation rates of 30–70% among pregnant women in general (Jordan, Dake, & Price, 2006). However, in actual practice many obstetricians are more likely to deliver the first two of the five As (ask and advise) and less likely to include the other three (assess, assist and arrange), which may impact effectiveness (Jordan et al., 2006).

Other behavioral smoking cessation interventions studied among the general population of pregnant women include cognitive behavioral therapy, motivational interviewing, interventions based on the stages of change, feedback on fetal nicotine exposure, the measurement of nicotine by-products, and incentive-based treatment (Fiore et al., 2008; Lumley et al., 2009). Counseling interventions appear to be more effective than usual obstetrical care (RR 1.44, 95% CI 1.19 to 1.75), and incentive-based treatment is more effective than less intensive interventions (RR 3.64, 95% CI 1.84 to 7.23) (Chamberlain et al., 2013) with incentive based treatment also associated with improvements in fetal growth and birth outcomes (Higgins et al., 2012).

Results of research on smoking cessation pharmacotherapies with pregnant smokers have been mixed (Brose, McEwen, & West, 2013; Coleman, Chamberlain, Davey, Cooper, & Leonardi-Bee, 2012; Swamy et al., 2009) and concerns remain about the safety of these medications during pregnancy (Albrecht et al., 2011; Alwan et al., 2010; Chisolm, Brigham, Tuten, Strain, & Jones, 2010; Swamy et al., 2009). Fiore et al. (2008) reviewed three existing randomized controlled trials of nicotine replacement therapy during pregnancy. Two found no significant improvement over non-pharmacologic approaches; one study comparing nicotine replacement and cognitive behavioral therapy (CBT) to CBT alone found improvement with the addition of nicotine replacement, however, the study was halted due to an increase in preterm birth rate in the nicotine treatment group (Fiore et al., 2008).

Although rates of spontaneous smoking cessation in pregnant women on medication-assisted treatment are extremely low (Chisolm et al., 2013; Jones et al., 2009), those engaged in substance abuse treatment may be interested in smoking cessation (Clemmey, Brooner, Chutuape, Kidorf, & Stitzer, 1997; Haug, Stitzer, & Svikis, 2001), and pregnancy can be a time when women are particularly motivated to stop smoking (Lumley et al., 2009). Pregnant women on methadone or buprenorphine are also a reachable population with regular contact with substance treatment providers. Moreover, studies in patients with substance use disorders suggest that smoking cessation treatment increases rates of substance abstinence and does not negatively impact the treatment of the primary substance use disorder (Dunn, Sigmon, Reimann, Heil, & Higgins, 2009; Reid et al., 2008; Shoptaw et al., 2002), all indicating that pregnancy is an ideal time for clinicians to treat women with tobacco use disorder.

Given the current rise in illicit opioid use during pregnancy (Patrick et al., 2012), concurrent cigarette smoking during pregnancy is becoming a growing problem with great public health significance (Haug et al., 2001; Jones et al., 2009; Tong, Jones, Dietz, D’Angelo, & Bombard, 2009). Effective treatments are needed. The purpose of this systematic review, therefore, is to summarize research on interventions to treat tobacco use disorder in pregnant women in medication-assisted treatment for an opioid use disorder.

2. Methods

Two librarians (including co-author H. Blunt) searched the following databases up to November 4, 2013: MEDLINE (PubMed, from 1946); Cochrane Library (Wiley, issues 11 and 12, 2013); Web of Science (Web of Knowledge, from 1900); PsycINFO (Proquest, from 1806); CINAHL (EBSCO from 1981); Dissertations & Theses (Proquest, from 1861).

The search included indexed terms and text words to capture the concepts of smoking, pregnancy, and opioid substitution. There were no language or study design restrictions. The search strategy was adjusted for the syntax appropriate for each database. (See Appendix A for full search strategies.)

Searches returned a total of 268 results (Fig. 1). Two review authors (S. Akerman and S. Heil) independently screened titles and abstracts for inclusion. We included trials of any study type and design (full text, those published as abstracts, and unpublished data) evaluating any treatment for smoking in pregnant women in opioid medication-assisted treatment. We included adult pregnant women (>18 years old) with a diagnosis of opioid use disorder/opioid dependence in medication-assisted treatment with buprenorphine, methadone, or Levacetylmethadol (LAAM).

The two above-mentioned authors independently screened for inclusion all studies identified as a result of the search protocol. There were no disagreements requiring consultation with a third person. Reviewers identified and excluded duplicates and collated multiple reports of the same study. They examined reference lists of included papers for additional relevant studies revealing no additional studies that met inclusion criteria.

3. Results

Three articles met inclusion criteria; one uncontrolled cohort study and two randomized controlled studies. These are summarized in Table 1. The cohort study evaluated a 6-week smoking cessation group treatment within a comprehensive outpatient substance abuse treatment program that included methadone maintenance therapy for 44 pregnant and 47 non-pregnant parenting women. Consistent with ACOG and US DHHS recommendations, the group included implementation of the 5 A’s technique for assessment of tobacco use as well as education about the risks of tobacco use and benefits of cessation, identification of patient motivators to quit, and coping skills. Daily self-reported cigarette use in the pregnant methadone maintained women decreased by 49% from week one of the intervention to the 3-month follow-up. This finding was not statistically different from the 32% decrease reported by the non-pregnant group, suggesting comparable efficacy for this intervention in methadone maintained pregnant and non-pregnant parenting women, but overall poor efficacy in terms of cessation. Authors of this study note that its limitations include the lack of a control condition, reliance on self-reported data (subject to recall bias and responding based on social desirability) as well as the small sample size (Holbrook & Kaltenbach, 2011).

A randomized trial evaluated a four-session motivational enhancement therapy for smoking cessation compared to usual care among pregnant smokers on methadone (Haug, Svikis, & Diclemente, 2004). Motivational enhancement therapy (MET) is a systematic intervention based on the principles of motivational psychology designed to promote a change in behavior (Miller, Zweben, DiClemente, & Rychtarik, 1995). Usual care consisted of provider advice to quit smoking during pregnancy. The intervention included an intake assessment, education, and interactive, personalized feedback regarding behaviors as well as follow up for 63 pregnant opioid-dependent smokers on methadone maintenance. Women in the MET group were no more likely to quit smoking compared to those receiving standard practitioner advice. Although participants in both groups self-reported a decrease in smoking, carbon monoxide and cotinine levels increased. Thirty-five percent of participants in the MET group moved forward on the change continuum (e.g., from pre-contemplation to contemplation) versus 15% in the standard care group. This suggests that the intervention may have increased their motivation for quitting but this intervention was insufficient.

A second randomized trial evaluated 12 weeks of contingency management for smoking cessation in pregnant women on medication-assisted treatment for an opioid use disorder. Pregnant women (n = 102) in a methadone treatment program were randomly assigned to

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