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Management of smoking in pregnant women

Background

Smoking is the most important preventable cause of adverse outcomes in pregnancy. However, most smokers who become pregnant continue to smoke and most of those who quit relapse after delivery.

Objective

This article explores the relationship between smoking and pregnancy, and reviews the evidence for best practice intervention by general practitioners.

Discussion

Continuing to smoke during pregnancy is strongly associated with socioeconomic disadvantage, mental illness and Aboriginal and Torres Strait Islander populations. Quitting is more difficult for these groups and interventions assist only six in every 100 pregnant smokers to quit. Behavioural counselling is the first-line treatment. Nicotine replacement therapy (NRT) can be offered if the smoker is unable to quit without it, although its efficacy is uncertain. Adequate doses of nicotine and good adherence may be required for the best results. The use of NRT in pregnancy is likely to be less harmful than continuing to smoke. Women should be encouraged to quit smoking before becoming pregnant.

Keywords

substance-related disorder; obstetrics/pregnancy; Indigenous health services; women's health

Smoking in pregnancy is the most important preventable cause of a wide range of adverse pregnancy outcomes.¹ Smoking causes obstetric and fetal complications and there is growing evidence of serious harm extending into childhood and even adulthood (*Table 1*). Unfortunately, most smokers who become pregnant continue to smoke and most of those who quit relapse after delivery.^{2,3}

Pregnancy is a window of opportunity for health professionals to help smokers quit.⁴ Women are motivated to protect their baby's health, and quitting smoking during pregnancy reduces the risk of complications.⁴⁻⁶ However, general practitioners (GPs) are missing many opportunities to intervene.⁷

In this article we review the natural history of smoking during pregnancy and postpartum. The growing list of health effects on the mother and child are outlined. Finally, we suggest updated evidence-based strategies for use by health professionals during pregnancy and lactation.

Natural history of smoking, quitting and relapse in pregnancy

Pregnant smokers fall into three groups, which require different approaches:

- Those who quit spontaneously when finding out they are pregnant. This group should be encouraged to maintain abstinence.
- Those who continue to smoke and require assistance to quit.
- Those who quit but relapse postpartum and may benefit from further counselling.

Spontaneous quitters

Up to 45% of women who smoke before pregnancy stop before their first antenatal visit.⁸⁻¹⁰ Women who quit spontaneously are more likely to have higher social status, no smoking partner, a lower degree of nicotine dependence, low parity and less concern about weight gain.^{9,11,12} Quitting before conception or in the first trimester results in similar rates of adverse pregnancy outcomes, compared with non-smokers;⁵ however quitting at any time during pregnancy produces health benefits.¹³ Quitting before pregnancy also allows the use of the full range of pharmacotherapies.

Continuing smokers

In Australia, 14.5% women report smoking while pregnant and 1 in 6 of these smokers quits before delivery.³ The real prevalence of smoking is likely to be higher, as up to 25% of pregnant smokers do not disclose their smoking status,¹⁴ often because of the social stigma.¹⁵

Smoking during pregnancy is strongly associated with socioeconomic disadvantage¹¹ and is particularly prevalent in Aboriginal and Torres Strait Islander populations (see below). Smoking is also a marker for mental illness and almost 50% of pregnant smokers have a mental health disorder of some kind.¹⁶ Smoking rates are higher in young women and 37% of teenage mothers smoke during pregnancy.³

Postpartum relapse

Most mothers who quit smoking during pregnancy resume smoking within 6 months of delivery and about 70% relapse within 12 months.² One reason for the high relapse rate is that pregnant women often report suspending their smoking only for the fetus and plan to resume smoking after the birth.¹⁷

Stress in the postpartum period arising from lack of sleep, caring for the infant, postnatal depression and concerns about weight gain are also likely contributors to the high relapse rate. Other factors include having a smoking partner, a higher smoking level before pregnancy, older age and socioeconomic disadvantage.¹⁸

Aboriginal and Torres Strait Islander pregnant women

Aboriginal and Torres Strait Islander pregnant women need special consideration. One in two (49.3%) Aboriginal and Torres Strait Islander women smoke while pregnant³ and there may be concomitant use of cannabis.¹⁹ Many Indigenous pregnancies are unplanned; women often present late to antenatal care and have fewer antenatal visits.^{20,21} As a result, opportunities for early smoking cessation intervention may be missed.

Owing to the normalisation of smoking in Aboriginal and Torres Strait Islander households, it is difficult for pregnant women to avoid other smokers and obtain support from family and partners.²² Smoking is often linked to difficult life circumstances and high levels of stress. Reduced cigarette consumption is a frequent occurrence, as cessation is perceived as 'too hard'. Few Aboriginal and Torres Strait Islander women maintain abstinence postpartum. For a more detailed review see Gould et al.²³

Table 1. Pregnancy-related health effects of smoking

	Health effect	Comments
Fertility	Delayed conception	2 months on average ⁵⁵
	Infertility: female	60% increased risk of infertility (OR 1.6) ⁵⁶
	Infertility: male	Decreased semen volume, sperm number and increased abnormal forms ¹
	Assisted reproduction	44% reduced odds of a live birth per cycle (OR 0.54) ⁵⁷
Obstetric	Spontaneous miscarriage	OR 1.8 ¹
	Preterm birth (<37 wks)	'twice as great' ¹
	Placenta previa	OR 2.1 ¹
	Placental abruption	OR 1.6 ¹
	Stillbirth	OR 1.1–3.2 ¹
	Ectopic pregnancy	OR 2.5 ¹
	Premature rupture of membranes	OR 2.1 ¹
Pre-eclampsia	OR 0.51 (49% risk reduction) ¹	
Fetal	Growth restriction	200 g lighter on average ¹
	Low birth weight (<2500 g)	OR 3.0 (white women) ¹
	Small for gestational age	OR 3.8 >35 years (<35 years = ns) ¹
	Birth defects	Limb reduction defects, clubfoot, oral clefts, eye defects and gastrointestinal effects (OR 1.25–1.50). Also many other smaller effects ⁵⁸
Child and adult	SIDS	OR 2.25 ⁵⁹
	Type 2 diabetes	OR 1.1 ⁶⁰
	Obesity	OR 1.52 ²⁶
	Hypertension	1.5–5.4 mm Hg increase ⁶⁰
	HDL	0.14 mmol/L decrease ⁶¹
	Nicotine dependence	Double the risk ⁶²
	Respiratory	Asthma, lower respiratory infection, decreased lung function ⁶³
	Cognition	Impaired academic performance and cognitive abilities ⁶⁴
	Behaviour	Conduct disorder, ADHD, antisocial behaviour ⁶⁵
Psychiatric disorders	Significant increase for most psychiatric disorders in early adulthood ⁶⁶	

OR = odds ratio; ns = not significant; HDL = high density lipoprotein

Health effects of smoking in pregnancy

The most common adverse fetal outcomes are growth restriction and preterm birth, both of which can lead to a range of serious health effects⁵ (Table 1). Nicotine reduces placental blood flow and carbon monoxide lowers oxygen availability to the fetus. The resulting decrease in nutrient and oxygen delivery to the fetus leads to growth restriction.²⁴ Carcinogens have also been implicated in low birth weight.²⁵ Babies with low birth weight experience rapid catch-up growth that can result in obesity and chronic diseases, such as coronary artery disease, diabetes mellitus and hypertension.²⁶

Studies in animals suggest that nicotine is toxic to the fetal brain and impairs lung development. Many other toxic compounds, including cyanide, polycyclic aromatic hydrocarbons, benzene and heavy metals such as lead and cadmium cross the placenta.²⁷

Non-smoking pregnant women are also at risk from second-hand smoke, which increases the risk of stillbirth and congenital abnormalities,²⁸ and reduces the birth weight by 33 g or more.²⁹

Lactation

Women who smoke may produce less milk³⁰ and are less likely to breastfeed.³¹ Smoking

immediately after breastfeeding is preferred as it allows more time for the nicotine and other chemicals to leave the breast milk before the next feed.³¹ Encouraging pregnant women to breastfeed may help them to remain abstinent postpartum.³¹

Smoking interventions in pregnancy

Interventions during pregnancy are modestly effective and assist six in every 100 smokers to quit.⁶ Many lighter smokers quit unaided when they find out they are pregnant and the remaining smokers may need more intensive treatment.^{11,32} The Australian Smoking Cessation guidelines state that neither of the two prescription medicines for smoking cessation, varenicline and bupropion, has been shown to be effective or safe in pregnant and breastfeeding smokers, and they are not recommended.³²

Identify pregnant smokers

Pregnant women should be assessed for smoking at every opportunity. Some women find it difficult to admit that they smoke because of the social stigma. Disclosure of smoking can be increased by as much as 40% through the use of multiple-choice questions instead of a simple yes/no question.^{13,33,34}

A hand-held carboxymeter measures expired carbon monoxide and is a valuable tool in general practice to motivate smoking cessation.³⁵ It is also very helpful for detecting active and passive smoking during pregnancy,³⁶ but needs to be introduced sensitively to minimise any embarrassment.

Counselling and other strategies

Smoking should be addressed at every GP visit during pregnancy in view of its serious health impact. Behavioural counselling is recommended as first-line treatment in pregnancy,^{13,32} although it is less effective than in the general population.¹³ Counselling in pregnancy produces a 4–6% increase in the quit rate, compared with no counselling.^{6,13,37}

Counselling strategies include providing information on the health effects, problem solving and facilitating social support.^{13,38} Motivational interviewing seems to be less

Table 2. Resources for general practitioners and patients

General practitioner resources
<ul style="list-style-type: none"> • RACGP. Supporting smoking cessation: a guide for health professionals (www.racgp.org.au/your-practice/guidelines/smoking-cessation/) • Department of Health and Ageing (DOHA). Clinical Practice Guidelines Antenatal Care (www.health.gov.au/internet/publications/publishing.nsf/Content/clinical-practice-guidelines-ac-mod1~part-b~lifestyle-considerations~tobacco-smoking) • Rural Health Education Foundation. Smoking and pregnancy: womb to breathe (www.rhef.com.au) • Australian Association of Smoking Cessation Professionals (www.aascp.org.au) National network of smoking cessation specialists • The Australian Indigenous HealthInfoNet (www.healthinfonet.ecu.edu.au/)
Patient resources
<ul style="list-style-type: none"> • QUITLINE (tel: 137848) • Quit4Baby website (www.quit4baby.com.au) • Quit for you Quit for two smartphone app (www.quitnow.gov.au/internet/quitnow/publishing.nsf/Content/quit-now-apps)
Online resources
<ul style="list-style-type: none"> • NSW Government Ministry of Health (www.health.nsw.gov.au) • QLD Health (www.health.qld.gov.au) • Quitnow: The National Tobacco Campaign (www.quitnow.gov.au) • Quit NSW. iCan Quit (www.icanquit.com.au) • Quit Tasmania (www.quittas.org.au) • Quit Victoria (www.quit.org.au)
Brochures (available nationally)
<ul style="list-style-type: none"> • Quit for you Quit for two booklets and wristbands (email: quitforyou@health.gov.au) • Queensland Cancer Council. Smoking and pregnancy (tel: 131120) • Quit Victoria. Pregnancy and quitting smoking information sheet; Important news for fathers who smoke (www.quit.org.au/resource-centre/fact-sheets/stopping-smoking) • Illawarra Shoalhaven Local Health District. No Butts Baby (email: Lisa.franco@sesiahs.health.nsw.gov.au; tel (02) 42216785)
Indigenous resources
<ul style="list-style-type: none"> • Blow away the smokes DVD (www.blowawaythesmokes.com.au) • Stickin' it up the smokes facebook site (www.facebook.com/stickinitupthesmokes) • Quit for you Quit for two booklets and wristbands (email: quitforyou@health.gov.au)

effective in pregnancy.³⁹ Guidelines also recommend pregnancy-specific self-help materials^{13,32} (Table 2) and referral to Quitline.³² A supportive partner can increase the ability of a pregnant smoker to quit successfully.⁹ However, it is unclear if encouraging partners to support smoking cessation during pregnancy and postpartum is beneficial.⁴⁰

Nicotine replacement therapy (NRT)

The use of NRT (nicotine patch, gum, lozenge, mouth spray and inhalator) during pregnancy has been controversial because of concerns about efficacy and safety, and many women are reluctant to use it.

Efficacy and effectiveness

A Cochrane review⁴¹ did not find any increase in abstinence rates in late pregnancy from the use of NRT, compared with controls, in randomised placebo-controlled trials. However, real-world studies suggest effectiveness in clinical practice. In one large non-randomised study in a clinical setting, women prescribed combination NRT (a nicotine patch combined with a faster acting form such as nicotine gum) had twice the quit rate of no medication or monotherapy.⁴² In another study, the addition of NRT to counselling tripled the effectiveness of counselling alone.⁴³ A recent randomised controlled trial (RCT) in a clinical setting demonstrated that nicotine patches were efficacious in the short term, compared with placebo (21.3% versus 11.7% at 4 weeks).⁴⁴ Even short periods of abstinence are beneficial for fetal growth.⁴⁵

The modest impact of NRT could be due to inadequate dosing as nicotine clearance is increased by 60% in pregnancy.⁴⁶ Poor adherence is also a likely cause of reduced cessation outcomes. In one study, only 7.2% of pregnant women used the active nicotine patch for more than one month.⁴⁴

Safety

Although nicotine is presumed to have some risk, clinical trials of therapeutic nicotine have not generally reported adverse fetal effects.⁴¹ A Danish national birth cohort study suggests use of a single NRT product does not reduce birth weight.⁴⁷ Two RCTs suggest that NRT may

increase birth weight when compared with placebo.^{44,48}

There is no evidence of increased rates of miscarriage, stillbirth, premature birth, admissions to neonatal intensive care or neonatal death between NRT and control groups.⁶ There is currently insufficient evidence to determine whether NRT is safe in pregnancy, but available data⁴⁹ and expert opinion⁵⁰ suggest it is less harmful than continuing to smoke.

Guidelines for use of NRT

The Australian Smoking Cessation guidelines³² recommend that pregnant smokers first try to quit with counselling and support. NRT should then be considered if the patient is unable to succeed without it, however, it should be used under the supervision of a suitably qualified health professional.

Intermittent, short-acting forms of NRT, such as the lozenge or mouth spray, are recommended to deliver a lower total daily nicotine dose.³² However, this may result in under-dosing and reduced effectiveness.⁵¹ The guidelines also advise that if patches are used they should be removed at bedtime.³²

Although guidelines recommend the smallest effective dose of nicotine, larger doses or even combination therapy may be required. We support the use of adequate doses to relieve cravings and withdrawal symptoms, and a full course of at least 8 weeks' treatment. The risks and benefits of NRT during pregnancy should be explained without making the patient unduly concerned.

NRT during lactation

Breastfeeding mothers can use NRT once the risks and benefits have been explained.³² Nicotine levels in the infant from NRT while breastfeeding are low and are unlikely to be harmful.⁴⁹ Infant exposure can be reduced further by taking oral doses of NRT immediately after breastfeeding.

Aboriginal and Torres Strait Islander pregnant women

Access to treatment, including NRT, is more difficult for Aboriginal and Torres Strait Islander pregnant women because of financial barriers and a lack of culturally appropriate services.⁵²

We suggest a culturally sensitive, non-judgmental approach, as well as information to help women understand how smoking could harm the fetus, and the benefits of remaining smoke-free after the birth. Inviting cooperation from partners and family may provide further support.²³

Prevention of relapse

Interventions to assist pregnant and postpartum smokers to remain abstinent have not generally been effective,^{9,53} with the possible exception of self-help booklets for low-income women.⁵⁴ Explaining the harm caused to the infant by second-hand smoke may help to motivate continuing abstinence.^{13,32}

Conclusion

Smoking during and after pregnancy is a major cause of adverse health outcomes for the mother and child during pregnancy and after birth, extending into adulthood. Quitting is more difficult in this population and postpartum relapse rates are high.

All smokers should be encouraged to quit before conception when more treatment options are available and therapy is more likely to succeed.

Counselling should be provided to all pregnant smokers and NRT considered after discussing the risks and benefits if women are otherwise unable to quit. The efficacy and safety of NRT in pregnancy is uncertain, yet NRT is considered to be safer than continuing to smoke. Adequate doses of nicotine and good adherence are required for the best results. Smoking cessation can have substantial and lifelong benefits for the mother and child and should be an integral part of pregnancy care.

Key points

- Smoking during pregnancy is the most important preventable cause of adverse pregnancy outcomes.
- Most smokers who become pregnant continue to smoke and most who quit relapse after delivery.
- Quitting smoking in pregnancy reduces the risk of complications.
- Behavioural counselling is recommended as the first-line treatment.

- NRT can be offered, under the supervision of a suitably qualified health professional, if the patient is unable to quit without it.
- Adequate doses of nicotine and good adherence are required for the best results.
- The efficacy and safety of NRT in pregnancy is uncertain.

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