Preconception care

CPD

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Background
Preconception care (PCC) comprises counselling and the provision of biomedical, behavioural and social health interventions to optimise the health of women and their partners prior to pregnancy and improve health-related outcomes for themselves and their children.

Objectives
With a focus on women, the aim of this paper is to discuss the evidence for PCC, available guidelines and strategies to increase primary care access.

Discussion
Each year an estimated 10% of women in Australia become pregnant. There is increasing evidence that optimising health in the preconception period is crucial to improving short-term and long-term outcomes for mothers and babies. General practitioners can have a key role in assisting women to identify modifiable and non-modifiable preconception risks and to make informed decisions about planning or avoiding pregnancy. The Royal Australian College of General Practitioners *Guidelines for preventive activities* in general practice includes a chapter on preventive activities prior to pregnancy, which is a useful resource. The critical first step is screening women for their pregnancy intentions by asking a simple question that can help facilitate the start of the PCC conversation.

PRECONCEPTION CARE (PCC), addressing the health of women and their partners prior to pregnancy, is increasingly recognised as an essential element to achieve healthy outcomes for mothers and their children. PCC involves a range of strategies including reproductive planning and the use of effective contraception before conception is desired; counselling regarding substance use in pregnancy, including avoidance of smoking and alcohol consumption; folic acid and iodine supplementation; weight reduction in those overweight or obese and medication adjustments.

The preconception period is still an emerging field of research, and there are gaps in the evidence for the benefit of PCC, but public health interest in the field is growing. Each year an estimated 10% of women in Australia become pregnant,[1,2] and currently there are only a few isolated comprehensive hospital-based PCC services that receive general practitioner (GP) referrals. The GP can potentially play a critical part in expanding women's and men's access to preconception health assessment and counselling.

Why is the preconception period important?

The periconception environment is critically important for the developmental process. Poor maternal health and diet before and in the early stages of pregnancy can lead to impaired fetal and infant growth, poor birth outcomes and long-term effects on cardiovascular and metabolic disease.[3] The concept of fetal programming, whereby the intrauterine environment is understood to have a profound impact on one's entire lifetime health, is known as the developmental origins of health and disease (DOHAD). One example of this is obesity. The offspring of mothers who are obese at the time of conception are more likely to be overweight and develop cardiovascular and metabolic disease.[3–5]

What PCC interventions improve maternal and fetal outcomes?

A number of community intervention studies have found that women and their partners who receive PCC are more likely to have improved knowledge and show positive health behaviours. Such behaviours include decreased smoking, increased use of folic acid and greater engagement in antenatal care.[6] A systematic review also found a positive impact on neonatal outcomes, with fewer neonatal deaths, and a greater chance of being breastfed.[7] In general, however, there is relatively limited evidence regarding the types of PCC interventions than can improve pregnancy outcomes.[8] Some key examples of preconception actions that improve outcomes are outlined below.

Folic acid

The addition of a 400–500 µg folic acid supplement in the preconception period has been shown to effectively prevent neural tube defects such as spina bifida and anencephaly. A Cochrane review reported that periconceptional folic acid supplementation results in a 72% reduction in risk of developing neural

tube defects and a 68% reduction in risk of recurrence, compared with either no intervention, placebo or micronutrient intake without folic acid.[9]

Obesity

For women who are obese, a study has shown that a 10% decrease in pre-pregnancy body mass index (BMI) could decrease stillbirth risk by 10%,[10] and there is consensus on the importance of weight normalisation prior to conception. The World Health Organization (WHO) Commission on Ending Childhood Obesity names preconception and prenatal care as one of six key strategies that have the potential to break the cycle of non-communicable diseases.[5]

Diabetes

For women with type 1 or type 2 diabetes, strict preconception control of blood glucose levels has been shown to decrease the incidence of congenital malformations, miscarriage, birth weight abnormalities and preterm birth.[11] Guerin et al showed a 3% risk of congenital malformations for preconception glycated haemoglobin (HbA1c) levels of 6%, which increased to a 6% risk with HbA1c levels of 9%.[12] Conversely, Inkster and colleagues showed measurable improvements in adverse first trimester outcomes for each 1% decrease in HbA1c levels.[11]

What guidelines exist for PCC?

The WHO published a global consensus on PCC,[8] and a number of countries, including the Netherlands, US and Italy, have national guidelines. Currently, Australia has no national guidelines; however, South Australia's Preconception Advice Clinical Guideline is an extremely comprehensive online resource to assist in the pre-pregnancy counselling process.[13] The Royal Australian College of General Practitioners (RACGP) lists PCC as one of the key preventive strategies that can be implemented in primary care and has an excellent chapter, 'Preventive activities prior to pregnancy', in their *Guidelines for preventive activities in general practice*.[14] The following section is based on RACGP and The Royal Australian and New Zealand College of Obstetricians and Gynaecologists (RANZCOG) guidance and is also summarised in Table 1.

Medical issues

Reproductive planning and contraception

A discussion about a woman's or couple's reproductive plan of first and subsequent pregnancies is important. Women and their partners should be educated that despite advances in assisted reproductive technology, the chance of conception decreases and risk of chromosomal abnormalities increases with maternal age.[15] In addition, an inter-pregnancy interval of two to five years is optimal,[16] and women and men should be provided with information about effective contraception to help facilitate this.

Pregnancy history

A detailed history of previous pregnancies is essential to assess for modifiable risk factors that may occur with adverse outcomes such as preterm birth. Other outcomes to explore include infant death, fetal loss and birth defects, particularly neural tube defects, as this would indicate a higher dose of folic acid for subsequent pregnancies.[9,14,17] Antenatal issues such as previous gestational diabetes need to be explored, as a history of this will affect the timing of glucose tolerance testing in subsequent pregnancies.[18] Previous preterm birth or babies that are small for gestational age may indicate the need for increased surveillance.

Medical conditions and medications

Assessment of pre-existing medical conditions, such as hypertension, diabetes, epilepsy, renal disease, autoimmune conditions, cardiac and other conditions that may increase risk to the mother and/or baby throughout pregnancy, is necessary. Multidisciplinary care and close communication with treating specialists is paramount. Some chronic conditions, such as epilepsy, require a period of stabilisation prior to conception, and appropriate contraception must be provided to facilitate this. A review of medications, over-the-counter preparations and vitamins is also required. Any medication with teratogenic potential should be ceased and replaced as appropriate. Many women are not aware of the potential teratogenic effects of prescription and

Table 1. Preconception care checklist

Diet
- Nutritional requirements including folic acid supplementation
- Advice on a healthy diet

Weight
- Measurement of body mass index and appropriate advice

Exercise
- Advise 150 minutes of exercise per week or 30 minutes on most days

Pregnancy history
- Screen for any modifiable risk factors

Genetic screening
- If indicated from personal/family history or ethnic background

Smoking/alcohol/illicit drugs
- Assess of intake and provide appropriate advice

Psychosocial aspects
- Screen for domestic violence
- Screen for mental health conditions

Medical conditions
- Review current disease status and medications
- Referral/correspondence with specialist if required

Environmental
- Assess work, home and recreational environments

Contraception/family planning
- Offer appropriate contraception advice for those not desiring pregnancy

Breast examination

Dental health check

Screening for sexually transmissible infections and other infectious diseases
- Measles, mumps, rubella, varicella zoster, hepatitis B
- Human immunodeficiency virus and hepatitis C with appropriate pre-test counselling
- Cervical screening

over-the-counter medications; this can cause much confusion and anxiety in the event of an unplanned pregnancy, and may contribute to a decision to terminate the pregnancy. The implementation of routine PCC and medication review may help to alleviate anxiety.

Genetic carrier screening

A woman's or her partner's obstetric and family history or ethnic background can sometimes prompt concern for an inherited genetic condition. Consultation with or referral to genetic services enables genetic counselling, guidance on appropriate testing and interpretation and explanation of results.[14] Commercially available direct-to-consumer (DTC) DNA tests are now available and provide DNA testing without the guidance of a health professional. Patients should be advised to be cautious if engaging in DTC

Table 2. Periconception nutrition supplementation

SUPPLEMENTATION

Nutrient	Target population	Recommended dose	Evidence
Folic acid	All women preconception High risk (previous NTD, anticonvulsant medication, GDM, malabsorption, BMI >30 kg/m^2)	400–500 µg daily for at least four weeks prior to pregnancy and for the first 12 weeks of gestation 5 mg daily for at least four weeks prior to pregnancy and for the first 12 weeks of gestation	Prevention of NTD such as spina bifida and anencephaly
Iodine	All women	150 µg daily while pregnant and breastfeeding	Production of maternal thyroid hormone, fetal brain and CNS development
Vitamin D	Women with vitamin D deficiency identified by blood tests	1000 IU/day (vitamin D 30–49 nmol/L) 2000 IU/day (vitamin D <30 nmol/L)	Reduces risk of small-for-gestational-age babies[21] and impaired fetal skeletal development
Iron	Women with iron deficiency identified by blood tests	Oral supplement with at least 60 mg of elemental iron daily	Prevention of anaemia
Vitamin B12	Vegans and vegetarians	2.6 µg/day or intramuscular injection 1000 µg/ampoule	Infant neurological sequelae
Calcium	Women with inadequate dietary intake (<1000 mg daily)	At least 1000 mg daily	Prevention of pre-ecalmpsia

RESTRICTIONS

Nutrient	Target population	Recommended limitation	Evidence
Vitamin A	All women	Dietary sources do not pose a risk at normal levels Limit vitamin A supplements to 3000 IU per day All synthetic derivatives of retinol should be ceased at least one month prior to conception	Increased risk of miscarriage and CNS malformations
Mercury-containing fish	All women	Limit of one serve per fortnight of fish containing high levels of mercury (shark, billfish) and no other fish to be eaten in that period OR Avoid fish containing high levels of mercury and eat two to three serves of other types of fish per week	Increased risk of negative effects on fetal brain and CNS
Caffeine	All women	Limit to 300 mg or less per day (equivalent to two to three standard cups of coffee)	Increased risk of fetal growth restriction[21]

BMI, body mass index; CNS, central nervous system; GDM, gestational diabetes mellitus; NTD, neural tube defects

DNA testing without the involvement of a specialist healthcare practitioner, as there are concerns about the quality of some of the products, particularly products sourced externally to Australia. There are also potential long-term implications of DNA testing such as psychological harm, unnecessary follow up and investigations, and impacts on life insurance.

Screening for sexually transmissible infections and other infectious diseases

Screening for immunity to measles, mumps, rubella, varicella zoster and hepatitis B should be performed. Other recommended vaccinations include diphtheria, tetanus and pertussis (dTpa), and influenza. It is important to inform women to avoid conceiving for at least 28 days after receiving any live attenuated vaccinations such as the measles, mumps and rubella (MMR) vaccine.[19] Screening for sexually transmissible infections (STIs) for women and men should also be performed where indicated, and hepatitis C and human immunodeficiency virus (HIV) testing can be performed with appropriate pre-test counselling. Cervical screening should be performed in accordance with current guidelines, with women over 25 years of age having a cervical screen for human papillomavirus every five years.[20]

Lifestyle issues

Diet

A nutritional assessment, diagnosis of any areas of inadequate intake and an intervention plan are important.[21] Evidence supports the use of folic acid in the preconception period, and folic acid and iodine supplementation during pregnancy. For other nutrients, the guidelines vary across professional organisations. Table 2 provides details on recommended nutritional supplementation in the periconception period taken from Australian and international guidelines.[9,13,14,17,21]

Weight

Women and men who are overweight (BMI 25–29.9 kg/m^2) or obese (BMI >30 kg/m^2) women and men should be given advice and set realistic goals to lose 5–10% of their body weight prior to conception. They should be educated on the risks of obesity, referred to a dietitian and encouraged to exercise.[21] For women classified as underweight, dietary advice and behaviour techniques should also be provided to help them achieve a target weight range.

Exercise

National guidelines recommend participating in moderate-intensity physical activity for 150 minutes per week or 30 minutes per day on most days.[22] There is no evidence to support any detrimental effects of exercise of this kind in the preconception period or during pregnancy. Certain forms of exercise, such as high-contact sports and scuba diving, are contraindicated. Evidence to answer specific questions such as 'How far can I run?' or 'How much weight can I lift?' is lacking. The patient infographic published by the Royal College of Obstetricians and Gynaecologists (RCOG) is a useful resource for women, and Table 3 outlines the exercise advice of the RCOG and RANZCOG for women in the preconception and pregnancy period.[23,24]

Smoking, alcohol and illicit drugs

Over 10% of women smoke during pregnancy,[25] and the rate of women who consume alcohol in pregnancy is even higher.[26] Women and men should be educated about the risks of smoking, alcohol consumption and use of illicit drugs in pregnancy, with referral to a quitline or group therapy where necessary. It is important to inform women and their partners that there is no established 'safe' level of alcohol consumption for the developing fetus and that abstinence is advised in the preconception period and during pregnancy.[26]

Psychosocial aspects

Domestic violence, defined as any physical or sexual violence or psychologically aggressive behaviour, is associated with

Table 3. Exercise advice for women in the preconception and pregnancy period

Type	Duration/frequency	Intensity	Other information
Aerobic	150–300 minutes of moderate intensity physical activity per week OR 75–150 minutes of vigorous activity per week OR A combination of the two	This is dependent on baseline level of fitness OR Assess via target heart rate: Age <20 years: 140–155 beats per minute Age 20–29 years: 135–150 beats per minute Age 30–39 years: 130–145 beats per minute Age >40 years: 125–140 beats per minute	Women should aim to be active on most days of the week Aim for exercise sessions to be no longer than 60 minutes Ensure adequate nutrition and hydration
Strength	Aim for two strength sessions per week on non-consecutive days	One to two sets of 12–15 repetitions of each muscle group	Can use light weights, resistance bands or body weights
Contact	Avoid contact sports, sports with a risk of falling and scuba diving		

substance abuse, poor antenatal care and subsequent poor obstetric outcomes.[27] PCC provides an opportunity to address this issue before screening at the antenatal booking visit. Likewise, early recognition of mental health conditions allows for the establishment of support services and optimisation of medications prior to the pregnancy period.

Environmental exposures

The work, home and recreational environment should be reviewed, with attention to specific environmental toxins such as lead, heavy metals and solvents, for example those found in paint strippers.

It is also appropriate to discuss TORCH infections (toxoplasmosis, other [eg syphilis, varicella, mumps, parvovirus and HIV, listeriosis], rubella, Cytomegalovirus and Herpes simplex), including methods to reduce exposure and transmission.

What are the current barriers to PCC?

Around 75% of Australians plan financially for retirement,[28] yet only 50% of Australian women plan their pregnancies.[29] The widely used term 'falling pregnant' reflects the idea that in common parlance it is regarded as normal for pregnancy to occur by accident rather than by design. Indeed, a key barrier identified by Australian GPs is a lack of women presenting in the preconception stage specifically for PCC, with most non-pregnant women presenting for other acute reasons.[30] Research suggests this may be due to women being unaware of the risks of suboptimal health in the preconception period or the aims of PCC.[31] Several studies have found that women will only seek PCC when they experience difficulty conceiving.

From the health practitioner perspective, GPs frequently report being time-poor and pressured to maintain current workloads.[4] In a study of Australian GPs, doctors believed there were numerous competing preventive priorities within the general practice setting; other issues were a lack of time and resources for assisting in the delivery of PCC guidelines.[30]

What are the enablers to PCC?

Perceived enablers identified by GPs are the availability of PCC checklists and patient brochures, handouts and waiting room posters that clearly explain the advantages of planning a pregnancy.[30] One approach worth consideration is the 'One Key Question' (OKQ) approach developed by the Oregon Foundation for Reproductive Health.[32] OKQ encourages practitioners to routinely ask women of reproductive age, 'Would you like to become pregnant in the next year?' The clinician documents one of four patient responses: *Yes; I'm OK either way; I'm not sure;* or *No*. Depending on the answer, the clinician then follows up with information and advice about PCC or contraceptive methods. To date, there have been no publishable studies on OKQ to determine its effectiveness, but early feedback from clinicians across the US is encouraging. Mazza et al suggested the involvement of the practice nurse as an enabler for the delivery of PCC.[30] This reduces the time burden on GPs without compromising patient care. Models to involve the practice nurse in PCC would need further development and research.

Key role of GPs in preconception care

GPs can play a key role in assisting women and men to identify modifiable and non-modifiable preconception risks and to make informed decisions about planning or avoiding pregnancy. The RACGP guidelines are a helpful resource to frame discussions about PCC. This can empower women and their partners to invest jointly in their own long-term health and the health of their future children, as identified by the WHO Commission on Ending Childhood Obesity. The critical first step is screening women for their pregnancy intentions and initiating conversations about optimising health before conception or discussing effective contraceptive options.

Key points

- PCC of women and their partners has far-reaching benefits for mothers and their children.
- Primary care for women of childbearing age should include routine assessment of a woman's reproductive goals and pregnancy intentions ('reproductive planning').
- PCC can be implemented into the standard consultation with the use of OQK: 'Would you like to become pregnant in the next year?'
  - Depending on the woman's response, either preconception advice or contraceptive advice can be provided.

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