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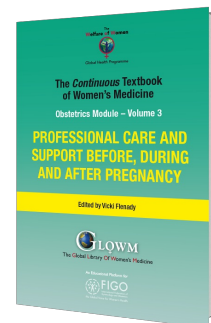
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ELEMENTS OF PROFESSIONAL CARE AND SUPPORT BEFORE, DURING AND AFTER PREGNANCY

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Chapter

Preconception Counseling

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INTRODUCTION

Preconception counseling is a form of preventative care which includes counseling and education about the state of a women's health prior to pregnancy. This involves determining a women's overall health status as influenced by her clinical, environmental and psychosocial status followed by identifying a set of interventions. The preconception period is often defined as the 3 months before conception because this is the average time to conception for fertile couples.¹ In relation to an individual, this period starts whenever a couple decides they want a baby because the time to conception is unknown. This period also varies between individuals as it reflects the time needed by individuals to achieve a desired health outcome in preparation for pregnancy, such as 6 months to attain a desired body mass index. The Developmental Origin of Health and Disease concept, has identified the period around conception as being a crucial for the processes mediating parental influences on the health of the next generation.² Poor developmental experience can increase the offspring risk of non-communicable diseases, atopic conditions, cancers and neurologic impairment. Benefits of intentionally preparing for pregnancy are supported by data indicating that unfavorable maternal and fetal outcome associated with pre-existing maternal conditions can be avoided through pregnancy intervention.³

Preconception care should begin during the adolescent years in the form of life skill development where young women are educated about the importance of factors such nutrition, contraception, tobacco/alcohol use, rubella immunization, sexually transmitted infections and safe sex practice for future health. The routine well-woman visit and health education at school affords the ideal opportunity for this form of generalized counseling. For women who are planning a pregnancy in the near future, the preconception office visit should begin with a systematic enquiry into the medical, reproductive and family histories; nutritional habits; drug exposures; and psychosocial profile. The incidence of medical disease in pregnancy is increasing worldwide and is an important contributor to maternal mortality in both developed and developing countries.^{4,5} Factors such as increasing obesity rates and delaying pregnancy until women are older means that more women are entering pregnancy with acquired medical conditions such as hypertension, diabetes and renal disease. Furthermore, advances in medical care mean that women with complex medical and surgical disease are able to have successful pregnancies. The aim of history taking is to determine pregnancy risk and optimize maternal

health prior to pregnancy. For example, women who are known epileptics should be counseled about risks of increased seizure frequency in pregnancy and the potential effects of seizures and anticonvulsant therapy on pregnancy outcome. Table 1 highlights some of the important factors to be determined in order to identify reproductive risk.

Table 1 Preconception health evaluation

Nutrition and weight management	
<ul style="list-style-type: none"> • Diet • Folic acid/multivitamin use 	<ul style="list-style-type: none"> • Ideal body weight
Family history	
<ul style="list-style-type: none"> • Heritable conditions 	<ul style="list-style-type: none"> • Previous birth defects
Social	
<ul style="list-style-type: none"> • Pregnancy intention/access to care • Occupational hazards • Mental health conditions such as depression 	<ul style="list-style-type: none"> • Use of alcohol, tobacco, recreational drugs • History of physical or psychological abuse
Medical disease	
<ul style="list-style-type: none"> • Diabetes • Respiratory • Renal conditions • Lupus 	<ul style="list-style-type: none"> • Thyroid disease • Cardiac disease • Epilepsy
Reproductive history	
<ul style="list-style-type: none"> • Uterine/cervical anomalies • One or more fetal deaths • Previous small-for-gestational-age infant 	<ul style="list-style-type: none"> • 2 or more previous miscarriages • Previous preterm birth • One or more infants with a birth defect
Medication	
<ul style="list-style-type: none"> • Drugs that must be stopped/ changed 	
Infections/vaccinations	
<ul style="list-style-type: none"> • Sexually transmitted diseases • Immunity against rubella/varicella 	<ul style="list-style-type: none"> • HIV and prevention of mother-to-child-transmission

The Preconception Health and Health Care Initiative Clinical Workgroup has identified nine core preconception wellness measures which are indicative of quality preconception care.⁶ Women who meet these nine targets at initial prenatal assessment are considered to have a high degree of preconception wellness.

1. Pregnancy intention;
2. Access to care;
3. Preconception multivitamin with folic acid use;
4. Tobacco avoidance;
5. Absence of uncontrolled depression;
6. Healthy weight;
7. Absence of sexually transmitted infections;
8. Optimal glycemic control in women with pre-gestational diabetes;
9. Teratogenic medication avoidance.

Pregnancy intention

Unintended pregnancy is the general term for mistimed, unplanned, unwanted and/or undecided pregnancy.⁷ Planned or intended pregnancy empowers women to make more informed decisions about antenatal care, prenatal diagnosis, use of folic acid and preventing exposure to teratogenic substances.⁸ Approximately 88 million pregnancies worldwide are unintended.⁹ Of these 33 million become unintended births, 10 million are miscarriages and 41 million end in abortion. Factors such as poor family planning, inadequate access and understanding of contraception and reproductive health education, lack of inter-partner communication and sexual violence have been attributed to unintended pregnancy.^{10,11}

Unintended pregnancies are associated with negative health, social and economic consequences and therefore adverse maternal and child health outcomes. A meta-analysis of studies performed mainly in high income countries has found that unintended pregnancies are associated with 1.41 greater odds of having a low-birth-weight baby (95% CI 1.31–1.51) and increased risk for miscarriage, stillbirth and neonatal death.¹² Unintended pregnancy rates are higher in middle- and lower-income countries and reducing unintended pregnancy in these countries has been identified as a high priority.^{13,14} Data from the Nepal Demographic and Health Survey found that when a pregnancy was unintended (compared with when it intended) mothers were more likely to receive inadequate antenatal care (OR 1.5; 95% CI 1.12–1.77) and opt for home births (OR 1.3; 95% CI 1.00–1.56).⁹ Studies from India and Nepal have found that children born from unintended pregnancies were less likely to receive adequate immunization and remained stunted.¹⁵ Similarly, prospective data on pregnancy intendedness in Bangladesh found high rates of neonatal and post neonatal mortality among children who were unwanted.¹⁶

The problem of teenage pregnancy has received substantial attention in sub-Saharan Africa, particularly South Africa with almost 23% of young women having a child during their teenage years.¹⁷ The majority of these pregnancies occur outside marriage and are unwanted and unplanned.¹⁸ Early childbearing has adverse consequences for both the child and mother. These women have an increased risk of complications such as anemia, preterm birth and pre-eclampsia.¹⁹ Younger women also have a higher risk of maternal mortality.⁴ Furthermore, a study of young mothers in South Africa found that many young women are far from emotionally, cognitively and socially ready for the prospect of motherhood.²⁰

Access to care

Women should be informed about the importance of early booking. The National Institute for Health and Care Excellence (NICE) recommends that the booking antenatal visit should take place prior to 10 weeks, while the World Health Organization (WHO) recommendation is 12 weeks.^{21,22} Initiating antenatal care in the first trimester is a key measure of healthcare access and improves birth outcome by providing an opportunity for early risk assessment such as anomaly screening, accurate gestational age dating and implementation of evidence-based interventions to prevent adverse outcome.⁶ Early antenatal booking is considered a marker of a woman's connection to a healthcare system.⁶

The 2016 WHO antenatal care (ANC) model recommends a minimum of eight antenatal contacts to reduce perinatal mortality and improve women's experience of care.²² The first contact should take place in the first trimester (up to 12 weeks), two contacts in the second trimester (20 and 26 weeks) and five contacts scheduled in the third trimester (at 30, 34, 36, 38 and 40 weeks). The increased frequency of visits during the third trimester are aimed at reducing preventable morbidity and mortality through systematic monitoring of maternal and fetal well-being, particularly in relation to hypertensive disorders and other complications that may be asymptomatic but detectable during this critical period. Antenatal care should be of a good quality with women having a positive experience because evidence has shown that if a woman's experience is poor, she will not attend antenatal clinic.²² Antenatal care (number and content of visits) should also be adaptable to suit the needs of vulnerable groups such as adolescent girls, displaced and war-affected women, women with disabilities and mental health concerns. Therefore, the overarching aim of the WHO antenatal care model is to provide pregnant women with respectful, individualized, person-centered care at every contact, with implementation of effective clinical practices (interventions and tests), and provision of relevant and timely information and psychosocial

and emotional support. This care should be provided by practitioners with good clinical and interpersonal skills within a well-functioning health system. Effective implementation of antenatal care requires a health systems approach and strengthening, focusing on continuity of care, integrated service delivery, availability of supplies and commodities and empowered healthcare providers.

Preconception multivitamin with folic acid use

Folic acid supplementation in the preconception period can reduce the risk of neural tube defects by as much as 70%.²³ The protective effect of folic acid is high if started 1 month before conception and continued to the end of the first trimester. The worldwide recommendation is 0.4 mg for low risk women. Diet alone does not provide adequate folate concentration in pregnancy (red cell blood folate concentration above 906 nmol/L) for the prevention of neural tube defects.²⁴ Folic acid supplements or fortification of food are effective alternatives. In a Chinese study, women who had folic acid supplementation 3 months before pregnancy (n = 1,182,967) had a significantly lower risk of low birth weight (OR 0.74, 95% CI 0.71–0.78), miscarriage (OR 0.53, 0.52–0.54), stillbirth (OR 0.70, 0.64–0.77) and neonatal mortality (OR 0.70 0.63–0.78) than women (n = 352,009) who did not use folic acid preconception.²⁵ Food fortification programs in countries like South Africa, Canada, Chile, Oman Jordan and Costa Rica have resulted in decreased rates of neural tube defects.²⁶

Preconception folic acid is important for women with known epilepsy. Anti-epileptic drugs, particularly valproate and carbamazepine interfere with folate metabolism. The association between carbamazepine, valproate and neural tube defects was reported by Robert *et al.* in 1982.²⁷ Higher doses of folic acid are therefore recommended for women with epilepsy. The American College of Obstetricians and Gynecologists recommend 4 mg/day, while NICE recommends 5 mg/day.^{21,28}

Folic acid may also play a beneficial role in preventing autism spectrum disorders in children. A combination of genetic and environmental factors contributes to autism spectrum disorder development. A prospective mother and child cohort study in Norway found that preconception folic acid was associated with a lower risk of severe language delay and autism spectrum disorder.^{29,30} A randomized control trial of 676 mother–child pairs in Nepal found a positive association between iron/folic acid supplementation and different aspects of intellectual functioning including memory, inhibitory control and fine motor functioning in the offspring.³¹

In Canada, multivitamin tablets with folic acid are available in three formats containing 0.4–0.6 mg, 1.0 mg and 5 mg folic acid. The Society of Obstetricians and Gynaecologists in Canada have recommended prenatal folic acid with a multivitamin after a study found that the combination tablet has been associated with decrease in specific congenital abnormalities including neural tube defects with associated hydrocephalus, oral facial clefts with or without cleft palate, congenital heart disease, urinary tract anomalies, limb defects as well as some pediatric cancers.³² Other systematic reviews of trials of multiple micronutrient supplementation during pregnancy of more than 88,000 women have shown modest effects on birth weight compared with control groups receiving iron and folic acid supplementation only.³³ Both the Royal College of Obstetricians and Gynaecologists and the WHO do not recommend multivitamin supplementation in addition to folic acid.

Tobacco avoidance

Smoking is an important modifiable cause of poor pregnancy outcome. Adverse consequences of smoking extend beyond pregnancy with increased childhood health risks. Compassionate counseling during the prenatal period can play a critical role in smoking cessation and improving outcome. Women should be advised to refrain from all forms of smoking such as cigarettes, smokeless tobacco (snuff), e-cigarettes and passive smoking. Approximately 10.7% of women aged 15 years and older smoke regularly in South Africa, while 13% use smokeless tobacco.³⁴ Snuff consists of dry tobacco leaves and is preferred by women from rural backgrounds. Its use plays an important social role in terms of relaxation with family and friends, and for ceremonial and medicinal purposes.³⁵ The use of alternative forms of smoking such as e cigarettes and vaping have increased recently. Women who use smokeless tobacco and e-cigarettes are exposed to nicotine but not the combustion products in tobacco smoke such as carbon monoxide and cyanide, and although this form of smoking is perceived to be safer, nicotine in any form poses health risks.

The Safe Passage Study followed the drinking and smoking behavior of 9912 South African and American women during their pregnancy.³⁶ Fifty-two percent of women used alcohol sometime during pregnancy, while 17% continued drinking throughout the entire pregnancy. Almost 50% of women smoked sometime during pregnancy, while 33% continued smoking for the duration of pregnancy. Women who both drank and smoked had a three times higher risk of stillbirth compared to women completely abstained. Smoking alone had a relative risk of 1.6 for stillbirth. Other effects of smoking during pregnancy include intrauterine growth restriction, placenta previa, abruptio placenta, low birth weight, increased perinatal mortality risks and sudden infant death syndrome.³⁷ Children born to mothers who smoke are at an increased risk of asthma, infantile colic and childhood obesity.^{38,39} Women using smokeless tobacco during pregnancy have equivalent levels of nicotine exposure and low birth weight compared to mothers using cigarettes.³⁷ The Birth to Ten Study found that snuff use was associated with a significantly shorter gestational age than women who smoked cigarettes or abstained.⁴⁰

Enquiry into tobacco use should be a routine part of the prenatal visit. Women who smoke should be advised to quit and must be provided with information about risks of continued smoking to the pregnancy and newborn. Those who are not ready to quit can benefit from consistent motivational approaches by healthcare workers. Women who are interested in quitting should be assisted with cessation techniques such as counseling, cognitive and behavioral therapy, hypnosis, acupuncture and pharmacologic therapy. Follow-up visits should be arranged to track the women's attempt to stop smoking.

Absence of uncontrolled depression at first prenatal visit

Mental health disorders such as stress, anxiety and depression are important causes of global disease burden for women between 14 and 44 years of age.⁴¹ Suicide is a leading cause of maternal death in high-income countries such as the United Kingdom and maternal mental disorders are approximately three times more prevalent in low- and middle-income countries than in high-income countries.⁴² High prevalence rates in developing countries are most probably related to women's exposure to multiple depression-related factors such as poverty, intimate partner violence and the increasing threat of HIV.⁴³ In community-based studies in Cape Town and rural KwaZulu Natal, South Africa, 35% and 47% of women, respectively, were diagnosed with depression during pregnancy.^{44,45} In a systematic review of 25,663 women, untreated depression was associated with increased risks of preterm birth (OR 1.56, 95% CI 1.25–1.94) and low birth weight (OR 1.96, CI 1.24–3.10) with a trend toward higher risks for exposure to more severe depression.⁴⁶ Effects on the neonate extend to childhood with psychosocial developmental delays and adverse child health outcomes reported by the WHO.

Despite high levels of depression in pregnancy, screening for depression before, during or after pregnancy is not part of routine care in several lower- and middle-income countries. The Perinatal Mental Health Project is a stepped care intervention for maternal mental health which begins with maternal screening at primary health care level.⁴⁷ All women are offered screening for depression by nurses and midwives. Women who reach a certain cut-off score are referred for onsite counseling. Over a 3-year period, 90% of 6347 women who attended a primary care clinic in Cape Town, South Africa, were offered mental health screening at the first antenatal visit. During this time 95% of women accepted screening. Of the 5407 women screened, 32% of women qualified for referral to a counselor and 62% (1079 women) of those who qualified agreed to be referred. Seventy-seven percent of women who were referred to counselors attended their appointments with an average of 2.7 face-to-face sessions during pregnancy. Postnatal telephone follow-up calls were made to women who attended counseling sessions. A preliminary analysis of the data shows that 87% of women reported an improvement in their presenting problem, 79% reported to be coping at the time of telephone assessment, while 92% rated the counseling sessions as positive.

Universal mental health screening during the perinatal period allows for early detection of psychological distress.⁴⁸ Women who meet the criteria for referral may be immediately referred to counselors and the need for specialist care may be mitigated.⁴⁷ Integrating mental health screening into routine antenatal procedures in low-income countries is particularly important as common mental disorders are often overlooked in these settings.

Healthy weight

Women should be counseled about the importance of a healthy weight for their own well-being and that of the neonate and, furthermore, the potential risk of adult disease through fetal programming. Obesity is a global health problem affecting both higher- and lower- and middle-income countries. Approximately 15% of women in the world are considered obese.⁴⁹ Women should strive to achieve a body mass index of between 18.5–24.9 prior to pregnancy. In a cross-sectional survey of health behaviors, including obesity risk knowledge, among women aged 16–40 years in Texas, 51% of women intending to become pregnant, had low obesity risk knowledge.⁵⁰ Thirty-one percent of women misperceived their body weight, while 76% were confused about what constitutes a healthy diet. The authors concluded that there was a need for improved preconception counseling regarding the risk of being overweight or obese and the negative diet and health-related attitudes.

Obese or overweight women who are planning to conceive should be encouraged and supported to reduce their weight through diet, exercise and behavior modification. The possibility of bariatric surgery should also be discussed. Table 2 lists the potential risks associated with obesity in pregnancy.

Table 2 Maternal and fetal risks associated with obesity in pregnancy

Maternal	Fetal
Subfertility	Preterm delivery
Miscarriage	Stillbirth – congenital abnormalities
Gestational hypertension	Birth trauma
Gestational diabetes	Fetal macrosomia
Pre-eclampsia	Neonatal morbidity
Obstructive sleep apnea	Neonatal infection
Cesarean delivery	Neonatal hypoglycemia
Infections morbidity	Respiratory distress syndrome
Thromboembolic risks	Increase hospital stay
	Fetal programming for adult disease

Absence of sexually transmitted infections at the first prenatal assessment

Active infection with a sexually transmitted disease during pregnancy increases perinatal and maternal risk during pregnancy. Most national guidelines recommend routine screening for human immunodeficiency virus (HIV) and syphilis in pregnancy, while others like the Center for Disease Control in the United States include hepatitis B in screening protocols.⁵¹ Hepatitis B surface antigen testing is recommended at the first antenatal visit regardless of vaccination status. Women who screen positive for hepatitis B may transmit the infection to the fetus, particularly during the time of delivery. Selective, risk factor-based screening, is advised for diseases like gonorrhea, chlamydia and hepatitis C. Men with confirmed zika virus infection or viral exposure are advised to have a 3-month preconception waiting period.⁵² HIV may be transmitted from an infectious woman to her baby during pregnancy, labor and delivery. Primary prevention includes early education of both males and females about risky sexual behavior such as unprotected intercourse and multiple partners. Knowing ones HIV status allows for treatment and reduction of viral load, which decreases the risk of fetal transmission during pregnancy and labor. HIV testing prior to pregnancy also empowers women to make informed reproductive choices. Approximately 30% of pregnant women attending public health clinics in South Africa are HIV infected. South Africa has one of the largest antiretroviral therapy programs in the world and since the introduction of the Prevention-of-Mother-To-Child-Transmission (PMTCT) program, a substantial reduction in vertical transmission rates have been observed. In 2011, 2.7% of HIV-exposed infants attending baby follow-up services were HIV-positive at 4–8 weeks of age, compared to an expected 30% in the absence of a PMTCT program.

WHO estimates that 12 million new cases of syphilis occur each year.⁵³ Complications of congenital syphilis include stillbirth, neonatal death, blindness, deafness, bone and teeth abnormalities and seizures. Women may be screened for the disease using a non-specific non-treponemal test such as the Venereal Disease Research Laboratory or rapid plasma regain. Positive screening tests are usually confirmed by confirmatory treponemal tests. Penicillin G successfully treats all stages of syphilis and congenital syphilis may be treated and prevented with early treatment. Because most national guidelines recommend screening all women during pregnancy for syphilis, screening just prior to conception is strongly recommended.

The preconception visit provides an ideal opportunity for women to be risk assessed and be counseled about safe sex practices, testing and treatment options.

Optimal glycemic control in women with pregestational diabetes

Women who are known to have diabetes prior to pregnancy are at an increased risk for adverse pregnancy outcome. Offspring of diabetic mothers are at an increased risk of structural abnormalities such as cardiac and neural tube defects and increased perinatal morbidity and mortality. Maternal risks include the development or worsening of retinopathy and nephropathy. These risks are attributed to negative impact of hyperglycemia. Glycated hemoglobin levels (HbA1c) are inversely related to adverse outcomes with the risk of adverse outcomes increasing by 5.5% for every 1% increase in HbA1c above 7.0%.⁵⁴ Women should therefore be advised to strive for an HbA1c target of 6.5% or less. Preconception care should therefore focus on helping women achieve optimal glycemic control. Women should also be screened for retinopathy and nephropathy. Folic acid supplementation should begin 3 months prior to conception and all medication should be reviewed for their safety profile in pregnancy. Focused prenatal care is associated with significant reductions in adverse pregnancy outcome.⁵³

Teratogenic medication avoidance

Medication use in pregnancy is common; however, good data on potential maternal and fetal effects are lacking as pregnant women are not usually included in drug studies to determine safety and efficacy. Approximately 10–15% of congenital anomalies are due to teratogenic maternal exposures to medications, alcohol or other exogenous factors that have adverse effects on the developing embryo or fetus.⁶ The use of older, generic drugs within each class is advised since there is more likely to be more data on use in pregnancy.⁵⁵ Fetal drug exposure, particularly in the first trimester, should be avoided as this is the period of organogenesis. Exposure to drugs later in pregnancy may also result in minor abnormalities, functional impairment or growth restriction. With optimal preconception care, women treated with teratogenic medication would discuss pregnancy intention with their healthcare providers. Women not desiring a pregnancy or those where pregnancy is not advised due to medical disease should be offered effective contraception. Women who are on medication for a medical disorder should be counseled on risks and benefits of potential alternative treatment regimens. Many medical conditions; however, may require higher dosing during pregnancy because of increased renal and liver clearance. Medication use should be limited to conditions where benefit outweighs the risk and where possible the lowest dose should be prescribed. Although there are many teratogenic medications, the most common drugs are angiotensin-converting-enzyme inhibitors, angiotensin receptor blockers, statins, lithium, valproic acid and warfarin.

CONCLUSION

Maternal physiology, diet, body composition and lifestyle have profound effects on offspring health. Research has shown that the fetus is particularly vulnerable to adverse influences around the periconception period. The preconception time period therefore provides a perfect “window of opportunity” for intervening on a variety of health practices. Additional research is required, particularly in lower- and middle-income countries to determine how systems can support the provision of preconception care.

PRACTICE RECOMMENDATIONS

- **The aim of preconception counseling is to optimize maternal health in preparation for pregnancy.**
- **A detailed history is important to determine pregnancy risk. This should include screening for mental health disorders.**
- **Women should be encouraged to book early. Antenatal care should be person-centered with the implementation of effective clinical practices.**
- **Folic acid supplementation should begin 1 month prior to conception.**
- **Women should be advised to lead a healthy lifestyle, abstaining from tobacco, alcohol and recreational drugs.**
- **Achieving a healthy weight with optimal glycemic control is important in reducing both maternal and fetal risk.**

CONFLICTS OF INTEREST

The authors of this chapter declare that they have no interests that conflict with the contents of the chapter.

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