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EXPERT OPINION

Optimizing Pregnancy Outcomes: The Role of Gynecologists in Preconceptional Care in Italy

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Abstract: The preconceptional period is crucial for women and couples who desire children as it influences the progress and outcomes of a healthy pregnancy. Preconceptional care is now an accepted paradigm by most healthcare professionals. However, its implementation in healthcare programs is still in the early stages. Preconceptional care starts with communication and a collection of personal and family medical history. It then encompasses a variety of recommendations for lifestyle interventions, as well as preventive laboratory tests. This review will summarize current recommended procedures, from nutritional to disease screening, and their impact on pregnancy outcomes. Folic acid supplementation has been shown to significantly decrease complications such as neural tube defects, and is now widely recommended during the preconceptional phase. Additionally, nutritional supplementation, including the intake of vitamins D and B12, has been linked to healthier pregnancies. Screening for ToRCH infections (toxoplasmosis, syphilis, hepatitis B, rubella, cytomegalovirus, and herpes simplex virus), as well as non-infectious conditions, may help avoid complications during pregnancy. This review will also provide an overview of current practices worldwide, focusing on the Italian context. This document will be helpful to update the medical community, especially gynecologists, on the current knowledge of the benefits of 1) maintaining a healthy nutritional state, including vitamin and mineral supplementation, 2) screening strategies for infectious and non-infectious diseases, and 3) avoiding dangerous behaviors, such as smoking, alcohol consumption, and drug use, for women and couples planning a pregnancy. It also provides suggestions on how to identify such couples to best intervene during the "window of opportunity". Finally, we aim to provide a simple decalogue, which healthcare professionals can use as a checklist. It can also be delivered directly to women or couples planning a pregnancy, reaching them with straightforward language.

Keywords: supplements, genetic screening, disease screening, recommendations, woman's health

Introduction

The preconception period has a critical role in optimizing pregnancy outcomes and reducing maternal-fetal morbidity and mortality. At the same time, this phase can be considered a "window of opportunity" to improve short and long-term health for both mothers and babies.[1] It is often defined as the three months before conception, but alternative definitions exist.[2] In this review, the preconceptional period is defined as the period from when a woman or a couple decides to have a baby to the actual conception. During this period, the health of the woman, as well as her nutritional state and lifestyle choices, influence fetal development. We know that nutrition is key to preparing the body for the many demands of pregnancy, which includes taking in a balanced amount of macro and micronutrients. For example, it is well-known that folic acid is essential to reduce the risk of neural tube defects.[3] Vitamin B12 improves maternal status and

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neurodevelopment in children.[4] In general, preconceptional vitamin and mineral supplements reduce the risk of preterm deliveries or low birth weight.[3,5]

The preconception phase is the time for healthcare providers to provide counseling about lifestyle choices that can improve reproductive health and lower risks associated with poor nutrition.[6,7] Among healthcare professionals, gynecologists provide specialized counseling about fertility and pregnancy. They identify and manage conditions that directly impact fertility, such as hormonal imbalances, polycystic ovary syndrome, and endometriosis. Moreover, the relationship between a woman and her gynecologist is similar to the relationship between a psychologist and their patients. It builds on intimate trust. Therefore, gynecologists may reach women in ways other professionals cannot and possibly be more successful in educating women about the importance of the multi-faceted preconceptional care.

However, even though the importance of preconception is well-recognized, many couples face pregnancy without preconception care. Preconception counseling is often limited to recommendations for folic acid supplementation, ignoring the general nutritional state and other important lifestyle choice recommendations. The main barriers to the implementation of preconceptional care are limited awareness and resource constraints. This gap in current healthcare practices calls for better strategies to improve maternal and offspring health.

With this Expert Opinion, we aim to present current knowledge from published material on the preconceptional period and care strategies, identify barriers and gaps, and propose strategies to bridge the current gaps, preventing avoidable adverse clinical outcomes for mothers and children. Real-life experiences and suggestions on current practices in preconceptional counseling – with a focus on Italy, where preconceptional care is still often neglected[8] – were collected from a panel of Italian experts in gynecology.

Methods

The literature search was performed on Medline using the following search query: (preconception OR preconceptional OR "pregnancy planning") AND ((supplements OR micronutrients OR vitamins OR nutritional) OR ("genetic testing" OR "disease screening") OR (recommendations OR guidelines) OR ("woman's health" OR gynecologist) OR pollutants). Only articles written in English were considered for inclusion. No stringent inclusion or exclusion criteria were adopted. Instead, articles were selected if they contained the main topic of the review, with particular attention to recent studies.

The expert consensus was collected by interviews performed in September 2024 in a panel composed of 11 Italian gynecologists from different Italian regions, practicing in public hospitals or private practices.

Although collected by years of experience and clinical knowledge, the resulting expert consensus and the perspectives shared in this paper may reflect individual experiences, which can vary across different healthcare settings and populations (last 20 years).

The Importance of the Nutritional State in the Preconceptional Period

Macro- and Micronutrients

Maintaining a balanced diet, with adequate consumption of macronutrients, including carbohydrates, proteins, and fats, helps support the physical changes that occur around conception and throughout pregnancy. In this period, the nutritional needs of women increase to satisfy the physiological demands.[9] Macronutrients play distinct roles: carbohydrates are the primary energy source; proteins have structural and functional roles, such as collagen or hormone production; and fats are structural components of cell membranes and are essential for tissue growth. Poor macronutrient intake can adversely affect the pregnancy, such as low birth weight or preterm birth.[9] Fatty acids are also important for brain development in fetuses and young babies.[10]

Especially at risk of maternal nutrient deficiencies are women with a history of bariatric surgery; such procedures aim at reducing the absorption of nutrients, thereby reducing obesity and related comorbidities, but have the downside of also increasing the risk of having small for gestational age (SGA) babies. However, it has been shown that providing nutritional advice to these women significantly reduces the risk of having an SGA baby.[11]

Nutritional education and counseling are, therefore, very important and recommended to improve maternal and fetal health.[12]

Moreover, it has been shown that a higher level of nutritional education is associated with increased use of supplements during pregnancy.[13] This is especially important to contrast micronutrient deficiencies that impact fetal health and development.

Micronutrient deficiencies have been linked to significantly increased reproductive risks, ranging from infertility to fetal structural defects and long-term diseases.[14]

Micronutrient deficiencies are not uncommon around the globe. Around 2 billion people are estimated to be affected.[5] Deficiencies in folic acid, vitamin A, iron, iodine, and zinc are the most prevalent and cause concern in pregnant women and children under 5 years old.[5]

In low- and middle-income countries, nutrient deficiencies are more prevalent: around 42% of women are anemic during pregnancy, and almost 11% of women of reproductive age have a low body mass index (BMI).[15]

Folic Acid

Adequate folic acid intake is essential to minimize the risk of developing neural tube defects (NTDs) in the developing fetus. Several studies have indeed confirmed that women who supplement their diet with folic acid in the preconceptional period and during pregnancy have a drastically reduced risk of NTDs. By pooling together results from the many studies performed on the topic, a recent umbrella review of systematic reviews and meta-analyses concludes that prenatal folic acid is associated with a 57% reduction in NTDs.[16]

As for other nutrients, the changing physiology of the mother and the developing fetus demands increasing levels of folic acid: adverse outcomes such as low birth weight or preterm birth have been associated with low levels of folate intake.[17]

Folic acid can be taken as supplements or with the diet: especially Mediterranean diets include folate-rich foods, such as legumes and leafy vegetables, and adopting such a diet has been associated with improved maternal and child health.[18]

Since not all pregnancies are planned, advising to take folic acid through natural sources all the time is a valid alternative to supplementation, which can enhance pregnancy outcomes.[19]

Due to mutations in the methylenetetrahydrofolate reductase (MTHFR), some individuals cannot convert folic acid into its reduced and methylated form (5-methyltetrahydrofolate or 5-MTHF), which is the biologically active form of the vitamin.[20] This happens with a much higher frequency in Hispanics and Caucasians, compared with African-Americans.[21] When this happens, unmetabolized folic acid (UMFA) can accumulate in serum, which has potential adverse effects.[22] It is, therefore, preferable to supplement with 5-MTHF instead of UMFA, the former being immediately bioavailable also in populations with defects in the MTHFR.[23] Another advantage of using the reduced and methylated form of folic acid is that this form passes the gastric barrier and is the preferred substrate for transport into the peripheral tissues by a carrier-mediated mechanism in the small intestine, ensuring a higher folate uptake.[24]

Also, 5-MTHF is unlikely to mask vitamin B12 deficiency: the folate biochemical pathway ensures that folic acid is transformed to 5-MTHF, and by doing so, purine and pyrimidine biosynthesis occurs for incorporation into DNA and RNA (pathway 1). 5-MTHF is then recycled into tetrahydrofolate, with vitamin B12 as a coenzyme in this reaction (pathway 2). If vitamin B12 is deficient, but high levels of folic acid are present, the synthesis of purine and pyrimidine through pathway 1 still occurs, whereas pathway 2 is blocked, leading to cognitive symptoms. Instead, if vitamin B12 is deficient, but folic acid is not present in high levels because supplementation occurs through 5-MTHF and not folic acid, both pathways 1 and 2 will be blocked, and symptoms of anemia will occur, thereby signaling possible vitamin B12 deficiency.[25]

One well-known marker of vitamin B12 deficiency is high plasma levels of homocysteine, which is not just a marker but also an independent risk factor for vascular disease involving the coronary, cerebral, and peripheral vessels as well as thromboembolism.[25] It has been shown that combining vitamin B12 with folate supplementation reduces plasma homocysteine levels more significantly than vitamin B12 alone.[26] A recent study has also shown that hyperomocysteinemia can be successfully managed by supplementation with a multimineral and multivitamin containing betaine, L-5-calcium methylfolate (active form of folic acid), vitamin B2, vitamin B6, vitamin B12, and Zinc.[27]

So, folic acid alone is not sufficient. Using a multivitamin that includes folic acid and other vitamins is significantly more effective (around 90%) in reducing the risk of NTDs than using folic acid alone, regardless of dosage. Additionally,

multivitamins with folic acid appear to be more effective in lowering the incidence of cardiovascular and urinary tract defects than folic acid alone.[28]

An interesting ongoing project, the EpiBrain project, will provide a better understanding of the role of B vitamins, including folic acid, in brain function, and the epigenetic mechanisms behind.[29]

Vitamin B12 and Vitamin D

We have seen that, together with folic acid, vitamin B12 is required during DNA synthesis, DNA-, protein-, and lipid-methylation, and the generation of neurotransmitters. This makes vitamin B12 essential for neurological function, and maternal deficiency may lead to poor cognitive functioning in the offspring. Preconceptional supplementation of vitamin B12 significantly improved neurodevelopmental performance in children between the ages of 2 and 4.[4] Also, in a prospective cohort study, women with vitamin B12 and folic acid concentrations higher than the median before assisted reproductive treatments (ART) had a significantly increased probability of live births (adjusted difference in live birth rates of 26% compared with women with folate and vitamin B12 concentrations less or equal to the median).[30]

Vitamin D is important in the regulation of calcium metabolism and bone health.[31] Since the growing fetus requires skeletal growth, extra calcium is needed. Consequently, extra vitamin D. Vitamin D deficiency is therefore common in pregnant women and has been linked with several adverse health outcomes for both the mother and developing fetus. These include preeclampsia, gestational diabetes mellitus (GDM), bacterial vaginosis, and maternal and fetal bone health.[31,32] Since vitamin D receptors are expressed in the ovary, placenta, and uterus, it is suggested that its deficiency may be associated with conception/fertility issues.[33] In a prospective cohort study, women were categorized into meeting or not the estimated average requirement for vitamin D, and clinical pregnancy and live birth rates were compared between the two groups. Clinical pregnancies were significantly more frequent in women who met the requirement (67.5% vs 49%). Analogously, live birth rates were higher (59% vs 40%) in women with adequate vitamin D levels compared to women who did not meet the recommended levels of vitamin D. Therefore, women with inadequate vitamin D levels might benefit from vitamin D supplements.[34]

Moreover, during pregnancy, the maternal immune response has to adapt to tolerate the growing fetus (maternal tolerance), and, in this scenario, Vitamin D plays an important role by modulating the immune system.[35] In fact, Vitamin D is involved in balancing pro-inflammatory and anti-inflammatory cytokines, by enhancing the production of regulatory T cells. This ensures a more favorable immunological environment for fetal development.[36]

Both vitamin B12 and D should therefore be considered when supplementing the diet of women planning to conceive.

Zinc and Iodine

Zinc is a ubiquitous metal needed in virtually any biological process. It is involved in the catalytic activity of a multitude of enzymes, including enzymes involved in DNA synthesis.[37] In addition, it is essential for numerous female reproductive processes, including oogenesis, follicle development, ovulation, maturation, fertilization, and implantation.[37] Zinc supplementation resulted in a 14% relative reduction in preterm births.[38] In a retrospective study, maternal plasma concentration of zinc was measured in women at week 15±1 of pregnancy, and time to pregnancy (TPP, in months) was documented: women who had optimal plasma levels of zinc between 7.8 and 12.24 µmol/L (51–80 µg/dL) had the lowest estimated median TPP (2.7 months), compared to women with lower (TPP 3.3 months) or higher concentrations (TPP 3 months).[39] Adams et al recommend adequate prenatal supplementation of zinc, which likely reduces the risk of preterm birth, impetigo, asthma, and preeclampsia.[40]

Iodine contributes to the normal production of thyroid hormones and normal thyroid function. Its supplementation is recommended in pregnant women to avoid hypothyroidism and intellectual disability in children.[41] A population study in Italy estimated that the daily iodine intake obtained from iodized salt and dietary sources is insufficient to meet the intake levels recommended by the European Food Safety Authority (EFSA).[42] Iodine deficiency should be corrected very early in pregnancy, better so in the preconceptional period, since it may result in permanent damage to the offspring.[40] Iodine deficiency can indeed result in a higher risk of miscarriage, stillbirth, and infant mortality, on top of impaired cognitive function.[40] Increasing evidence suggests that supplementation of iodine should happen before conception since supplementing during pregnancy might not be sufficient to effectively replete low levels of iodine.[43] In a prospective cohort

study that recruited 501 women looking to conceive, it has also been shown that iodine-deficient women had a 46% reduction in fecundity, with significantly longer times to pregnancy.[44]

Other General Recommendations

Metabolic Health

An elevated BMI is associated with lower fertility and an increased risk of adverse pregnancy outcomes, such as GDM and increased rates of c-section deliveries.[45,46] Maternal obesity and GDM are also linked to adverse outcomes in the offspring by increasing the risk of childhood obesity and metabolic disorders, neonatal hypoglycemia, and macrosomia.[47] It is, therefore, important to adopt lifestyle interventions, such as practicing healthy physical activity (PA), during the preconceptional period to boost fertility and minimize pregnancy complications.[48] Indeed, regular preconceptional PA is associated with better cardiovascular health, mental well-being, and weight management, as well as reduced risk of developing GDM and preeclampsia, which in general improve conception chances and pregnancy outcomes.[2,49]

Similarly, effective blood pressure control is essential during the preconceptional period, as hypertension can lead to complications such as preeclampsia and other adverse fetal outcomes such as placental abruption, stillbirth, preterm birth, or low birth weight.[50] Women with elevated blood pressure should be advised to manage their condition through lifestyle interventions, including dietary adjustments, regular PA, and, when appropriate, antihypertensive medications under medical supervision.[51]

Women who undergo bariatric surgery can lose weight and improve their ovulatory dysfunction and irregular menstrual cycles, concomitantly increasing their chances of spontaneous conception.[52] There is, however, still an ongoing debate as to whether preconceptional weight loss has any influence on pregnancy chances and outcomes in women who rely on ART.[48,53,54] As much as preconceptional regular PA provides benefits to the couple seeking a pregnancy, high-intensity PA should be avoided by both women and men, as it negatively influences fertility.[55]

It is, therefore, important to address metabolic health during preconceptional counseling, although this is the most complex topic to address. Several barriers limit the couple's engagement, which include alternative priorities, financial limitations, a lack of accessibility, and a lack of motivation.[49]

Non-Infectious Disease Screening

An important aspect to consider during pregnancy planning is the risk of transmitting genetic diseases to the baby. This can be evaluated through genetic testing. It's a delicate aspect involving ethical considerations such as privacy and genetic discrimination.[56] But when done with ethical oversight, it can help in making an informed decision about passing on severe diseases, such as spinal muscular atrophy (SMA), cystic fibrosis (CF), fragile X syndrome (FXS), hemoglobinopathies, or thalassemia.[57]

Ideally, carrier testing during the preconceptional phase should be offered if there are known cases of genetic disease in the family.[58–60] Carrier screening has been linked to reduced incidences of genetic disorders in offspring. Informed couples thereby gain access to reproductive options, such as ART options that include preimplantation genetic testing.[61]

Other non-communicable diseases do not require genetic testing but impact pregnancy outcomes. For instance, hypertensive disorders are a frequent cause of maternal morbidity and mortality, and hyperlipidemia is a risk factor for preeclampsia.[62] Also, pregestational diabetes increases the risk of adverse outcomes in both mother and child and is linked to preeclampsia, congenital defects, macrosomia, c-section delivery, and preterm delivery.[63] Moreover, periodontal disease is associated with adverse pregnancy outcomes.[64] Simple screenings during preconception, and regular visits at the dentist, help effectively and timely manage the conditions to avoid complications during pregnancy. Healthcare providers can offer informed counseling with dedicated interventions such as lifestyle modifications and medical management.

Infectious Disease Screening

Screening of both active and past infectious diseases in women who are planning a pregnancy is of paramount importance since vertical transplacental infection of several etiological agents can cause severe outcomes in the unborn

child. Routine screening for ToRCH infections (toxoplasmosis, other agents – syphilis and hepatitis B – rubella, cytomegalovirus, and herpes simplex virus) and couple's education on avoiding exposures is the first step in reducing the risk of contracting such infections.[65,66]

Toxoplasmosis is contracted from contaminated food, water, or soil. Transmission to the fetus can have drastic neurological consequences. However, the risk of consequences can be reduced by effective treatment.[67]

Congenital syphilis causes severe adverse effects in up to 80% of cases and is associated with stillbirths and morbidity and mortality of newborns despite affordable treatment options.[68]

Vertical transmission of hepatitis B carries a significant risk to the offspring since it may result in chronic HBV infection and subsequent severe liver-related complications in life, especially cirrhosis and hepatocellular carcinoma.[69]

Congenital rubella syndrome includes signs of cataracts, sensorineural hearing impairment, congenital heart disease, jaundice, purpura, hepatosplenomegaly, and microcephaly. Rubella can be prevented by vaccination.[70]

Infection by cytomegalovirus (CMV) is the most common congenital infection. Most babies are asymptomatic, but the symptomatic ones may suffer from isolated hearing loss to severe neurological problems. It is unclear if broad screening strategies during preconception have beneficial impacts on the prevention and management of the disease since reactivation of the virus is the main mode of transmission to the fetus. The education of couples during preconception and pregnancy is probably the most efficient tool for preventing adverse outcomes from CMV infection.[71] Simple precautions, such as avoiding exchanging bodily fluids and having correct hygiene, can prevent infection.

Herpes simplex virus (HSV) infections, when contracted in utero, can cause encephalomalacia, hydrocephalus, calcifications, and microcephaly, thereby causing severe neurodevelopmental outcomes. It is challenging to prevent transmission from mother to infant. Thus, mothers should be examined carefully if they present genital lesions, and a C-section is advised in the case of an active HSV infection.[72]

Other non-TORCH infections are equally concerning when contracted during pregnancy and include Listeria, HIV, Parvovirus B19, Varicella-zoster, Hepatitis C, and Zika virus.[65]

Therefore, early screening for infectious diseases is a critical medical practice, as early treatment can significantly decrease vertical transmission rates, with a measurable reduction in congenital malformations and neonatal morbidity.

Human papillomavirus (HPV) screening for the prevention of cervical cancer is recommended by the World Health Organization (WHO) for all women, starting at the age of 30.[73] Vertical transmission from mother to fetus has been observed, providing another strong argument for preconceptional screening.[74] The benefits of preconceptional vaccinations, however, are still debated, since an elevated risk of spontaneous abortions after vaccination could not be completely ruled out.[75]

Moreover, it is important to know the immunological status of women planning a pregnancy since the immunological memory of the mother (after infection or vaccination) may protect the fetus.[66] If immune memory is absent, vaccinations can be offered for several infectious diseases.

Environmental Pollutants, Smoke, Alcohol, Drugs

Exposure to environmental pollutants, smoke, alcohol, and drugs has detrimental effects on an individual's health. During the preconceptional phase, it can influence the outcome of a future pregnancy and the health of the offspring.[76]

Outdoor ambient air pollution, such as traffic-related air pollution, affects pregnancy outcomes, such as reduced birth weight. It is suggested that air pollution exposure can induce inflammatory responses and oxidative stress that influence placental growth and, consequently, fetal growth.[77] Air pollution may also be the cause of miscarriage, stillbirth, or preterm delivery.

Especially endocrine-disrupting chemicals (EDCs) that are present in the atmosphere as pollutants pose a significant risk during the preconceptional period. EDCs include polycyclic aromatic hydrocarbons (PAHs) and microplastics, which may interfere with hormonal signaling, eventually leading to fertility and fetal development issues.[78] For instance, PAHs can alter sperm functions and hormone levels, leading to altered male reproductive functions.[79] With regards to female fertility, studies performed on animals and human epidemiological studies demonstrated how EDCs can alter puberty timing, can cause irregular menstrual cycles, subfertility and infertility, lead to preterm birth and adverse birth outcomes, and diseases such as polycystic ovarian syndrome, endometriosis, and fibroids.[78]

For women living in high-traffic areas or areas subject to wildfires, avoiding outdoor activity when air quality is poor and using a HEPA filter air purifier to reduce exposure to pollutants is recommended.[80]

Maternal smoking affects the fetus in many ways and can lead to intrauterine growth restriction, congenital malformations, low birth weight, prematurity, as well as sudden infant death syndrome.[76] Smoking also causes fertility issues to both women and men: in men, smoking has been associated with a negative impact on sperm, specifically with reduced count, altered morphology, reduced motility, and increased DNA damage; in women, smoking may induce increased thickness of the "zona pellucida" in the oocyte, which makes sperm penetration more difficult.[81] Smoking should be avoided by anyone, especially women who are planning a pregnancy. This could be challenging, given that 8% of pregnant women in Europe keep smoking during pregnancy.[82] Preconceptional care should focus on informing women about the possible adverse outcomes associated with smoking and assistance in smoking cessation strategies.[76]

Similar to smoking, excessive maternal alcohol consumption can lead to adverse pregnancy outcomes, including impaired cognition in the offspring, low birth weight, preterm birth, or miscarriage.[83] Also, chronic over-consumption of alcohol can impact ovarian reserve and, therefore, fertility in women. However, moderate consumption has not been found to affect fertility.[81] Nevertheless, alcohol consumption should be kept to a minimum or ceased to minimize risks.[2] Knowledge is the best tool to enable women to make educated choices about alcohol consumption.[83]

Preconceptional illicit drug use can have teratogenic effects, leading to complications such as neonatal abstinence syndrome, placental abruption, low birth weight, and maternal, fetal, and infant mortality.[84,85] Drug abuse can also lead to fertility problems; for instance, heroin and methadone can cause amenorrhea.[81]

Taking prescription drugs should also be reviewed if a couple is planning a pregnancy. Proper counseling should aim at assessing the risk/benefit ratio of continuing therapy on an individualized basis. Women who are taking care of chronic diseases with prescription drugs should be advised to reduce the intake to the minimum and the lowest dosages.[85]

The Role of the Healthcare Professionals

General Preconceptional Counseling Practices Worldwide

Preconceptional care has become a recognized important and integral part of primary health care for women worldwide. Different countries have adopted strategies to try to reach women or couples who are trying to conceive.

For instance, in the USA, an initiative named "One Key Question" encourages healthcare providers to integrate a proactive screening of pregnancy intention into their routine by asking one simple and direct question: "Would you like to become pregnant in the next year?". According to the answer, the healthcare professional will provide personalized follow-up counseling, including contraceptive counseling for those who respond "no".[86]

In Europe, many countries have guidelines for women with chronic diseases who are trying to conceive, but for healthy women, standard practice is still heterogeneous and inconsistent. The most common intervention that most professionals agree upon is the supplementation of folic acid when trying to conceive, but guidelines on any other intervention are scarce.[87]

In the Netherlands, general practitioners are the healthcare providers that have the most contact with women of reproductive age. However, they are less engaged in delivering preconceptional care.[88] Around 2007, an internet-based questionnaire was developed to provide a risk assessment instrument and preconceptional advice to couples trying to conceive.[89] Still, financial compensation for time spent delivering preconceptional care has not been arranged yet in Dutch obstetric care.[88]

In Australia, community awareness of preconceptional care is low. In 2021, a "Preconception Health Network" was established to promote best practices in preconceptional care and educate people to "optimize their reproductive health and wellbeing across the life course".[90]

The "National Free Preconception Health Examination Project" was launched in China in 2010. Since basic family information is available to community workers, these can call fertile couples without children and introduce the free national preconception care service. If couples plan to conceive within 6 months, they are offered a health examination, including a full preconceptional counseling session.[91]

Italian Current Practice

The Italian Ministry of Health, in 2010, launched the project "Pensiamoci Prima" (literally "Let's think about it in advance", or "Let's plan ahead"). A website was published ("pensiamociprima.net"), containing all relevant information to guide a couple planning a pregnancy. This was an attempt at reaching healthy, fertile couples and presenting preconceptional care as an opportunity for improving the health outcomes of a future child and mother. The website seems to have been discontinued at the end of 2023, but similar resources are available, for example, "e-medicina.it". In 2017, the Ministry of Health also introduced a decree on the new essential levels of care, updating and replacing the old one dated 1998. The decree lists healthcare services for couples wishing to have a child and pregnant women. It includes specialized and diagnostic services that benefit women's and their unborn children's health. These services are provided at public and accredited private healthcare facilities, including family counseling centers, and are free (without cost-sharing). The list for preconceptional care includes a first gynecological visit, where the actual preconceptional counseling takes place, and laboratory tests: screening for blood type, search for immunity against rubella, complete blood count (cytometric analysis and differential leukocyte count, including hemoglobin, erythrocytes, leukocytes, hematocrit, platelets, microscopic review if necessary), hemoglobin and its fractions, and Pap smear test. However, the list of free preconceptional laboratory tests is far from comprehensive. Although the Ministry of Health has attempted to improve preconceptional care and awareness, the topic is still neglected in Italy.[8]

We, as expert gynecologists practicing in Italy, feel that one of the key barriers to better preconceptional care is the lack of awareness and education among the general public, including the importance of optimizing health before conception. Many couples do not actively seek preconceptional consultations, either because they do not feel the need for it, or due to difficulty accessing services, eg, in less centralized areas. Another significant barrier is the healthcare system's fragmentation in Italy. While public services are available, patients may encounter long waiting times, and information regarding the full range of preconceptional services might not be sufficiently communicated. Even though Italy has made efforts to make preconceptional care available at no additional cost, logistical challenges and inconsistencies between regions mean that some couples may not benefit from these services.

Best Practice: Expert Opinion and Conclusions

To address these challenges, we propose that the Italian government increase investments in public health education campaigns targeting preconceptional care. Also, enhanced training for healthcare providers would increase recognition of the importance of preconceptional health in conversations with couples. Furthermore, a broader population could be reached by expanding digital platforms (eg, using social networks) with more accessible and up-to-date resources. Expanding telemedicine services could also facilitate access, especially in less urban areas.

Of course, our recommendations are tailored to Italy with its Italian-specific gaps and barriers but are generally applicable to other countries as well. Especially adopting digital platforms and expanding telemedicine services would greatly benefit low-resource settings in particular.

Preconceptional care counseling should be proposed, if not directly delivered, any time any healthcare professional meets a couple who is planning, or not excluding, a pregnancy. This is valid especially for general practitioners, gynecologists, andrologists, psychologists, geneticists, and nutritionists.[8] Gynecologists, first and foremost, should adopt a woman/couple-centered approach, engaging women in discussions about their family-building plans and medical history. A trusting relationship should be built to encourage women to ask more questions and raise concerns. Any healthcare professional providing preconceptional care should be well-informed about the latest guidelines and research, thereby being able to transfer the correct information to the women, who can, in turn, make informed decisions about their reproductive health. We also believe that information should be delivered in an easy-to-understand format, with an opportunity to expand upon topics if desired. This allows for reaching a broader audience and avoiding problems of information accessibility. Table 1 provides a simple "decalogue" of practical and concise information that can be used to inform women or couples during the preconceptional counseling visit. It has been designed in a simple language in order to reach the largest possible population. We also recommend that such decalogue be directly handed to the woman or

Table 1 Essential Tips if You are Planning a Pregnancy

#	Tip	Comments
1	Have annual gynecological checkups	Schedule a preconceptional counseling visit with a healthcare provider to assess overall health and discuss any medical conditions or medications that may affect pregnancy. This is also the time to discuss family history and contemplate the possibility of genetic testing.
2	Optimize nutrition and supplement with folic acid and other essential micronutrients	Focus on a balanced diet rich in fruits, vegetables, whole grains, and lean proteins. Take a multivitamin and multimineral supplement in accordance with your gynecologist when you start thinking about a pregnancy and continue through the first trimester.
3	Adhere to HPV screening programs	Also, consider HPV vaccination well in advance. Discuss this with your gynecologist.
4	Keep an adequate weight	Involve your partner!
5	Keep an eye on your blood pressure	Consider getting a portable blood pressure monitor
6	Engage in regular physical activity	Involve your partner!
7	Avoid alcohol, smoking, drugs	Involve your partner!
8	Check your immunological status	A simple blood withdrawal can give you peace of mind and inform you if you need treatment or a vaccination.
9	Go to the dentist annually	Oral health has a direct impact on child health!
10	Manage chronic conditions	Talk to your specialist doctor about your plans on getting pregnant, and come up with an updated medication regimen.

Abbreviation: HPV, human papilloma virus.

couple planning the pregnancy and that such decalogue be translated into other languages present in the community to increase accessibility by minorities.

The role of healthcare professionals, especially gynecologists, in preconceptional care is essential to achieve optimal health outcomes for future mothers and their children. Gynecologists are in an optimal position to adopt proactive and comprehensive counseling and information about individualized interventions, exploiting the window of opportunity offered by healthy women who come for a gynecologic consult.

Finally, it is important to stress that the effectiveness of the proposed interventions should be regularly monitored and evaluated in terms of improved pregnancy outcomes, reduced rates of adverse birth events, and increased adherence to recommended lifestyle changes. This will help identify areas in need of adjustment. Furthermore, follow-ups may provide feedback from women and couples, and identify where preconceptional care can further be improved. This will ultimately contribute to the well-being of families, which will raise healthier children in healthier communities.

Abbreviations

5-MTHF, 5-methyltetrahydrofolate; ART, assisted reproductive treatments; BMI, body mass index; CF, cystic fibrosis; CMV, cytomegalovirus; EDC, endocrine-disrupting chemical; EFSA, European Food Safety Authority; FXS, fragile X syndrome; GDM, gestational diabetes mellitus; HSV, Herpes simplex virus; MTHFR, methylenetetrahydrofolate reductase; NTD, neural tube defect; PA, physical activity; PAH, polycyclic aromatic hydrocarbon; SGA, small for gestational age; SMA, spinal muscular atrophy; ToRCH, toxoplasmosis, other agents – syphilis and hepatitis B – rubella, cytomegalovirus, and herpes simplex virus; TPP, time to pregnancy; UMFA, unmetabolized folic acid.

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Author Contributions

All authors made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, analysis and interpretation, or in all these areas; took part in drafting, revising or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work.

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Disclosure

The authors report no conflicts of interest in this work.

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