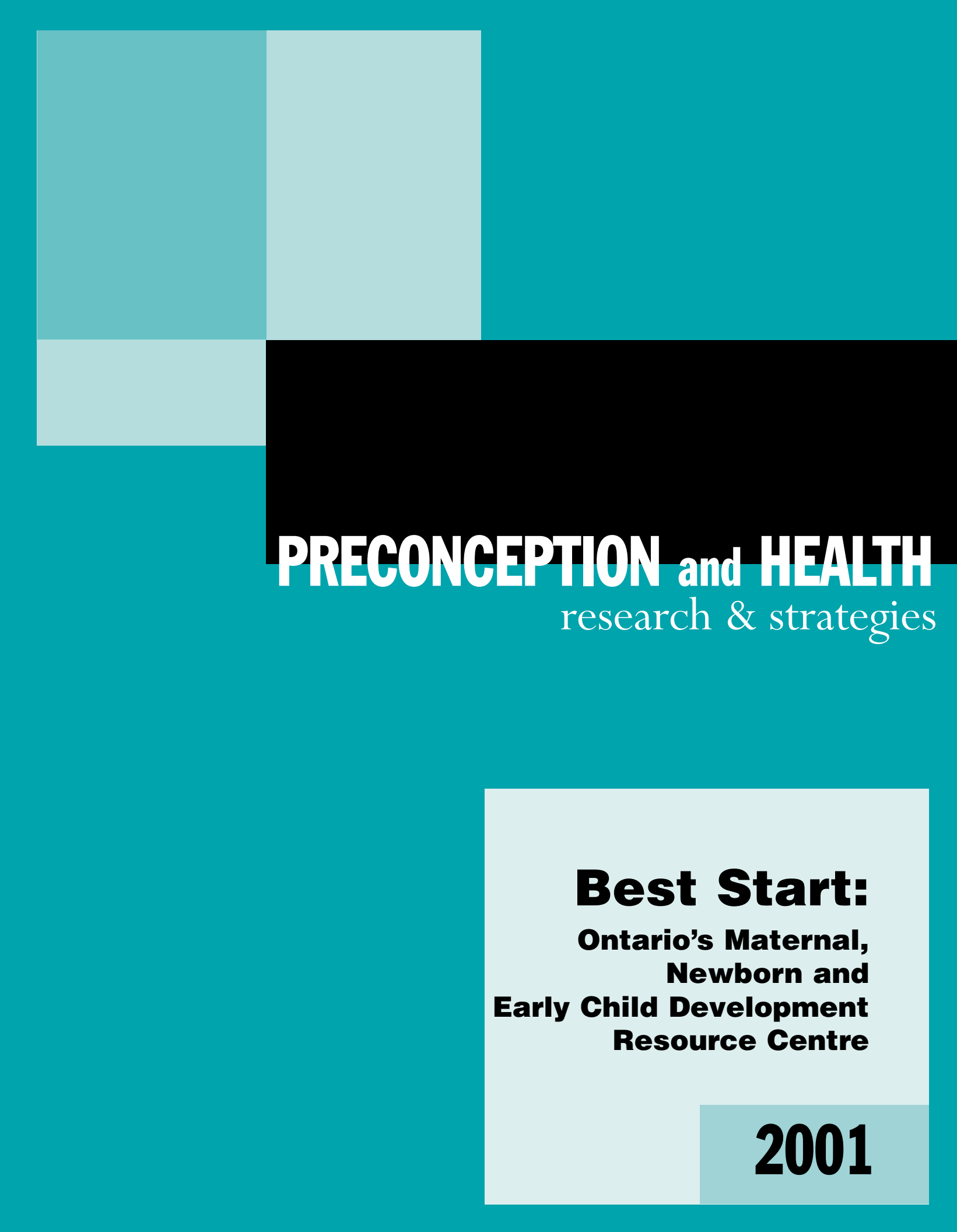




PRECONCEPTION and HEALTH

research & strategies

Best Start:
**Ontario's Maternal,
Newborn and
Early Child Development
Resource Centre**

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INTRODUCTION

This resource was developed in response to an increasing demand for information and guidance on preconception and health. Public health units, community health centres, community-based groups and others working on maternal newborn health asked about best practices and evidence related to health prior to pregnancy. “Preconception and Health: Research and Strategies” can help program planners direct their work to successful interventions by making available current research and practical approaches. General information is provided on the importance of a couple’s health prior to conception. The resource includes a summary of current research on many aspects of preconception including infection, nutrition, exercise, alcohol, smoking, drugs, special situations, the environment, social support and violence. In addition, each chapter incorporates a synthesis of current approaches related to each topic, providing the reader with insights on program planning for preconception health.

This resource will help individuals and groups:

- Become familiar with current research on preconception
- Have a better understanding of the issues involved
- Understand the scope of preconception
- Grasp the causes and relevant solutions to preconception hazards
- Identify possible initiatives
- Mount successful initiatives

The following section describes the current knowledge on preconception health promotion. While the focus of this resource is on the broader aspects of preconception health promotion, historically, health professionals have focussed their efforts on preconception care for women. Much of the research documentation is limited to evaluation results from services related to health care for women prior to pregnancy. We recognize that counseling women prior to pregnancy is an important approach, but it is only one aspect of preconception health promotion. While current research is restricted in its scope, the program applications are intended to reflect the entire range of health promotion strategies. We also encourage the reader to consider the broad range of strategies described in the final section of this resource, and not to focus entirely on preconception care for women.

PRECONCEPTION AND HEALTH

Preconception — Key to Healthier Babies

The Concept

Traditionally, prenatal care has been accepted as a critical intervention to improve pregnancy outcomes. Most Canadians view pregnancy as a nine-month event ending in the birth of a healthy infant. Yet, it is known that a healthy birth is also dependant on the health of the couple prior to pregnancy. Reproductive health begins long before a baby is conceived. Prenatal care, alone, is offered too late to prevent many adverse outcomes. Preconception is an integral and important aspect of maternal newborn health promotion. Promoting health prior to pregnancy can help couples make decisions about pregnancy and parenting, prevent problems during pregnancy and improve the health of babies at birth (Allaire & Cefalo, 1998; Cefalo et al., 1995; Jack & Culpepper, 1991; Levitt, 1993; Swan & Apgar, 1995; Summers & Price, 1993). Preconception health promotion helps to ensure that couples are in optimal health at the onset of pregnancy (Wallace & Hurwitz, 1998). It is preventive in nature, striving to reduce risks to the mother and infant and thereby decrease mortality, disease, birth defects and other adverse consequences. Information on preconception and health should be provided to all couples planning a pregnancy, not just those with identified risks (Cefalo & Moos, 1995).

Some health promoters prefer the term periconception to preconception, as it includes both the period prior to conception as well as the period between conception and confirmation of pregnancy (Czeizel, 1995). For sake of consistency, this resource will use the term preconception health promotion.

Planning ahead gives a couple time to improve their general health status prior to conception. For example, a woman can start taking folic acid supplements. Also, by planning ahead, a woman can avoid putting the fetus at risk before she knows she is pregnant, during its first critical weeks of development (Perry, 1996). However, some problems occur long before individuals think of starting a family and others take more than a few months to resolve. As a result, the period of preconception is difficult to define. A teenage girl's decision not to start smoking improves her preconception health, even though she may not have a child until much later in life. A couple's decision to quit smoking before starting a family also improves preconception health.

Preconception and health is further confounded by the fact that as many as half of all Canadian pregnancies are unplanned (Health Canada, 1999d; Health Canada, 2000b). Individuals who are less likely to plan their pregnancy may have greater risks during pregnancy, due to a range of factors including low socio-economic status (Cefalo & Moos, 1995). While a proportion of unplanned pregnancies are due to violence or use of alcohol, many were mistimed but not unwanted pregnancies. When pregnancies are unplanned, for whatever reason, the couple does not have the opportunity to assess and improve their health prior to conception. While preconception health promotion fails to serve couples with unplanned pregnancies, it can have substantial health benefits to couples that do plan their pregnancies (Wallace & Hurwitz, 1998).

Planning a pregnancy is not enough. Couples making a conscious decision to get pregnant may not improve their health prior to conception. The concept and opportunity of preconception is not well understood by Canadians. Many Canadians wait until a positive test confirms the pregnancy to make health changes such as stopping the consumption of alcoholic beverages. This action is too late to have an impact on the quality of the male's sperm, and could put the fetus at risk during a sensitive phase of early development.

To improve preconceptional health, health promoters have the double challenge of increasing the proportion of pregnancies that are planned, and also, increasing the number of couples who take conscious steps to improve their health prior to pregnancy. Strategies for preconception should include those who could get pregnant, those who are planning a family, and those who will likely have a family later on in life. Not only do health promoters want to provide information and improve knowledge, they also want to help individuals change behaviour (Wallace & Hurwitz, 1998). Preconception health promotion is not limited to counselling couples about medical concerns. Strategies can include increasing skills and knowledge, creating supportive environments, developing healthy public policies, strengthening community action and reorienting health services. For more information on strategies, see the final section of this resource.

For preconception health promotion to be effective, the general public and health professionals need to place a high value on health before pregnancy. In a 1998 survey of British women, less than 40% considered preconception care to be essential, and more than 10% believed it was of no importance. In contrast, 86% of physicians and 95% of nurses felt that preconception care improved maternal and newborn health (Wallace & Hurwitz, 1998). Clearly, health promoters need to work, not only at improving services related to preconception, but also at promoting the benefits of those services.

The Benefits

According to Moos (1989) preconception health promotion is a prevention strategy that helps couples to prepare for pregnancy in order to provide the healthiest environment possible to the earliest embryonic cell. Preconception health promotion has been recognized as enhancing pregnancy outcomes by optimizing health during the most critical period, 17 to 56 days after conception (Moos, 1989; Perry, 1996). This period of significant fetal development often occurs before a woman recognises that she is pregnant. During this time the central nervous system, limbs and internal organs develop. Preparation for conception is of particular importance in the prevention of birth defects (Czeizel, 1995).

Preconception health promotion and counselling are important examples of primary prevention, using a program of activities directed toward improvement of general wellness while also involving specific protection for pre-existing conditions (Kuller, 1994; Wallace & Hurwitz, 1998). The initial focus of preconception health promotion is to make individuals aware of the importance of optimizing the early fetal environment through healthy choices prior to conception (Schrandt-Stumpel, 1999). Although 60% of all congenital anomalies are preventable, most are untreatable (Czeizel, 1995).

Health promotion for men and women in preparation for pregnancy can identify not only medical risks but also social, psychological, lifestyle and workplace conditions. In some cases, when there are risks involved, couples may use the information to make informed choices about whether or not they should plan a pregnancy.

Preparing for a healthy pregnancy incorporates many components, including making choices about smoking, use of medications and alcohol, healthy nutrition, personal fitness and updating immunizations. Understanding the impact of risk behaviours may provide individuals with the incentive and strategies to make changes that will not only benefit their own lives but also the lives of their future children (Levitt, 1993). While it is unrealistic to expect all couples to address all potential areas of risk, community supports such as smoking cessation programs, food banks and addiction counselling programs play an important role in helping to change unhealthy risk conditions or environments.

While we have much to learn about the process and benefits of preconception health promotion, there are indications that couples are interested in the services and that preconception health promotion helps couples have healthier children. Planned pregnancies are associated with healthier behaviours, including reduced smoking, fewer caffeinated beverages, and increased daily vitamin use (Schrandt-Stumpel, 1999).

Preconception care showed a clear cost benefit in the prevention of congenital abnormalities (Czeizel, 1998). Cost benefits have also been seen in preconception care for women with diabetes and epilepsy (Schrandt-Stumpel, 1999). Preconception health promotion helps to complete the continuum of existing reproductive health services (Bushy, 1992).

Preconception health promotion is not only focussed on physical preparation for pregnancy. It also allows couples to think about their new role as parents and can provide the opportunity to discuss readiness to start a family, spacing of children and the benefits of breastfeeding, thereby laying a foundation for lifelong health. The couple can also discuss how they will share the work, discipline methods, child care, parental roles and finances. Preconception health promotion provides individuals thinking about pregnancy with information that helps them make informed choices about raising healthy children. An exploration of these important issues is beyond the scope of this resource.

Canadian Families

Canadian families are changing, with many parents choosing to delay parenting and to have smaller families. In 1996 almost two thirds of all babies were born to mothers between the ages of 25 and 34 compared to only 39% in 1971. The average number of children in a Canadian family decreased steadily from 1.8 children per family in 1971 to 1.2 children per family in 1996 (Health Canada, 1999c; Canadian Institute of Child Health, 2000). Birth control has become more reliable, available and acceptable, helping couples choose to delay childbearing and/or have smaller families.

With couples planning smaller families, later on in life, there is increasing pressure to have a “premium baby” (Bushy, 1992). While this places unrealistic expectations on maternal newborn health, it does indicate an increased readiness for improving health prior to conception. Couples need to be reminded, that in spite of all precautions, there is still a risk of complications during pregnancy or after delivery.

Preconception health promotion efforts need to be sensitive to the diversity of families that may be considering a pregnancy. Families can mean heterosexual couples, homosexual couples or single parents. In this document, the term “couples” will be used to reflect the potential input from a male and a female partner, however the broader range of actual families is respected.

Canadian families also come from a variety ethnic and cultural backgrounds, with an associated range of beliefs about sexuality, male/female roles, pregnancy and parenting. The geography of Canada is also varied. Families may live in heavily populated urban centres or in the isolation of small rural communities, requiring a range of approaches to preconception health promotion (Health Canada, 2000b).

Preconception health promotion serves to:

- Help individuals make informed decisions about whether or not to have children
- Guide couples in changing less healthy behaviours
- Help individuals identify and avoid risk situations
- Assess genetic risks
- Assist in the management of conditions such as illness and use of medication prior to conception
- Help women be in optimum health prior to conception and during the first few weeks of pregnancy
- Provide information for men on optimum health during sperm development
- Increase knowledge about how to have the healthiest pregnancy possible
- Increase fathers' skills in providing support during pregnancy
- Provide an opportunity to discuss a range of parenting decisions, including breast feeding

Health of the Mother

Improved health of the mother prior to pregnancy is clearly associated with positive newborn outcomes. There is evidence in a wide range of areas that women should assess and improve their health prior to pregnancy (Cefalo & Moos, 1995). Medical and other community supports such as preconception classes, medical appointments and media campaigns can help women understand and improve their health prior to pregnancy. More intensive supports may be needed for some women, for example, those at higher risk due to pre-existing medical conditions, women with addictions and those suffering from the effects of violence or poverty (Health Canada, 2000b).

Health of the Father

Although research in the area of male health and reproduction is limited, there is increasing evidence to suggest that paternal factors play a role in perinatal outcomes. The

genetic contribution of the father has been well documented, however, the less well-defined characteristics of a father's behaviour and general health status before and during conception are now considered important elements of preconception health (Yamey, 1999). A wide range of factors including tobacco smoke, alcohol, workplace chemicals and heat can adversely influence the health of men prior to conception. The most common reproductive consequence is infertility or reduced fertility. Men thinking about fatherhood are wise to adopt healthy lifestyle habits and to protect themselves from environmental and workplace toxins. Griffiths (1996) noted that men are more likely than women to have unhealthy lifestyles, to drink too much alcohol, to smoke, and to eat a less healthy diet.

Paternal exposures to toxins prior to conception can cause a variety of problems. If genetically altered sperm fertilizes an ovum, there appears to be an increased risk for miscarriage or birth defects (Cefalo et al., 1995). Males using chemicals at work may also introduce toxins into the home through their clothing. Paternal alcohol use in the month prior to conception is also linked with low birth weight. The age of the father is also associated with increased incidences of single gene mutations in their children, including achondroplasia, Marfan's syndrome and neurofibromatosis (Cefalo et al., 1995; Olsen, 1994).

Although there are biological limits to a male's influence on reproductive outcomes, there are no limits to the ways in which he can support his partner. According to Cefalo and Moos (1995), a man can control his own alcohol, tobacco and drug exposures or change his nutritional habits as a means of aiding his partner in doing the same. Fathers can also make a difference by learning about pregnancy, cleaning the cat litter box, and being patient and supportive.

The impact of biology and lifestyle are not the only areas that affect men's health. Society's expectations of men have created an environment in which men are less able than women to recognize physical and emotional distress and seek help (MacIntyre et al., 1996). Men are also relatively unaware of the length of time it takes for sperm to develop and of possible reproductive hazards. They may be less willing to request a protective reassignment or leave due to reproductive hazards at work. Consequently, program planning needs to be sensitive to these issues and societal factors that affect men and their health.

General Approaches

Preconception health promotion can include a combination of community supports, risk assessment, education, management or referral. The approaches can be individual or community wide.

High Risk

Much of the current literature on preconception focuses on counselling for women with pre-existing conditions such as diabetes or epilepsy. Individuals at higher risk need to know how important it is to seek advice before getting pregnant (Health Canada, 1999d). By supporting women and their partners before and early in pregnancy, parents are empowered to examine their own health and its influence on the health of their baby (Cefalo & Moos, 1995). While information for individuals with pre-existing medical concerns is important, it is not the only valid approach to preconception.

Population Based

By directing preconception health promotion only at those women identified with a known health risk, a large proportion of the female population of reproductive age is missed. Consequently, the goal of preconception health promotion is to reach all women and their partners, enabling them to be in an optimal state of physical and emotional health at the onset of pregnancy (Wallace & Hurwitz, 1998). Population-based approaches are well suited to the promotion of health prior to conception. Multiple strategies in multiple settings are needed to promote general health and to prevent health problems (Stewart, 1998).

Broader Determinants of Health

Although there are many factors regarding pregnancy planning that individuals and families can improve upon, there are also broader issues that influence pregnancy outcomes such as social assistance, workplace policies and organization and delivery of health services. Preconception health promotion informs the general population about the factors that contribute to a healthy pregnancy and a positive birth outcome, encouraging communities to share responsibility for maternal newborn health. Community resources and support systems can be identified, helping men and women to access these resources

prior to pregnancy (Health Canada, 2000b). Gaps in services can also be addressed, in order to meet the health needs of a community.

Key Principles: Preconception and Health

Preconception health promotion includes many components that are based on the principles of family-centred maternity and newborn care. Individuals and groups promoting preconception health should strive to:

- Adopt practices that value pregnant women, children, and families;
- Encourage men and women to prepare actively for pregnancy;
- Identify individuals with increased risks and provide information needed to make decisions and to reduce the risks;
- Be aware of the many environmental factors influencing the family, including social, psychological, spiritual and physical;
- Respect the diversity of people's lives and experiences; and
- Help women and their partners understand health issues as they relate to pregnancy and conception, so that they may make informed choices about pregnancy.

NUTRITION AND PHYSICAL ACTIVITY

Nutrition

Taking responsibility for one's health before conception is important, however food choices are not simply a matter of personal choice. Nutrition programs have recognized the importance of knowledge, attitudes and skills in developing positive health practices such as appropriate food choice behaviour, yet capacity involves more than knowledge about what to eat. It includes food preparation skills, preparation time and personal buying power, all of which are profoundly influenced by social and environmental factors. Economic and social forces, together with factors related to the physical environment, influence what foods are available and a person's individual capacity to make choices.

Unemployment and inadequate financial resources reduce individual capacity to meet daily needs for food. A woman's reproductive health is especially vulnerable to poor nutrition. Low socio-economic status is one of the most significant factors associated with low birth weight (Carmichael et al., 1997; Kramer et al., 2000).

Specific nutrition issues that need to be addressed in preconception involve screening for unhealthy eating habits, medical problems related to nutrition, improving access to food and necessary supplements, and increasing general nutrition knowledge. Actions must be based in research, information and public policy and consider the determinants of health (Health Canada, 2000b).

Nutritional assessment should include eating habits, food allergies, history of being underweight, overweight or eating disorders and use of vitamin or mineral supplements (Perry, 1996). The patient should be aware of the importance of good nutrition prior to pregnancy, during pregnancy and while breastfeeding. Referrals can be made to dietitians or assistance programs, as necessary.

Men who are planning a family should also eat well prior to conception as some male fertility problems can be linked to poor nutrition. While we have much to learn about nutrition and spermatogenesis, evidence shows that zinc deficiency is associated with low sperm counts and a vitamin C deficiency with decreased motility and clumping of sperm (Booth, 1987).

The Health Canada website (<http://www.hc-sc.gc.ca/hppb/nutrition>) has several documents available on-line for in-depth coverage of nutrition and population health. Documents that may be of interest to program developers include: “BMI”, “Vitality”, and “Canada’s Food Guide for Healthy Eating”. Some content for this section is based on Health Canada’s, “Nutrition for a Healthy Pregnancy” and “Family-Centred Maternity and Newborn Care”.

Nutrients of Special Concern

Current knowledge suggests that women should be particularly attentive to their intake of the following nutrients: calcium, vitamin D, folate and iron. Zinc is also important in preconception. Women planning a pregnancy should be cautioned about high doses of vitamin A.

Calcium and Vitamin D

- Women in the childbearing years need a dietary calcium intake of 700 mg per day (Health Canada, 2000b). Women who are lactose intolerant or lacto-vegetarian or under the age of 25, are at risk for calcium deficiency.
- ‘Natural’ calcium supplements made from bone meal, oyster shell and dolomite should be avoided because they may contain high levels of lead (Cefalo & Moos, 1995).
- Calcium interferes with iron absorption; therefore a calcium supplement should not be taken at the same time as a prenatal vitamin or an iron supplement. Foods that contain high levels of calcium are: canned salmon and bones, spinach, broccoli and brussel sprouts and nuts. Low impact exercise helps to assure an adequate store of calcium is available to meet the increased demands of pregnancy.
- It is important to remember that calcium absorption requires adequate supplies of Vitamin D, commonly found in milk products. Daily consumption of 100 IU is recommended prior to pregnancy, assuming a large proportion of the required nutrient would be derived from exposure to sunlight (Health Canada, 2000b).

Folate

- Several studies have shown that folic acid reduces the risk of neural tube defects in the fetus (Czeizel, 1995; Werler et al., 1999; Schuurmans et al., 1998). Because neural tube defects occur in the first few weeks of pregnancy, often before a woman knows she is pregnant, maternal folate intake should start prior to conception (Koren, 1993). All women who could become pregnant require of 0.6 mg of folate per day at least one month prior to pregnancy and during the first three months of pregnancy (Koren, 1993; Health Canada, 1999b; Scanlon et al., 1997).
- As it is difficult to achieve this level of folate from diet alone, a folic acid supplement of 0.4 mg per day is recommended prior to conception and early in pregnancy (Health Canada, 1995a).
- In addition to the folic acid supplement, women should be encouraged to eat foods rich in folate prior to conception and throughout pregnancy. Foods with higher levels of folate include dark green lettuce, green peas, broccoli, dried peas and beans, oranges and melons (Health Canada, 1999b). Many foods are now fortified with folic acid, for example enriched flour.
- Women in poverty may have difficulty obtaining folic acid supplements and foods rich in folate. There is a low prevalence of folic acid use in women with lower education levels, women who smoke and are of younger age (Matthews et al., 1998).
- Women at higher risk due to diabetes or epilepsy should talk to their health provider about appropriate folic acid levels.
- Women who have had a previous pregnancy affected by a neural tube defect are at increased risk of having another affected pregnancy. These women should consult their physician who will likely advise a supplement of 4 mg per day of folic acid (Schuurmans et al., 1998).

Iron

- Women of childbearing age often have minimal iron stores as a result of menstrual iron loss and inadequate iron intake (Health Canada, 2000b). In preparation for the large demands for iron during pregnancy, iron supplementation is often necessary and is ideally started before pregnancy begins (Perry, 1996; Health Canada, 1999b).
- Good food sources of iron are red meat, dried beans and peas, dried fruit, and fortified cereals. Iron absorption is enhanced by Vitamin C (Health Canada, 2000b).

Zinc

- Zinc deficiency has been linked to an increased risk for congenital malformations. Zinc, obtained through protein, such as red meat, liver and eggs, is necessary for RNA and DNA synthesis (Cefalo & Moos, 1995).

Vitamin A

- Women should be advised not to take more than 10,000 units per day of Vitamin A, which has been linked with an increased risk for birth defects. If women are taking a multivitamin, they should only take one tablet a day (Health Canada, 1999b).

Caffeine

There is a pervasive presence of caffeine in the typical Canadian diet. Caffeine is found in soft drinks, coffee, chocolate, tea, cocoa, prescription drugs, and some over-the-counter medications.

Several studies have examined the effects of caffeine consumption on the reproductive health of women, suggesting a small but statistically significant increase in risks for spontaneous abortion and low birth weight in pregnant women who consume more than 150 mg of caffeine each day (Fernandes, 1998). Other studies have found a direct correlation between high caffeine consumption and delayed conception (Hakim et al., 1998). Health Canada and Motherisk recommend moderation in the use of caffeine, restricting intake to no more than 400-450 mg per day or the equivalent of two cups of percolated coffee a day (Health Canada, 1999b; Koren, 2000).

Caffeine is a socially accepted, addictive drug that may be very difficult for some women to eliminate or reduce in their lives (Hinds et al., 1996). Caffeine consumption is associated with insomnia, anxiety, irritability, anorexia, and cardiac arrhythmia. Counselling a woman about health problems associated with caffeine consumption other than those related to pregnancy may help her decide to cut down or quit before pregnancy. Allowing time to gradually reduce the amount of caffeine consumed each day helps prevent withdrawal symptoms such as caffeine headache and irritability.

Caffeine Content in Beverages and Medications			
Coffee (automatic drip)	146 mg/cup	Excedrin	64.8 mg/tablet
Tea (3 minute brew)	46 mg/cup	Anacin	32 mg/tablet
Coca-cola	65 mg/12 oz.	Cold preparations	15-30 mg/tablet
Pepsi-cola	37 mg/12 oz.	Caffergot	100 mg/tablet

Body Weight

While most women recognize the importance of healthy eating, some find it particularly challenging to achieve. Many women say they have little time and energy to devote to meal planning and preparation. For some women, healthy food choices are not affordable. Healthy eating messages often conflict, resulting in a lack of clear, reliable and relevant information (Health Canada, 2000b). In addition, social pressures encourage women to strive for unhealthy weights.

Our culture associates beauty with being female from the earliest days of a child's life. Long before puberty, girls learn that beauty is a basic dimension of the female gender role (Rice, 1995). Most women are dissatisfied with their body size and shape. Many women eat less in an effort to control their weight, putting them at greater risk of inadequate intake. Women may attempt to alter their size through dieting, self-starvation, self-induced vomiting, laxatives, diuretics or strenuous exercise. Close to 70% of Canadian women are weight preoccupied and almost 40% are continually gaining and losing weight. Most women who practice weight control activities are of childbearing age (Rice, 1995). Media images, with their underlying messages about the importance of appearance, are particularly harmful to adolescents and young adult women.

A healthy body weight promotes general health, reduces the incidence of disease and is a major positive influence in the management and outcome of pregnancy (Cefalo & Moos, 1995). Weight related problems can negatively influence the mother's and unborn baby's health and, if possible, should be addressed through appropriate information and supports prior to pregnancy (Health Canada, 2000b). Being overweight puts women at risk for poor health and pregnancy outcomes (Carmichael et al., 1997). Women who are underweight have an increased risk of infertility and anaemia and are also more likely to have an infant with a low birth weight (Rice, 1995). The higher rate of low birth weight in the adolescent population may be partially due to the vulnerability of adolescents to cultural pressures

to restrict weight. In addition, teens are still growing and may need greater weight gain during pregnancy (Rice, 1995).

The challenge for health professionals is to help establish healthy beliefs about weight and to encourage the adoption of healthy eating habits throughout life (Health Canada, 2000b). Addressing factual and realistic information about body size may be helpful in counteracting social pressure to attain an unrealistic body image. Further supports may be necessary for individuals with more specific weight issues and those who cannot afford the healthy food they need.

More detailed information on healthy body image and reproductive health is provided in “Promoting Healthy Body Image: A Guide for Program Planners” (Rice, 1995), available from the Best Start Resource Centre or at <http://www.beststart.org>.

Vegetarian Considerations

Well-planned vegetarian diets support good nutritional status and health. However, ensuring nutritional adequacy becomes more challenging as more types of food are avoided and when nutrient needs are higher such as during adolescence and pregnancy. Refer vegetarian women who are planning a pregnancy to a nutritionist for a dietary assessment and counselling (Health Canada, 1999b).

Key Principles: Nutrition

- Advise women who are within a healthy BMI range that their weight is compatible with good health.
- Help women to view their weight more realistically and to develop healthy eating practices.
- Emphasize that a healthy weight is consistent with good health, that a healthy weight varies among people of the same height and that the body shape of celebrities is unrealistic and unattainable for most people.
- Encourage vegetarian women to plan their diet well by including a variety of vegetarian food choices offered in each food group of *Canada's Food Guide to Healthy Eating*.
- Stress the importance of folic acid supplementation and of eating foods rich in folate to decrease the risk of a neural tube defect.
- Encourage women planning a pregnancy to consider their iron, calcium and zinc intakes.
- Take into account the many factors that impact on an individual's ability to access food.
- Advise women to limit their intake of caffeine.

Physical Activity

The number of women exercising regularly has increased because of an emphasis on the health benefits of physical fitness. Physical fitness is an important element of health before conception. Regular, moderate exercise should be included in health recommendations for each woman (Health Canada, 1998b).

Brisk walking and swimming are particularly suited for women planning a pregnancy, providing cardiovascular benefits without high-impact stress on joints. Fitness prior to pregnancy sets the stage for physical activity during pregnancy. In the absence of complications, mild to moderate physical activity during pregnancy will not harm the fetus and can benefit the mother in many ways (Health Canada, 1999b). Women who maintain their physical fitness during pregnancy are more likely to have shorter labours

and postpartum recovery periods. In addition, women who continue regular, vigorous exercise during pregnancy give birth to babies who have less fetal fat combined with normal overall growth (Clapp, 1996; Clapp, 1998).

Women should be encouraged to talk to a health professional about physical activity. In most instances, women can continue usual exercise routines during pregnancy. Women will need advice on exercise cautions and intensity levels, which are dependant on the general fitness level of the woman and her level of exercise before pregnancy (Schuurmans et al., 1998). Slight modifications to physical activity may be necessary as pregnancy progresses (Leuzzie & Scoles, 1996; Heffernan, 2000).

There are some important cautions about exercise during preconception. Women in vigorous exercise programs should be made aware of the potential risks and teratogenic effects of hyperthermia (overheating) on the developing fetus, especially during the first weeks of pregnancy (Cefalo & Moos, 1995; Perry, 1996; Shephard, 2000). Intensive exercise may also lead to cessation of ovulation in women and reduced sperm production in men (Perry, 1996). Women should avoid recreational hot tubs and saunas, which can also contribute to hyperthermia. Men should be informed about increased scrotal temperature with sauna use and the potential for damaged sperm (Rogers & Davies, 1995).

Key Principles: Physical Activity

- Recommend a regular exercise routine, such as brisk walking and/or swimming, for all women. Women who have been physically active both before and during pregnancy have shorter labours and postpartum recovery periods.
- Provide information to women in vigorous exercise programs about the effects of decreased body fat and the ability to conceive.
- Encourage women planning a pregnancy to avoid the use of hot tubs and saunas because of the potential teratogenic effects of hyperthermia on the developing fetus.
- Provide information to men about the potential risk of high scrotal temperature on sperm development.
- Promote active living in schools and in the community.

TOBACCO, ALCOHOL AND DRUGS

Tobacco Use

Smoking is an individual behaviour that impacts fertility, pregnancy, the health of children and adults (Cefalo & Moos, 1995). The healthiest choice for a couple planning a pregnancy is to stop smoking and to establish a smoke-free home prior to conception.

Men and women smoke for a variety of reasons and are influenced by social and cultural norms, laws, and the smoking behaviour of people at work and at home. The addictive effects of nicotine and the habits formed while smoking are not easy to change. However, the benefits of cessation for the mother, father and the baby are long term, extending from preconception, to pregnancy and after the baby is born.

Paternal Smoking

Paternal smoking may result in decreased male reproductive ability, adversely affect his partner and have harmful effects on the baby after it is born (Cefalo & Moos, 1995). A definitive link has been established between erectile dysfunction (impotence) and smoking. However, erectile function can return to normal for men who quit smoking (Cook, 1998). There is also evidence that smoking also decreases sperm count and motility. Chemotherapy, radiation, and surgical treatments for cancers caused by smoking can destroy sexual function and fertility (Ji et al., 1997).

Maternal Smoking

Maternal smoking has been identified as the single most preventable determinant of low birth weight and perinatal mortality and can increase the likelihood of spontaneous abortions, ectopic pregnancies and placental irregularities (Cefalo & Moos, 1995; Schuurmans et al., 1998). In addition, mothers who smoke should be informed that smoking cigarettes may delay conception and decrease their fertility (Saxco, 1999).

Overall, 28% of Canadian women smoke, with the highest proportion of smokers in the 20-24 year old age group. Although there is increasing awareness about the risks of smoking during pregnancy, 58% of current smokers continued to smoke during their most recent pregnancy (Health Canada, 1995b).

Smoking alters the taste of certain foods. Smokers eat less vegetables, fruit, whole grains and low fat milk because of the reduced palatability of certain food groups. In addition, smoking results in an increased metabolic rate and there is an antagonistic reaction between certain nutrients and components of tobacco smoke. Individuals who smoke should be encouraged to eat a balanced diet and may require additional intake of vitamins B6, B12, C, E, folate, B-carotene, selenium, and sulphur amino acids (Health Canada, 1999b).

Program planners should be aware that women may smoke to deal with stress, to control weight and because they are addicted (Health Canada, 2000b). Women, living in very stressful circumstances, may use smoking as mechanism for coping. It is important to be understanding of the reasons that women smoke and the role of relapse in the process of cessation.

Suggestions for Interventions

Quality health care relies heavily on primary prevention efforts such as smoking cessation supports. The role of preconception counselling is to educate couples about the general risks of tobacco use and assist them in the process of stopping smoking. Hutchison et al. (1996) noted that women in the first trimester of pregnancy showed the greatest intention to quit, suggesting that pregnant women may be most receptive to quitting tobacco use at this time. Ideally, smoking cessation programs should be introduced in the preconception period when mothers and fathers may be motivated to change behaviour and would benefit most from cessation (Kinnon & Hanvey, 1995).

Health care providers should assess a couples smoking status and knowledge about the general health risks of tobacco smoke on fertility and pregnancy. The woman and her partner can be asked about readiness to quit or cut down prior to conception. Providers can offer brief interventions for cessation and relapse prevention (Edwards et al., 1996). Although quitting smoking prior to pregnancy is the healthiest choice, even reducing smoking can improve birth outcomes (Schuurmans et al., 1998). By quitting or cutting back on smoking, men can make it easier for their partners to change their smoking behaviour. Men who are unwilling or unable to quit smoking can decrease harmful effects on their partner by choosing to smoke outside the home.

Providers who are aware of local cessation programs, self help materials and pharmacological therapy can make effective referrals, providing ongoing support during the difficult process of quitting. The following stages of behavioural change can be used to

describe the process of stopping smoking: not thinking about quitting, thinking about quitting, planning to quit, trying to quit, or staying smoke-free. Smoking cessation approaches should include a range self help materials and support groups as each smoker requires different supports during the stages of quitting smoking (Hotz, 1995).

Broader tobacco interventions such as tobacco taxation, health warnings on tobacco products, advertising bans, programs directed at youth, and restrictions on where people can smoke and who can purchase cigarettes also have an impact on individual smoking behaviour. Media publicity is helpful in creating a climate of opinion that supports tobacco legislation (Reid, 1996).

Some suggested tools on smoking include: “Understanding and using the stages of change” (Hotz, 1995) and “Delivering gender sensitive tobacco reduction programs: Issues and Approaches” (Kinnon & Hanvey, 1995). More information about smoking can be obtained from Health Canada (<http://www.hc-sc.gc.ca/hppb/tobacco/>) and the Program Training and Consultation Centre (1-800-363-7822 or <http://www.ptcc.on.ca>).

Key Principles: Tobacco Use

- Implement community wide smoking prevention programs using a variety of strategies in multiple settings.
- Recognize that smoking is highly addictive and a difficult behaviour to change.
- Assess the woman and her partner’s readiness to quit or cut down prior to conception. Determine their knowledge about the general health risks of tobacco use, and the impact of smoking on fertility and on the fetus.
- Focus on the many benefits of quitting smoking.
- Include smoking counselling as part of routine health care, using the stages of change to tailor advice and interventions.
- Provide current lists of local cessation supports.

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Key Principles: Tobacco Use (cont.)

- Use multiple approaches to deliver individualized advice on several occasions. A variety of approaches can be used, including:
 - One-to-one counselling
 - Frequent mail and telephone follow-up
 - Help with behaviour change
 - Support groups
 - Guidelines for partner cessation
 - Self help booklets
 - Referral to appropriate services

Alcohol Use

Alcohol use in Canada is widely accepted and affects all levels of our society (Abel, 1998; Loney et al., 1994). Prior to pregnancy, alcohol consumption increases the risk of female infertility (Health Canada, 2000b). During pregnancy, alcohol can affect the growth and development of the fetus' body and brain. Some unborn babies are unintentionally exposed to alcohol because:

- two out of three women drink some alcohol (Canadian Institute of Child Health, 2000)
- many pregnancies are unplanned (Health Canada, 1999b)
- women may continue to drink, without realizing that they are pregnant.

Many terms have been used to describe the spectrum of long-term effects caused by drinking alcohol during pregnancy, including: Fetal Alcohol Syndrome (effects on the brain, facial features and growth), Fetal Alcohol Effects (some of the characteristics of Fetal Alcohol Syndrome) and Alcohol Related Birth Defects (all birth defects associated with alcohol consumption during pregnancy). Fetal Alcohol Syndrome and Fetal Alcohol Effects are among the leading causes of preventable birth defects and developmental delays in Canadian children (Health Canada, 1996b). The most current term is FASD or Fetal Alcohol Spectrum Disorder. It more accurately describes the broad spectrum of disorders associated with alcohol use during pregnancy.

Researchers have not identified a specific amount of alcohol required to produce Fetal Alcohol Syndrome. However, the degree to which a fetus is affected is related to the amount consumed during pregnancy (Shu et al., 1996). Heavy drinking and binge drinking have been shown to be particularly harmful (Health Canada, 1999b). Significantly, the first month of fetal development (usually before a woman is aware that she is pregnant) is recognized as a particularly vulnerable time for fetal exposure. The joint statement from the Committee on the Prevention of FAS and FAE in Canada (Health Canada, 1996b) concludes that there is no safe level of alcohol use during pregnancy.

Women who are alcohol dependent may suffer from addiction, might not be eating well, may smoke or use other drugs and may be living a chaotic life, dominated by poverty and violence. Interventions need to be non-judgmental and sensitive to each individual life situation.

In a 2000 Environics survey, 89% of those surveyed believed that alcohol use during pregnancy could lead to life long disabilities in a child. However, there is confusion in the general population about safe amounts of alcohol, when women should stop drinking and on the characteristics of Fetal Alcohol Syndrome (Health Canada, 2000a). Interventions for the general public should be used to increase awareness and knowledge on the topic, and to promote the benefits of a planned pregnancy.

Some women are able to change their drinking behaviour prior to pregnancy based on information alone. Others need comprehensive supports. Every woman who receives preconception counselling should be asked about alcohol consumption (Schorling & Buchsbaum, 1997). Health care providers have a responsibility to inform women and, when necessary, to provide appropriate assistance and referrals (Floyd et al., 1999; Health Canada, 2000b). It is important to identify women who are likely to drink heavily as well as those likely to have difficulty stopping drinking. Various screening tools can assist in the identification of women at risk. TWEAK, T-ACE and NET have been shown to be particularly sensitive in detecting heavy drinking periconceptually (Bradley et al., 1998; Buchsbaum et al., 1992). Referrals to community and family-based addiction programs should be made in an empathetic and non-confrontational manner, with consideration for the many barriers to treatment, which can include accessible child care.

While the drinking behaviour of fathers does not cause the spectrum of effects known as Fetal Alcohol Syndrome, men play an important role in supporting and encouraging their partner in the adoption of healthier behaviours. In addition, alcohol has been known to affect sperm morphology (Summers & Price, 1993).

The Canadian Centre for Substance Abuse (1-800-559-4514 or <http://www.ccsa.ca>) offers a directory of information on alcohol and pregnancy. Health Canada (<http://www.fas-saf.ca>) also provides additional resources.

Key Principles: Alcohol Use

- Use a non-judgmental attitude when working with women who abuse alcohol.
- Prior to conception, ensure that women receive information about the danger of alcohol use during pregnancy.
- Ask women about their drinking behaviour and screen women for binge drinking and heavy drinking.
- Provide needed supports and referral for individuals who may require assistance in stopping drinking.
- Investigate the use of broad prevention strategies including mass media advertising and school and community programs.
- Be aware of successful alcohol reduction strategies used in other communities. Consider the feasibility of implementing a similar program in your community.

Drugs

Drugs are widely available in our society and are used by men or women for either medical or non-medical purposes (Health Canada, 2000b; Shaw et al., 1996). Koren (1994) noted that women of childbearing age have increased their non-medical drug use over the last two decades.

This section will briefly review the preconception concerns around prescription medications, drug dependency and herbal medications. A detailed discussion of illicit drugs, such as narcotics, stimulants and hallucinogens and of all contraindicated prescription medications is beyond the scope of this document. The Motherisk program (416-813-8084 or <http://www.motherisk.org>) provides a number of resources concerning the effect of drugs on reproductive and preconception health including “Maternal-Fetal Toxicology, a Clinician’s Guide” (edited by Dr. Gideon Koren). Also contact the Canadian Centre on Substance Abuse (613-235-4048 or <http://ccsa.ca>) for more information.

Prescription Medications

Almost all medications cross the placenta and some affect fertility. Most prescribed medications have not been tested for effects on reproductive health (Health Canada, 1999b). The general public should be encouraged to talk to their health care provider about the prescription and non-prescription drugs they use, before starting a family. Preconception is the ideal time to adjust dosages and to move to safer medications. Health professionals also play an important role in reassuring or advising patients who inadvertently used medications before they were aware that they were pregnant.

When a patient must continue with medications that can be harmful during pregnancy, they should take care to use effective contraceptive practices, unless abstinence is chosen. Depending on the medication, a pregnancy test may be advisable prior to starting treatment.

Some Medications Associated with Adverse Fetal Effects		
Medication	Taken For	Fetal Effects
Accutane	Acne	Fetal malformations
ACE Inhibitors	Chronic hypertension	Miscarriage, fetal death, renal failure and malformations
Aminopterin, methotrexate	Cancer treatment	Malformations of the brain, growth retardation
Carbamazepine	Anti-convulsion	Malformations of the brain, face, cardiac defects, skeletal defects, central nervous system
Coumadin, Warfarin	Anti-coagulation	Fetal malformations, central nervous system abnormalities, eye abnormalities, skeletal deformities, heart disease, growth retardation, bleeding, spontaneous abortion, stillbirth, fetal mortality, low birth weight
Daunoubicin	Cancer treatment	Anencephaly, cardiac defects
Lithium	Manic Depression, Bipolar Disorder	Cardiac defects
Phenytoin	Anti-convulsion	Heart defects, microcephaly, growth retardation, facial abnormalities
Propylthiouracil, methimazole	Thyroid medication	Goiter
Quinolones	Anti-microbial	Damaged cartilage

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Some Medications Associated with Adverse Fetal Effects (cont.)		
Medication	Taken For	Fetal Effects
Retinoic Acid	Cancer treatment, Acne	Heart defects, deformities of the brain, limb deformities
Tetracycline	Antibiotic	Limb deformities, yellow deciduous teeth
Trimethadione	Anti-convulsion	Microcephaly, cardiac defects, club foot, growth retardation
Valporic Acid	Anti-convulsion	Deformities of the brain, deformities of the face

Drug Dependency

Most women who use drugs on a recreational basis or who are drug-dependent are very concerned about the risks to their unborn children (Loebstein & Koren, 1997). Women who are drug dependent can benefit from preconception health promotion that is integrated with drug treatment (Health Canada, 2000b). Care for these women is challenging. Koren (1994) emphasizes the importance of offering advice in a non-judgmental and respectful context. Woman should be provided with information about the risks of drug use during pregnancy and provided with appropriate supports and referrals.

Herbal Medications

According to McCutcheon (2000), a wealth of non-scientific information about herbal remedies is available and scientific literature is growing rapidly. Some herbal teas and other herbal products can have harmful effects during pregnancy (Health Canada, 1999b). Health care providers should be familiar with herbs and herbal preparations in order to provide information about safety, contraindications and usage (Belew, 1999). However, there is little information available concerning the specific use of herbal medications in the preconception period.

According to Belew (1999) most herbs should be avoided in the first trimester. The Canadian Pharmacists Association (<http://www.cdnpharm.ca>) have published “Herbs: Everyday Reference for Health Professionals”.

Key Principles: Drugs

- Review and assess all medications, including over the counter medications, for the benefit to risk ratio.
- Encourage couples planning a pregnancy to talk to their health care provider about medications and herbal remedies that they use.
- Address the underlying social determinants of health as maternal behaviours such as drinking, smoking, and using recreational drugs are likely to be interrelated.
- Know the community resources available to assist women to quit using drugs.
- Apply broad-based community prevention programs, starting with children and adolescents, to ultimately decrease maternal use of drugs in pregnancy.

Infections and Immunizations

A woman's health status is dramatically altered when impacted by an infectious disease. Perinatal consequences can be short or long-term when maternal infection continues without appropriate treatment. In addition, the necessary therapy may cause problems for the mother and/or the fetus. Vaccinations for serious diseases such as rubella and varicella offer effective protection from harmful effects during pregnancy (Cefalo & Moos, 1995). One of the most important services offered prior to pregnancy is to make certain that all appropriate immunizations are up to date (Lerner, 1997).

In this section, a brief discussion of common infections includes cytomegalovirus; human parvovirus B; rubella; toxoplasmosis; and varicella. In addition, a summary of infections is presented in chart form. Information on sexually transmitted diseases is provided in a separate section. The health care provider is encouraged to consult Health Canada's website for current information on vaccinations and treatment at <http://www.hc-sc.gc.ca>.

Cytomegalovirus (CMV)

- This virus is a member of the herpes virus group, which includes herpes simplex virus types 1 and 2 and varicella-zoster virus (chicken pox). Cytomegalovirus infects between 50-85% of adults by the age of 40. For most healthy individuals who acquire CMV after birth, there are few symptoms and no long-term health consequences. Once a person becomes infected, the virus remains alive, but dormant within that person's body for life. Severe impairment of the body's immune system by medication or disease consistently reactivates the virus from the dormant state.
- Transmission of CMV occurs from person to person, requiring intimate contact with the person infected by the virus. Infectious CMV may be shed in the bodily fluids, including urine, saliva, tears, semen and breast milk.

Infections

- Healthy pregnant women are not at special risk for disease from CMV infection. However, the fetus may be at risk for congenital CMV. When women acquire their first CMV infection during pregnancy, there may be serious consequences for the unborn child. However, two-thirds of the infants will not become infected and only 10-15% of the remainder will have symptoms. For infants who are infected, the most common CMV complications are hearing loss, visual impairment or mental retardation (Olsen, 1994).
- Women should be encouraged to practice good personal hygiene and hand washing with soap. Women at increased risk for CMV include day care workers, nurses and mothers of young children (Olsen, 1994).
- Vaccines for CMV are in the research and development stage.

Human Parvovirus B 19 (fifth disease or erythema infectiosum)

- Parvovirus B19 is a virus, causing a mild flu-like illness in adults. School teachers, day care workers, and mothers of young children have a higher risk for infection (Olsen, 1994)
- Parvovirus B may cause fetal loss, aplastic anaemia or fetal hydrops (Thacker, 1999).
- Currently, there is no vaccine to prevent parvovirus.

Rubella

- The rubella virus causes a mild, highly contagious illness.
- The fetus of a mother who contracts the illness in the first trimester of pregnancy may be born with one or more birth defects, referred to as congenital rubella syndrome.
- All patients seeking preconception care should have their rubella immunity documented. Women who are pregnant or intending to become pregnant within 3 months, should not receive a rubella vaccine. If a woman is susceptible to rubella and does not plan on becoming pregnant for at least 3 months, a rubella vaccination is recommended (Perry, 1996).

- If a pregnant woman is inadvertently vaccinated or if she becomes pregnant within 3 months after vaccination, she should be counselled about the concerns for the fetus. The rubella vaccination during pregnancy should not be a reason to consider termination of the pregnancy. Studies have shown that the teratogenic risk is negligible with less than a 5% chance of affecting the fetus (Leuzzie & Scoles, 1996).

Toxoplasmosis

- Toxoplasmosis is a parasitic infection complicating 0.1% to 0.5% of all pregnancies.
- While toxoplasmosis is a mild non-threatening disease in adults, infection during pregnancy can be devastating for a developing fetus. Although the risk for transmission increases by trimester, congenital toxoplasmosis most often occurs as a result of fetal infection in the first-trimester. Nearly 40% of infected infants will suffer severe neurological damage or fetal death. Early treatment of the infection decreases the risk of harm to the fetus (Thacker, 1999).
- The primary sources of maternal infection are contact with domestic cats and their feces, and ingestion of infected undercooked meat (Swan & Apgar, 1995). Pre-existing maternal infection poses no risk to the developing fetus.
- It is important to prevent toxoplasmosis in pregnant women, as no vaccine is available. During preconception counselling, precautions to reduce the chance of becoming infected with toxoplasmosis should be discussed with all women of reproductive age (Swan & Apgar, 1995).

Varicella -Zoster Virus

- Chickenpox (varicella) is a usually mild viral infection, characterized by an itchy rash and fever. Serious complications are uncommon in children.
- In the fetus, congenital varicella syndrome describes a group of birth defects that can include skin scarring, missing or short limbs, small head/brain, cataracts, seizures and mental retardation (Leuzzie & Scoles, 1996). This syndrome affects only 2% of infants whose mothers were infected with the virus in the first 20 weeks of pregnancy.

- During preconception, the health care provider can ask whether a woman has had chickenpox. If she is unsure, the provider may recommend a blood test to determine her immunity. If she is not immune and if she is not pregnant, she should receive a vaccination of VZIG immune globin, and postpone her attempts to conceive for at least three months (Perry, 1996).

Summary of Infections			
INFECTION	MODE OF TRANSMISSION	PRECONCEPTION CONCERNS	RECOMMENDATIONS
CMV	person to person, requiring intimate body contact with person shedding virus (body fluids)	if a woman becomes infected with CMV during the first trimester, the fetus may be at risk for serious congenital defects	- good personal hygiene - simple hand washing with soap - vaccines are in the research and development stage - once infected, virus remains alive but dormant for life
Human parvovirus B 19	infected respiratory secretions	may cause fetal loss, aplastic anaemia or fetal hydrops	- no vaccine - good personal hygiene - simple hand washing with soap
Rubella	nasal and throat secretions from infected person	fetus may be at risk for serious congenital defects, if mother contracts rubella in the first trimester	- documented immunity - childhood immunization - a woman should wait 3 months to conceive, after receiving the vaccine
Toxoplasmosis	parasitic infection, commonly found in cat feces and infected undercooked meat	early trimester infection may result in fetal death, miscarriage or neonatal defects, such as hearing loss or learning disabilities	- no vaccine - cook meat thoroughly - avoid changing kitty litter - keep cats inside - wear gloves when gardening - wash hands thoroughly after handling raw meat
Varicella (HSV-1) chickenpox	- exposure to infected person - airborne or direct contact with infected person's rash	chicken pox infection acquired by the mother in the first 20 weeks of pregnancy, may result in fetal defects (1-2%)	- if a woman is unsure about her chickenpox exposure, her immunity can be confirmed with a blood test - VZIG vaccine can be given to women who have not previously developed immunity to chickenpox

Key Principals: Infections and Immunizations

- Discuss the importance of exposure and immunity to infections with couples seeking preconception advice.
- Encourage women to wash their hands well and to cook meat thoroughly.
- Advise women planning a pregnancy to avoid changing cat litter.
- Check for immunity to rubella.
- Advise women to wait at least 3 months after a vaccination for varicella and rubella, before trying to conceive.

Sexually Transmitted Diseases

Preconception is an important time to screen for sexually transmitted diseases, to provide treatment if possible and to educate both men and women about preventive measures and the potential risks to the fetus. Untreated infections can lead to serious problems including infertility, pelvic inflammatory disease, ectopic pregnancy, and perinatal and neonatal mortality and morbidity (Health Canada, 1998a). Individuals at increased risk for sexually transmitted diseases include sexually active youth, injection drug users, commercial sex workers, travellers, street youth and men who have unprotected sexual relations with other men (Health Canada, 1998a).

Infections discussed in this document include chlamydia, genital human papillomavirus, gonorrhea, hepatitis, herpes, HIV/AIDS and syphilis. A summary of these sexually transmitted diseases is presented in chart form at the end of the section. The health care provider is asked to consult Health Canada's "Canadian STD Guidelines" for comprehensive coverage of the topic. The publication is available at <http://www.hc-sc.gc.ca/hpb/lcdc/bah>. This section is based on information from this source.

Chlamydia

- Chlamydia, caused by the bacterium *Chlamydia trachomatis*, is the most common sexually transmitted disease in Canada, affecting young men and women in their teens and early twenties. Women most at risk for chlamydia infection are younger (under 25), have multiple sex partners, and do not use barrier methods of contraception. The high incidence of chlamydia in young females in Canada is cause for great concern, especially when considering that approximately 70% of chlamydia cases in women are asymptomatic and undiagnosed (Health Canada, 1998a).
- Serious reproductive risks accompany chlamydia infection, most notably pelvic inflammatory disease, ectopic pregnancy and infertility. Chlamydia infections increase the risk of fetal death, low birth weight and postpartum endometritis (Health Canada, 1998a).
- Consequently, preconception counselling of a woman with a history of pelvic inflammatory disease, sexually transmitted diseases or multiple sexual partners should include screening for chlamydia (Schuurmans et al., 1998). Since gonorrhea and chlamydia often occur together, a gonorrhea culture should also be taken.

Genital Human Papillomavirus

- Genital Human Papillomavirus (HPV) is a common viral sexually transmitted disease. While common, only 1% to 2% of those infected develop clinical symptoms. Some strains result in ano-genital and mucous membrane warts, others cause a range of genital cancers. The warts can increase in size and number during pregnancy.
- Papillomavirus has been associated with cervical dysplasia and invasive cervical cancer (Swan & Apgar, 1995). This virus can be transmitted perinatally and occasionally causes warts in the throat of the infant. Women with genital warts do not require caesarean delivery unless the warts block the birth canal (Health Canada, 1998a)
- No therapy acts as a guaranteed cure for HPV, however, 80% of individuals with external warts and 90-95% of those with cervical lesions experience complete clearance (Health Canada, 1998a). Condoms may not be successful in preventing transmission of this virus (Health Canada, 1998a).
- All women should be counselled to have regular pap smears (Health Canada, 1998a).

Gonorrhea

- Gonorrhea, caused by *Neisseria gonorrhoeae*, is second only to chlamydial infections in the number of cases reported in Canada (Health Canada, 2000b). The incidence of gonorrhea is highest in high-density urban areas among persons less than 24 year of age who have multiple sex partners and engage in unprotected sexual intercourse. Most women (70%-80%) with gonorrhea have no clinical symptoms and cases often go undetected (Health Canada, 1998a).
- A pregnant woman can pass gonorrhea to her baby during birth, causing a serious eye infection or blindness.
- Although there is concern about the antibiotic resistance of some strains of gonorrhea in Canada, the standard treatment for gonorrhea is a single dose of antibiotic. Considering that 20%-30% of asymptomatic men and 30%-50% of women infected with gonorrhea are also infected with chlamydia, patients treated for gonorrhea should also be treated for chlamydia.

Hepatitis B Virus

- Hepatitis B virus, causing an inflammation of the liver, is the most common type of hepatitis in North America. In Canada, transmission of hepatitis B is primarily sexual, although intravenous and perinatal transmission also occurs. Since 1987, when an effective vaccine and universal prenatal testing for Hepatitis B surface antigen became available, the reported rate of Hepatitis B has declined by more than 50% (Health Canada, 1998a).
- The mother may transmit hepatitis infections to the fetus. While infection as an adult rarely leads to long term problems, infections early in life may become chronic, leading to cirrhosis of the liver and liver cancer (Health Canada, 1998a; Baker, 1999).
- Prior to pregnancy all women at risk because of work or habits should be screened for antibody status and provided with immunization if necessary (Schuurmans et al., 1998).
- All provinces and territories except Manitoba now have universal school-based immunization programs. These programs are expected to reduce the incidence of hepatitis B substantially in the next decade. Nevertheless, vaccination for people in high-risk groups, such as hospital workers, individuals who handle blood products, patients with multiple sex partners and IV drug users is still recommended (Dacus et al., 1995).

Herpes

- Herpes simplex virus type 2 infection is life long and frequently asymptomatic. It is present in 25% of women in Canada, however only 25% of these women are aware of the infection.
- Neonatal herpes is most often acquired during the birth process. Intrauterine infection is rare. Neonatal infection may result in retardation or death of fetus. Caesarean delivery is recommended for women with active lesions.
- Identification of herpes in women, who are unaware of their disease, provides an opportunity for appropriate education regarding the prevention of viral transmission to sexual partner(s) or in the case of pregnancy, the fetus (Health Canada, 1998a). Treatment is useful in reducing symptoms, complications and transmission, but only if given in the early stages of the infection.

Human Immunodeficiency Virus/AIDS

- A history of sexually transmitted diseases, or a current or former partner with a history of intravenous drug use should alert clinicians to address HIV risks and to offer appropriate counselling and testing.
- HIV affects fertility in a variety of ways including pelvic inflammatory disease, problems of the lower genital tract and menstrual irregularities (Abercrombie, 1996).
- Acquisition of HIV in either the preconception or perinatal period is associated with increased health problems in pregnancy and in the newborn. Risk of transmission of HIV from an infected mother to her fetus is 14-30%. Most women who transmit the HIV infection to their fetus are asymptomatic.
- There are now medical therapies to lower the chance of an HIV-infected pregnant woman passing HIV to her infant. Women who are HIV infected should be informed that the progression to AIDS is not increased in pregnancy. Pregnancy, however, may exacerbate symptoms of opportunistic infections, for example, tuberculosis (Leuzzie & Scoles, 1996).
- Women with HIV/AIDS may benefit from nutritional counselling as mouth pain, difficulty swallowing, altered taste, diarrhea, loss of appetite, nausea, vomiting and fatigue may make it difficult to eat (Health Canada, 1999b).

- Women may experience shame and isolation due to the stigma of HIV. When discussing increased risks during pregnancy with HIV infected women, care should be taken to treat the individual as someone with a serious life threatening disease, rather than merely a vector of disease (Abercrombie, 1996). Counselling for HIV-infected individuals should be objective and non-judgmental and should include advice on high risk behaviours and contraception (Health Canada, 1998a).
- For women and men who are not infected, HIV counselling provides an opportunity to learn important prevention information, reducing the possibility of future exposures (Abercrombie, 1996).
- Testing and counselling should be offered to all individuals planning a pregnancy, not just those who are at a higher risk for HIV.

Syphilis

- Syphilis is caused by the bacteria *Treponema pallidum*. Although rare, congenital syphilis is a serious infection with potentially debilitating consequences including spontaneous abortion, low birth weight, stillbirth, blindness, deafness, bone disease and other birth defects. Manifestations of syphilis may occur in infancy or later in life. When the mother has untreated syphilis, there is a 50% risk of transmission to the fetus. Only 2 congenital cases were reported in Canada in 1995 (Health Canada, 1998a).
- Serum screening should be done prior to conception or early in pregnancy, as per provincial regulations (Schuurmans et al., 1998).

Summary of Sexual Transmitted Diseases			
INFECTION	MODE OF TRANSMISSION	PRE CONCEPTION CONCERNS	RECOMMENDATIONS
Chlamydia	sexual relations	- risk of pelvic inflammatory disease and infertility - intrauterine death of fetus - low birth weight - neonatal respiratory and eye problems	- antibiotics - consistent use of condoms - safe sex / reduction of high risk behaviour
Genital Human Papillomavirus	- sexual activity - skin to skin contact	this virus may be transmitted to the fetus at birth occasionally causing warts in the throat	- a range of treatments is available, however, no therapy guarantees a cure - condoms may not be effective in preventing transmission
Gonorrhea	sexual relations	neonatal blindness	- antibiotics - consistent use of condoms - safe sex / reduction of high risk behaviour
Hepatitis B	- sexual activity - blood	- active infection transmitted to fetus - progression of infection to chronic carrier state - cancerous tumours	- Engerix B vaccine in at risk population - early vaccination - avoidance of high risk behaviours - immunization for high risk groups
Herpes (HSV-2) genital herpes	sexual relations	neonatal infection may include retardation and death of fetus	- no cure, antiviral drugs can lessen symptoms - HSV titres are not always reliable - consistent use of condoms - safe sex / reduction of high risk behaviour
HIV/AIDS	- IV drug abuse - intimate contact with bodily fluids of an infected person - saliva, tears, semen, blood	mother transmits infection to the fetus	- no cure - perinatal transmission can be reduced with antibiotics and antiviral drugs - consistent use of condoms - safe sex / reduction of high risk behaviour
Syphilis	sexual contact	neonatal infection can result in low birth weight, stillbirth and manifestations of syphilis	- serum screening should be done prior to conception or early in pregnancy - treat with antibiotics

Key Principals: Sexually Transmitted Diseases

- Use a supportive and non-judgmental approach in strategies for decreasing risk behaviours and promoting safe sex.
- Discuss preconception health when individuals ask about sexually transmitted diseases or birth control.
- Include questions about high risk behaviours and sexually transmitted diseases in preconception counselling.
- Promote immunization for hepatitis B in high risk groups.
- Treat sexually transmitted diseases prior to conception.
- Use varied community wide approaches to promote safer sex behaviours.
- Treat individuals presenting symptoms of chlamydia or gonorrhea for both infections as they often occur together.
- Identify barriers to prevention practices and ways to overcome these barriers.
- Provide women who are HIV positive with medications to reduce likelihood of transmission to the fetus.
- Provide referrals to appropriate agencies, supports and health services.

PREGNANCY PLANNING FOR SPECIAL SITUATIONS

The presence or history of a medical condition or disease in a woman of childbearing age can have direct and dramatic effects on reproductive health and perinatal outcomes. Preconception counselling can benefit all couples planning a pregnancy, but is particularly valuable for women with special medical conditions. While pregnancy is not recommended for women with certain diseases such as pulmonary hypertension, which is associated with 50% maternal mortality rate, the ultimate decision lies with the couple (Dacus et al., 1995). Without preconception care, couples do not have the option of discussing the risks with a health care provider and making informed choices about whether or not they wish to undertake pregnancy (Moos, 1989). Management of an existing condition or disease prior to conception allows the woman to enter pregnancy in optimal health. Although caring for pregnant women with medical problems is the domain of various specialists, it is the responsibility of primary care providers to address preconception health issues and to make necessary referrals. Risks to the mother and her fetus can be eliminated or significantly reduced when a preconception care program is provided consistently (Cefalo & Moos, 1995).

A considerable amount of medical literature has been devoted to chronic diseases and as research adds new information, treatment strategies change and improve. This document will review a few diseases of concern during preconception.

Chronic Illness

Cancer

- Cefalo & Moos (1995) noted that cancer is the second most common cause of death of women in the childbearing years. Women are most often affected by cancers to the thyroid, breast, cervix, ovaries and colon, as well as leukemia, lymphoma and melanoma.
- Preconception counselling for the patient with a history of cancer is focussed on education of the woman and her partner about the effect that pregnancy may have on her prognosis and the fetal complications that may arise from current or past therapies. The most important considerations are the length of time since the initial cancer and the presence or absence of axillary metastases.
- Women with breast cancer and axillary metastases are advised to postpone pregnancy for 5 years and to consult their physician for other precautionary tests (Cefalo & Moos, 1995).

- Both women and men undergoing chemotherapy should be informed of the potential risk of infertility and that there is a 4% chance of genetic damage (Meistrich, 1993).

Cardiovascular Disease

- Many women with congenital heart disease can successfully tolerate the profound changes associated with pregnancy (Kirkland, 1992).
- During preconception counselling, a woman with heart disease should be informed of the risk of pregnancy specific to her condition, including:
 - potential morbidity and mortality risks to the mother;
 - medical expectations regarding management of the pregnancy and birth;
 - fetal considerations; and
 - long term prognosis for the woman as it affects her ability to parent.
- A thorough physical assessment is extremely valuable in evaluating the extent of the disease, the woman's functional capacity, previous surgeries and her medication regime.
- Some conditions, such as pulmonary hypertension, complicated co-arctation of the aorta and Marfan's syndrome, mitral stenosis, and aortic stenosis can mean that pregnancy is inadvisable (Clark, 1991; Leuzzie & Scoles, 1996). The final decision rests with the woman, having a clear understanding of the medical risks she is willing to accept.

Diabetes

- Blood sugar control prior to conception maximizes fertility and optimizes fetal development (Dokken, 1998; Casele et al., 1998). Efforts to promote glycemic control in diabetics prior to conception have been complicated by the number of unplanned pregnancies and lack of structured preconception care (Casele et al., 1998; Rodgers & Rodgers, 1996). Factors that appear to make preconception care more effective are higher education levels, higher incomes, regular employment, and encouragement from health care provider to avoid an unplanned pregnancy (Dokken, 1998).

- A woman who has a pregnancy complicated by poorly controlled diabetes is at risk for spontaneous abortion, blood pressure problems, amniotic fluid abnormalities, preterm labour, infection, and the need for induction of labour and caesarean birth. Her fetus/newborn is also at risk for growth problems, metabolic imbalances and abnormalities of the heart, kidney, spine and brain. Controlling blood sugar levels prior to conception reduces the incidence of abnormalities (Kirkland, 1999).
- Preconception health promotion for diabetic women includes:
 - Patient education about the interaction of diabetes, pregnancy and family planning;
 - Education in diabetes self-management skills; and
 - Counselling about methods to reduce stress and improve adherence to the diabetic treatment plan (American Diabetic Association, 2000).
- Preconception care for diabetic women is best managed through a multidisciplinary team approach (Kirkland, 1999).

Epilepsy

- A coordinated approach to care between the primary care provider, neurologist, geneticist and obstetrician is necessary for successful management of a woman with epilepsy (Betts & Fox, 1999). Routine preconception care for women of childbearing age with epilepsy, can also prevent adverse outcomes from an unplanned pregnancy.
- Fertility may be decreased in both men and women using anti-epileptic medication (Penovich, 2000).
- Forty percent of women with a seizure disorder experience an increase in seizures during pregnancy (Thacker, 1999; Cefalo & Moos, 1995).
- Although many anti-seizure medications are considered teratogenic, the risks created by maternal seizure activity are considered more threatening to fetal well-being. Medication that gives good seizure control should be balanced with possible risk to the fetus (Betts & Fox, 1999). Folic acid supplementation in higher amounts may be indicated, based on the woman's history and the health care provider's clinical judgement (Bruni, 1998).

Lupus

- Women with lupus need to carefully plan their pregnancy, waiting until their disease is well controlled or in remission before trying to conceive (Dacus et al., 1995).
- Pregnancy during active lupus can result in serious complications, miscarriage or stillbirth. Gestational hypertension may occur or lupus may flare up during pregnancy. There is an increased risk of stillbirth, miscarriage and preterm delivery. About 3% of infants born to mothers with lupus will have neonatal lupus, however, this usually disappears by the time the infant is 3-6 months of age and does not reoccur. About half of all infants born with neonatal lupus have heart conditions (Dacus et al., 1995).

Maternal Phenylketonuria (PKU)

- Since the advent of newborn screening for PKU in the early 1970's, many women with PKU are now reaching childbearing age and preparing to have children of their own (Kirby, 1999). Women who wish to become pregnant, should be educated about various methods of birth control until their phenylalanine levels are controlled (Gibbings, 1994). Women who receive education about the importance of dietary control are more likely to persevere with the restrictive and costly diet (Kirby, 1999).
- Women who have PKU and do not follow the special phenylalanine-restricted diet are at increased risk of producing a child with severe mental retardation and congenital anomalies (Kuller, 1994; Koch et al., 1995; Kirby, 1999).

Psychiatric Illness

- Women receiving treatment for psychiatric illness such as schizophrenia, depression, bipolar disorder, panic disorder and obsessive compulsive disorder, should talk to their health care provider prior to planning a pregnancy. Some of the medications taken for psychiatric illness can be harmful during pregnancy. Lithium, in particular, is associated with an increased risk for malformations of the heart and other anomalies. Other medications of concern include phenytoin, carbamazepine and valporic acid. Potential adverse effects include structural malformations, intrauterine fetal death, altered fetal growth and central nervous system defects (American Academy of Pediatrics, 2000).

- There may also be serious consequences to the mother and the fetus if appropriate medications are not used. The benefits of a therapy need to be carefully weighed against the potential harm to the fetus. Physicians should prescribe the lowest dosage that provides adequate control of the illness. It may also be appropriate to increase supplementation of folic acid (American Academy of Pediatrics, 2000).

Thyroid Problems

- Hypothyroidism can make it difficult for a woman to conceive as menstruation may be irregular, heavy or cease. If tests show an under active thyroid gland, this can be effectively treated with thyroid hormone replacement therapy. Women planning a pregnancy should be counselled that their dosage will need to be carefully monitored during pregnancy (American Association of Clinical Endocrinologists, 1996).
- Hyperthyroidism, treated with antithyroid medication, should be carefully controlled during pregnancy as some medications increase the risk of having a baby with thyroid problems.
- Women with thyroid problems should be counselled prior to pregnancy about the risks and available treatments (Cefalo & Moos, 1995).

Key Principles: Chronic Illness

- Manage existing conditions or diseases prior to conception to help women to enter pregnancy in optimal health.
- Consider changing or modifying medications prior to conception for individuals with certain chronic diseases.
- Assess medical concerns, focussing on risks to the mother as well as her developing fetus.
- Assist women in considering the risks related to pregnancy and the long term prognosis as it affects her ability to parent.
- Refer individuals to community agencies, support groups and health services, as appropriate.

Previous Outcomes

Two of the most common reasons a woman and her partner seek preconception care are prior pregnancy loss or compromised neonatal outcome (Ninia, 1994). Reproductive history is an important tool for identifying factors that contributed to the earlier poor outcome. Patients should be asked if they have had previous pregnancies that resulted in miscarriage, fetal death, premature delivery, or infants with low birth weight, that required intensive care or had birth defects. By discussing reproductive history in the preconception period, it may possible to identify and address factors that influenced previous outcomes. Cefalo & Moos (1995) note that 70-80% of couples with a history of pregnancy loss, will go on to have a successful pregnancy.

Couples who have experienced poor reproductive outcomes may be experiencing grief and guilt. They require advice on the risks they face and how to reduce their risks in subsequent pregnancies. Information should be provided in a supportive and unhurried manner (Cefalo & Moos, 1995).

Genetics

The most easily obtainable yet most frequently neglected aspect of preconception counselling is the family and genetic history (Cefalo & Moos, 1995). Congenital anomalies occur in 2% to 3% of all term pregnancies (Dacus et al., 1995). Throughout Canada, information necessary to determine a probability estimate for genetic problems is available in genetic counselling centres. Health care providers should contact their regional centres for detailed information. Risks for certain heritable diseases can be determined prior to conception. This information can help couples make informed decisions relative to childbearing.

Some of the more common genetic problems, such as Sickle Cell Anemia, Down Syndrome and Tay-Sachs, can be diagnosed prenatally. If a thorough medical history elicits any risk factors, couples can be educated about tests and diagnostic procedures available when they conceive. Women who are over 35, couples with a family history of a genetic condition, carriers of chromosome rearrangements and cases where the parents are closely related, can all benefit from advice from a genetic counsellor (Dacus et al., 1995).

Infertility

The inability to achieve a desired pregnancy can challenge an individual's self-concept, self esteem and value system. Infertility is a major life stressor and may be difficult for some couples to accept (Bernstein et al., 1992). Infertility, once seen as a female problem, affects both males and females with almost equal frequency. In Canada, 8.5% of couples are affected by infertility (Canadian Institute of Child Health, 2000). During preconception counselling, some of the factors that contribute to infertility can be explored and options for couples wishing to conceive can be addressed.

Lifestyle behaviours, such as alcohol, sexually transmitted diseases, smoking and drug use, impact on fertility in both men and women. Sexually transmitted diseases and delayed childbearing have been identified as two of the most important risk factors of infertility (Health Canada, 1993). General factors that can affect the ability of a woman to ovulate, conceive, or deliver a child include the following: advanced maternal age, advanced paternal age, and increased parity. Infertility in men may be exhibited by decreased sperm mobility, morphology and count (Berkowitz et al., 1990; Bianco et al., 1996; Gilbert et al., 1995).

There are several assisted reproductive methods available to couples, including sperm banking and in vitro fertilization. For couples considering reproductive technologies, the health care provider should help them to have realistic expectations for the outcomes and knowledge about the procedures, both negative and positive (Bernstein et al., 1992). It should be noted that women who are infertile and then achieve pregnancy are statistically at a higher risk for spontaneous abortion, premature labour and perinatal loss.

Key Principles: Previous Outcomes, Genetics and Infertility

- Couples who have experienced a prior pregnancy loss or compromised neonatal outcome should consult a physician.
- Sexual health, drug, tobacco and alcohol use have a significant impact on male and female fertility.
- Link infertile couples with supportive counselling, to help them explore options that are available and acceptable to them.
- Offer genetic counselling to anyone with a history of a known genetic condition.

THE ENVIRONMENT

All individuals are exposed on a daily basis to environmental toxins, whether or not they work outside the home (Health Canada, 2000b). Preconception health promotion should include information about hazards at work, home and in leisure activities. There are not always easy answers to concerns about the environment, either in assessing harmful effects or in reducing their impact. Little is known about reproductive effects of chemicals that may be found in many different combinations and concentrations (Summers & Price, 1993). Concerned individuals can find out more through: Motherisk Program, Internet address: <http://www.motherisk.org>; or “Maternal-Fetal Toxicology, a Clinician’s Guide” (edited by Dr. Gideon Koran).

The Workplace

There are some situations in workplaces that are of concern prior to conception and during pregnancy. Ideally, a couple should consider their risks at work prior to pregnancy and make any necessary precautions or accommodations.

The topic of reproductive health in the workplace is dealt with in great detail in the Best Start Resource “Workplace Reproductive Health: Research and Strategies”. A few concerns specific to preconception are identified here. Health professionals should be cautioned not to raise undue fear about the many chemicals and situations at work. However, they should also make it clear that lack of information on a certain chemical does not necessarily indicate that is safe (Cefalo & Moos, 1995). It is rarely necessary for an individual to leave work due to workplace reproductive concerns. In most cases work modifications or extra precautions are sufficient to reduce the risks.

Maternal or paternal exposure to certain workplace toxins (chemicals, solvents, gases and metals) have been associated with reduced fertility, still birth, miscarriage, low birth weight and birth defects (Olsen, 1994; Nasso, 1997). Couples planning a pregnancy should be encouraged to check chemicals they use at work for possible reproductive health concerns and to reduce or minimize their exposure to these agents.

Workplace reproductive hazards are not restricted to chemical use. Workers who may be exposed to ionizing radiation are encouraged to adhere to radiation safety measures. However, the use of video display terminals is not a concern prior to or during pregnancy (Nasso, 1997). Certain occupations, for example teachers and health care workers, have increased exposure to infectious diseases. Heat, vibration, stress, long work hours and shift work are also concerns prior to conception.

The Environment

Preconception health promotion also helps couples assess their work for risks during pregnancy. Prolonged standing and strenuous work during pregnancy are associated with preterm delivery and lower birth weight. Women may want to ask about work reallocation or light duty policies for pregnancy (Swan & Apgar, 1995). Long work hours, noise, vibration and shift work are also of concern during pregnancy (Schuurmans et al., 1998).

Some Workplace Risks During Preconception		
WORKPLACE RISK	PRECONCEPTION CONCERNS	RECOMMENDATIONS
Chemicals (e.g. heavy metals, solvents, anaesthetic gases and pesticides)	Problems with sperm count, sperm shape, sperm transfer, sexual performance, sperm chromosomes, menstrual cycle, infertility, spontaneous abortion, birth defects	Find out about the chemicals you use at work by checking Material Safety Data Sheets and, if necessary, request further information. Use protective equipment and follow precautions as indicated.
Ionizing Radiation (e.g. x-rays)	Infertility in men and women, spontaneous abortion, birth defects	Adhere to radiation safety measures and use appropriate protective equipment.
Infectious Diseases (e.g. viral, fungal and bacterial infections)	Birth defects, central nervous system disorders and fetal death	Ensure immunization is up to date. Follow infection control procedures and practice good hygiene. Use protective equipment as needed.
Temperature (e.g. heat stress, cold, exercise)	Decreased sperm count, menstrual problems	Work re-allocation or frequent breaks. Use of appropriate protective equipment
Vibration	Menstrual disorders, spontaneous abortion	Work re-allocation
Stress	Irregular menstruation, difficulty conceiving, spontaneous abortion	Social support, stress reduction techniques, reduced work hours or responsibilities
Long Work Hours	Spontaneous abortion	Reduce work load
Shift Work	Changes to menstrual cycle, absence of ovulation, spontaneous abortion	Regular shifts

Home & Leisure Activities

Couples planning a pregnancy should be encouraged to read the precautions on cleaning agents, paints, solvents, pesticides, gases and other chemicals used in the home and to follow any recommended safety measures (Perry, 1996). Some hobbies involve the use of lead, and should be avoided prior to and during pregnancy (Swan & Apgar, 1995). Other hobbies may involve paint thinners, lacquer, paint or varnish removers, cleaning solvents, plastics and adhesives. Exposure to these substances should be minimized prior to and during pregnancy. Couples working on their house should be cautioned about lead dust from old paint, and those who garden should be warned about pesticide use (Cefalo & Moos, 1995). Couples planning a pregnancy can be reassured that there is no convincing evidence to date that electromagnetic fields from computers, waterbeds and electric blankets are associated with an increased risk for spontaneous abortion (Cefalo & Moos, 1995).

The Community

Toxic chemicals are no longer restricted to work and home situations. Environmental pollutants are found in the air we breathe, the water we drink and the earth we live on. A range of environmental toxins may contaminate water. Couples who use their own well water may wish to have it tested for the presence of environmental toxins (Olsen, 1994). Although the causes of environmental pollutants are complex, and reduction and clean up even more of a challenge, attention needs to be given to the environment we live in.

Second Hand Smoke

Second-hand smoke is the most common and harmful form of indoor air pollution (Singh et al., 1996; Health Canada, 2000b). Studies have shown a relationship between exposure to passive smoke in pregnant women who do not smoke and an increased risk for delivery of a full-term, low birth weight infant (Cook, 1999). Women, prior to pregnancy, should consider the second hand smoke they may be exposed to at work and at home, and make changes if possible.

Program planning strategies for a reduction of the exposure to second-hand include: municipal by laws for smoke-free public places, schools, public transportation; smoking cessation programs for the general public and media campaigns alerting the population of the hazards of second-hand smoke (Cook, 1999).

Key Principles: The Environment

- Encourage individuals planning a pregnancy to find out about the chemicals they use at work.
- Ask about chemicals used in the home for cleaning, hobbies and gardening.
- Promote smoke-free homes and municipal smoking bylaws to reduce exposure to second hand smoke.
- Work toward reducing pollutants in our environment.

SOCIAL SUPPORT

Thompson (1990) defines social support as the comfort, assistance and information one receives from individuals or groups, formally or informally, providing a balanced, secure environment. A woman's social history reveals information essential to preconception care. Social factors related to lifestyle choices, behaviours and habits, significant relationships, and environmental exposures have tremendous impact on perinatal outcomes. Support may be lacking when people are economically disadvantaged or new to Canada. Many factors contribute to stress in a woman's life, such as balancing child and home related activities with employment, volunteer activities, and personal relationships (Health Canada, 2000b).

Studies in the last decade have found a positive correlation between high levels of maternal stress and adverse perinatal outcomes. Specifically, preterm labour and low birth weight are associated with maternal stress during pregnancy. Evidence also supports a relationship between stress and significant cervical shortening during 25 to 32 weeks gestation. Cervical shortening within these weeks is associated with preterm labour and birth, implicating stress once again as a risk factor for adverse perinatal outcomes (Cooper, 1996).

Psychological stress can also precipitate unhealthy behaviours in women such as smoking, poor weight gain, alcohol and drug abuse. These behaviours are reported to be more prevalent among stressed women (Gabbe & Turner, 1997). Maternal smoking, poor weight gain, and substance abuse are associated with increased rates of prematurity and low birth weight. Smoking doubles the risk of intrauterine growth restriction. Again, stress is shown to be a contributing factor for these adverse outcomes (Grimstad et al., 1999).

The preconception period offers an opportunity to assist women and their partners with stress reduction before pregnancy. Eliminating or reducing high stress levels during the preconception period can reduce the perinatal risks associated with maternal stress. Unfortunately, stress has become an integral part of the modern lifestyle, and some women may need assistance identifying stressors in their lives. Information and community resources for teaching stress reduction techniques should be made available. During preconception counselling, discussion should focus on the sources of support for the couple and the support needed to raise a family. If the health care provider identifies a lack of support, the couple can be linked to appropriate community resources (Health Canada, 2000b). Problems and risks can be identified, addressed and minimized or eliminated by careful assessment and appropriate intervention.

Social Support

Social support can be found at drop in centres for pregnant women, through in home support workers or family resource centres. Women who received extra social support said it was helpful to talk with others about their lives and their pregnancy, have improved emotional well being, make better use of community resources and are more willing to seek out supports when needed (Best Start, 1998).

Key Principles: Social Support

- Look at the factors that contribute to the stress in women's lives prior to conception and provide interventions to help women cope effectively with these stressors.
- Encourage couples to develop a system of social support including family, friends, drop in centres for pregnant women and family resource centre programs.

DOMESTIC VIOLENCE AND ABUSE

Domestic violence, including physical battering, psychological and sexual abuse, is commonly encountered by women of childbearing age. Approximately 29% of all women experienced violence from a current or previous partner (Health Canada, 2000b). Abuse often starts or escalates during pregnancy (Schuurmans et al., 1998).

It is important for health care providers to recognize that high risk behaviours are often related to abuse. Abused women are known to smoke more cigarettes, take more prescription drugs and antidepressants and are less likely to seek early prenatal care (Best Start, 1998). Forty to 45% of all battered women are forced into sex by their abuser. As a consequence, battered women are at increased risk for sexually transmitted diseases, including HIV/AIDS, gynecologic problems such as irregular periods and unintended pregnancy.

Ferris (1994) reported that 98.7% of physicians believe they are failing to identify women in abusive relationships. There are no demographics predictive of abuse. Only when a systematic assessment of each woman presenting for care is incorporated into every health care visit will it be possible to impact on domestic violence through the medical system.

During preconception counselling, routine assessment of domestic abuse involves identifying the risk factors and clinical clues that indicate abuse; and asking direct sensitive questions in a safe, private and therapeutic environment about the presence of abuse in the woman's life. Open-ended questions directed in a supportive, non-judgmental manner, assist in the identification of women requiring further support and in linking them with community resources (Schuurmans et al., 1998). It has been shown that battered women will disclose abuse to a health care professional more often than to a relative or close friend (Bohn, 1990). Various tools are available to help health care providers identify women at risk, such as the ALPHA assessment tool (Schuurmans et al., 1998; Wilson et al., 1996). Individuals disclosing abuse will benefit from a supportive non-hurried description of available options and resources (Schuurmans et al., 1998).

Educational material on abuse, including telephone numbers of local shelters and help lines, should be displayed in public and private areas including waiting rooms and washrooms (Schuurmans et al., 2000). Other tools such as small cards that list community services, posters that talk about the fact that abuse is a crime and the public media are also effective in addressing abuse.

Domestic Violence and Abuse

Health Canada has many resources for community planners at the following web address: <http://www.hc-gc.ca/hppb/familyviolence>, including “A Handbook for Health Care Professionals Responding to Abuse During Pregnancy” (Health Canada, 1999a) and “Breaking the Links Between Poverty and Violence against Women” (Health Canada, 1996a).

Key Principles: Domestic Violence and Abuse

- Establish multi-disciplinary committees in each community to look at the problems associated with violence against women. These committees need to investigate local resources and develop a plan of action for their community.
- Post information about domestic abuse, including local help lines, in public washrooms, waiting rooms and examination areas.
- Include questions about abuse as part of routine prenatal and preconception care along with a supportive attitude to encourage women to seek assistance.
- Become familiar with local support services for women suffering from abuse.
- Evaluate further the effects of violence on pregnancy outcomes and the effectiveness of interventions and the efficacy of prevention programs.

STRATEGIES FOR PRECONCEPTION AND HEALTH

Opportunities for Preconception Care

Effective preconception health promotion involves an array of affordable and accessible programs. According to Health Canada (2000b), preconception programs may be offered through a variety of methods, in various community locations, and through creative approaches. Strategies need to reflect the difficulty identifying those who could benefit from preconception health promotion. Preconception awareness can be improved through a variety of methods including routine health care visits, patient education materials and group instruction (Perry, 1996). Opportunistic approaches, such as talking about preconception when birth control is being re-assessed, can reach women who may not have considered improving their health prior to pregnancy. Factors that appear to make preconception care more effective are higher education levels, higher incomes, regular employment, encouragement from health care provider to avoid an unplanned pregnancy (Dokken, 1998).

Preconception strategies consist of risk assessment, health promotion and intervention (Schrander-Stumpel, 1999). Psychological readiness for parenting, physical readiness for conception and pregnancy, and necessary referrals are all-important components of preconception services. A range of preconception strategies will encourage couples to actively plan their pregnancy and help them identify and modify risks. Approaches to preconception should include individuals with known risks, as well as the general population.

Czeizel (1998) observed that preconception care could be perceived as a scientific procedure and a highly responsible action. Preconception programs in North Carolina serving women with limited education and lower income levels were of interest to 89% of the clients (Cefalo & Moos, 1995). According to Wallace and Hurwitz (1998), an effective method of delivering preconception care is opportunistically. Frede (1993) suggests preconception counselling can be discussed during an annual examinations or during a primary care visit for other health problems.

Ideally, preconception appointments and classes should be made available to all couples. There are many other opportunities for preconception health promotion, including:

- School sexual health education
- Bridal fairs
- Marriage preparation classes
- Appointments for renewal or review of birth control
- PAP smear
- Testing for sexually transmitted diseases
- Negative pregnancy test
- Postpartum appointments
- Use of the public media
- Mall displays
- Workplace health events

Challenges for program developers include a high rate of unintended pregnancies, lack of knowledge among men and women and health care providers concerning the benefits of preconception care and lack of research proving its effectiveness (Allaire & Cefalo, 1998, Levitt, 1993). In addition, Levitt (1993) noted that the women and men in greatest need for health care services are generally those who have the greatest difficulty in accessing it. Fragmentation of services, lack of facilities and resources for treating high risk behaviours, poor professional reimbursement for risk assessment and health promotion and lack of training of health care professionals are additional barriers to preconception health promotion (Levitt, 1993).

The following sections will provide information and examples for a range of approaches designed to promote health before pregnancy.

Surveys to Determine Areas of Interest and Need

Prior to selecting preconception initiatives, you will need to determine the interests, needs and existing services in your community. Both service providers and the audience of interest should be involved in selecting appropriate direction for your work. Survey results will vary from community to community, and needs change over time, necessitating ongoing efforts to monitor community needs and interests.

Example: Preconception Survey

The Simcoe District Health Unit surveyed its community in 1994 as part of their planned approach to increasing awareness and services around preconception and health. They found that a high proportion of those surveyed connected preconception health with improved pregnancy outcomes. Most individuals surveyed recognized that male health is also important prior to conception. About half wanted to learn more about preconception health and were prepared to make lifestyle changes. There was interest in incorporating preconception information in secondary school health education and in making preconception care available to those planning a pregnancy. Preconception literature and one-on-one interaction were strategies that appealed to the participants. The survey results helped the committee select and define interventions around preconception knowledge and behaviours.

Preconception Appointments and Assessment Forms

Ideally, preconception counselling should become an integral part of health services for men and women of reproductive age (Nasso, 1997). A preconception appointment provides benefits to all couples planning a pregnancy, but is particularly important for those with existing medical complications (Dacus et al., 1995). While it may be beneficial for couples to share a preconception appointment, it is critical to speak to women alone about their reproductive history, sexually transmitted diseases and abuse. Assessment forms can help health professionals and their patients determine and modify possible risks.

The Clinical Practice Guidelines of the Society of Obstetricians and Gynecologists of Canada state that all women considering conception should talk to their physician (Schuurmans et al., 1998). Preconception health appointments should include the following: health history, physical examination, appropriate tests and health promotion interventions. Preconception discussions should include a medical history, genetic conditions, medications, lifestyle issues (including smoking, alcohol, drugs, nutrition, physical fitness), pre-screening for rubella, syphilis and HIV, necessary immunizations, past obstetrical history and advice to take folic acid (Schuurmans et al., 1998). Perry (1996) also suggests including information about teratogenic exposure, social support, cultural practices and financial issues. Adding patient assessment and education on preconception to a busy practice will require the commitment of all staff. Use of nurse interviews, classes, videos and health promotion handouts will facilitate the process

(Swan & Apgar, 1995). Referrals and/or additional office visits may be necessary if significant risks are identified (Swan & Apgar, 1995).

A format for preconception care (Czeizel, 1995) could include the following stages:

1. Reproductive health check up
2. Referrals to health care specialists as needed (ie genetic counselling, special clinics for those with chronic diseases such as epilepsy or diabetes, treatment of infections, infertility specialists, updated immunizations)
3. Minimum three month preparation for conception (avoidance of alcohol, discontinue contraception pill, folic acid supplementation)
4. Better Protection Early in Pregnancy (visit clinic immediately after first missed menstrual period)
5. Referral to antenatal clinics at 10-12 weeks

Example: Preconception Health Appraisal

The University of North Carolina developed a Preconception Health Appraisal tool (Moos, 1989) consisting of a 53 question checklist about issues that could affect health if pregnancy occurred. The appraisal is self administered and provides the woman with information about any areas of concern. The information on the sheet is then reviewed with a health professional. Patients using the tool have responded positively to the information and the counselling.

Example: Preconception Assessment

The Montreal General Hospital completed a pilot test on the use of an adapted preconception assessment form (Leduc & Parenteau-Carreau, 1992). As a woman ticked off a risk factor on the top sheet, a mark was made on the following page corresponding to appropriate information or advice. Patients completed the forms in the waiting room and then the information was reviewed and discussed with a nurse. The patient kept a copy of the assessment and was provided with necessary referrals and appropriate educational brochures for reinforcement. Common risk factors identified by the forms included alcohol consumption, less than 3 meals a day, and use of prescription and non-prescription medication. Of the women who completed the form, 95% said they were highly or moderately interested and 100% found it easy to understand.

Preconception Classes

A short class on preconception is an effective and efficient way to provide general information to couples planning a pregnancy (Summers & Price, 1993). Participants can then be encouraged to access individual counselling, physical examination and appropriate testing. Content for preconception classes should include psychological readiness, physical readiness, routine screening, concerns of the father, genetic counselling, creating a positive environment for conception, family planning, timing conception and choosing a health care provider (Summers & Price, 1993).

A range of resources is available to those planning preconception classes. The preconception workbook developed by Best Start Barrie and the Simcoe Health Unit is a practical tool for preconception classes. There are also many existing fact sheets, brochures and videos that are suited to preconception classes. Kort and Moos (1988) developed a manual for community education programs on preconception health, including background information, sample activities and tips on organising and implementing programs.

Example: Preconception Classes

The Rochester General Hospital provided 2 to 3 hour preconception classes to groups of up to 16 individuals (Nasso, 1997). The classes included a presentation and discussion and incorporated a variety of audiovisual and written materials. There was a small fee for the classes and they were advertised in a health newsletter and in local obstetricians and/or gynaecologists offices. Most participants had positive comments about the classes.

Example: Health Before Pregnancy Information Sessions

Simcoe District Health Unit and Best Start Barrie developed information sessions for the public on preconception. The sessions provided a forum for the participants to learn more about health before pregnancy. Public health nurses facilitated the 5 sessions, and more than 40 individuals participated. Participants attended to obtain information about factors that influenced their future babies health, nutrition, things to avoid, environmental hazards and finances.

School Health Education

Preconception programs can be incorporated into existing school sexual health curricula. Teachers, parents, and health care providers may be included as partners in planning effective programs for children and adolescents. Health Canada, (1994) suggests supporting the use of innovative ideas such as peer support programs, school sexuality clinics, and student-led initiatives. School based preconception education has the benefit of increasing knowledge about health habits such as smoking and alcohol use, early on in life. It also provides an ideal opportunity to promote the benefits of a planned pregnancy, later on in life.

Example: Your Fertile Future

The Waterloo Health Unit developed a tool for promoting preconception health in the school environment. The board game “Your Fertile Future” focuses on lifestyle choices, environmental factors, relationships and readiness for parenting. It is a fun way to promote thought and discussion about reproductive health.

Example: Smart Planning...Healthier Babies

“Smart Planning...Healthier Babies” is a classroom program designed for grades 8 and 9 by the University of North Carolina (Moos & Kort, 1988). The binder introduces a range of information, approaches and activities suitable for these grade levels.

Workplace

Workplaces are another way to reach couples in their reproductive years who may be planning a pregnancy. In addition, there are specific workplace hazards that can be addressed. Many workplaces already involve their employees in some form of a wellness program, such as back care fitness, heart health and smoking cessation. Health professionals interested in promoting preconception health in the workplace environment can build on existing programs by providing displays, preconception classes, distributing resources and reducing workplace risks.

Example: New Beginnings

New Beginnings is a program binder developed by the University of North Carolina (Bendict, 1994) for the promotion of workplace reproductive health. A section of the binder covers promotion of preconception health in a workplace environment. Ideas include the use of classes, videos, games, literature and displays.

Resource Development

If resources need to be developed, it is important to involve the audience of interest in design, wording, content and distribution methods. The resources should be respectful of the wide range of individuals who may be planning a pregnancy, their differing beliefs and life circumstances. Written materials should be sensitive to the fact that, in spite of excellent care prior to conception, some pregnancies will end in miscarriage, some babies will be born with birth defects and some couples will find that they face infertility.

Example: Preconception Resources

The Simcoe District Health Unit and Best Start Barrie formed a partnership to develop needed resources on the topic of preconception. Focus groups were used to test and refine messages, images and draft resources. They designed a preconception workbook, brochure, display, poster, fridge magnet, radio ads, newspaper articles and a billboard. These popular resources have since been used or adapted by health units across the province of Ontario.

Media Campaigns

Health care providers should be aware of the power of the media in promoting popular messages about health. Media campaigns can be used to encourage couples to actively plan a pregnancy, to provide couples with needed information on preconception and to encourage them to seek care prior to conception. Allaire and Cefalo (1998) have suggested that health promoters use broad-based health educational campaigns, in order to include all women of reproductive age and their partners.

An example of a creative approach, suggested by Allaire and Cefalo (1998), used the insertion of information leaflets inside feminine hygiene products as a means of educating the general population about preconception health promotion. Another useful approach involves written information from a pharmacist. For example, stickers could be placed on oral contraceptive packages, encouraging women to talk their pharmacist about folic acid if they stop using the pill because they want to become pregnant (Schrandt-Stumpel, 1999).

In the community setting, preconception health promotion programs can occur anywhere men and women gather. Because many women do not routinely access health care or information, alternative methods must be found. The use of trained peers and professionals involved in outreach programs, one-to-one visiting programs, programs

through community and day care centres, churches, drug and grocery stores are all potential means of reaching isolated women (Health Canada, 2000b).

Example: “Is There a Baby in Your Future” Campaign

In 1996 Algoma Best Start and the Algoma Health Unit developed a media campaign promoting the benefits of improved health prior to conception. The campaign materials included a series of newspaper articles, a television ad, a radio quiz, packages of information for couples planning a pregnancy, a ribbon campaign and several displays. The external evaluation of Best Start’s work showed a significant increase in awareness of the benefits of preconception health.

Example: “Your Health Before Pregnancy Makes a Difference” Campaign

The Durham Region Health Department implemented a preconception campaign in 2000, based on many of the resources developed by the Simcoe District Health Unit and Best Start Barrie. The Health Unit adapted existing preconception radio ads, the magnet, “Health Before Pregnancy” brochure, and television ads and also produced a GO train ad and post-it notes. Their main messages focussed on nutrition, healthy weights, social support and avoidance of alcohol, tobacco and drugs. Resources were mailed to physicians and displays and the media were used to promote the messages with the general public.

Physician Education

Physicians are seen as credible sources of information by the general public and are front line workers in the provision of preconception care. In a survey of physicians, 90% of general practitioners knew about preconception and considered it part of their job, and only 50% felt they had sufficient knowledge to give adequate advice (Schrandt-Stumpel, 1999). In most communities preconception health promotion is not a regular part of reproductive health care. Physicians may need assistance in implementing services and routines to promote health before pregnancy. Health practitioners should be involved in designing training events and need to have input on the agenda, location, timing and speaker, in order to meet their needs.

Example: Preconception Training Event

Algoma Best Start and Algoma Health Unit planned a central training event for health professionals and community partners in 1996. Merry-K. Moos, an expert on preconception from the University of North Carolina, was brought in for a full day workshop on the process of improving preconception health. This session provided the

information, ideas and motivation necessary for the formation of working groups in several communities on preconception and health.

Community Supports

Many of the previous approaches assume that couples are able to make health changes based on information and advice. In some cases comprehensive supports are required in order for individuals to improve their health. Women living in poverty, in violent situations and/or struggling with addictions, are at particular risk. Preconception health promotion should be sensitive to the fact that referrals may need to be made to a wide range of community services including access to food, folic acid supplements, smoking cessation supports, treatment and counselling for addictions and other strategies supportive of healthy behaviours. Groups wanting to improve health prior to conception may need to look at developing or enhancing needed services or improving access to existing services.

Research and Evaluation

Finally, successful preconception health promotion depends on accurate, current information in order that health care providers are familiar with the most recent research evidence. Evaluation should be incorporated into all program plans. According to Jack and Culpepper (1990), the value of these basic services should not be discounted since they not only empower women and their partners to make informed decisions about themselves and the children they may have, but these services may ultimately reduce infant morbidity and mortality.

Summary

Ultimately it is hoped that an increased number of effective approaches to preconception will:

- Decrease the number of unplanned pregnancies
- Increase the number of couples assessing their health and making appropriate changes prior to pregnancy
- Decrease the complications during pregnancy
- Improve maternal and neonatal outcomes

Preconception Resources and Services

PRECONCEPTION RESOURCES AND SERVICES	
SOURCE	RESOURCES & SERVICES
Best Start: Maternal, Newborn and Child Health Resource Centre 180 Dundas Suite West, Suite 1900 Toronto, ON, M5G 1Z8 Tel: 416-408-2249 or 1-800-397-6547 Fax: 416-408-2122 http://www.beststart.org	Health Before Pregnancy Information Package Prevention of Low Birth Weight in Canada Consultations and Workshops Health Before Pregnancy Brochures Health Before Pregnancy Display
March of Dimes (US) Birth Defects Foundation Box 1657 Wilkes-Barre, PA, 18703 Tel: 1-800-367-6630 Fax: 717-825-1987 http://modimes.com	Men Have Babies Too Brochure Think Ahead for a Healthy Baby Brochure Are You Ready? A Guide to Planning a Healthy, Happy Pregnancy Folic Acid Flyer Three Ways to Have a Healthy Baby Poster Folic Acid Poster Preconception Planning Video
Simcoe District Health Unit 15 Sperling Ave Barrie, ON, L4M 6K9 Tel: 705-721-7330 Fax: 705-721-1495 http://www.simcoehealth.org	Your Health Before Pregnancy Brochure Your Health Before Pregnancy Workbook Your Health Before Pregnancy Magnet Your Health Before Pregnancy Display Your Health Before Pregnancy Radio Ads
Motherisk The Hospital for Sick Children Dept. of Clinical Pharmacology 555 University Avenue Toronto, ON, M5G 1X8 Tel: 416-813-6780 Fax: 416-813-5979 http://www.motherisk.org	Pregnancy Wallet Card Advice and Information

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PRECONCEPTION RESOURCES AND SERVICES	
SOURCE	RESOURCES & SERVICES
University of North Carolina at Chapel Hill Department of Obstetrics and Gynecology Maternal-Fetal Medicine CB#7570, UNC-Chapel Hill Chapel Hill, NC 27559-7570 Tel: 919-966-1601 http://www.unc.edu	New Beginnings Smart Planning...Healthier Babies Thinking Ahead Preconception Health Appraisal Forms
Waterloo Regional Health Unit 99 Regina Street South Waterloo, ON, N2J 4V3 Tel: 519-883-2009 Fax: 519-883-2241 http://chd.region.waterloo.on.ca	Your Fertile Future

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Best Start: Ontario's Maternal, Newborn and Early Child Development Resource Centre

The Best Start: Ontario's Maternal, Newborn and Early Child Development Resource Centre supports community groups, organizations and health professionals working on health promotion initiatives to enhance the health of mothers, babies and children. The Centre provides consultation, training, information and resources across the province of Ontario. We help enhance community capacity to develop and implement population based, community-wide, comprehensive initiatives that address the range of risk factors associated with maternal, newborn and child health.

The Best Start: Ontario's Maternal, Newborn and Early Child Development Resource Centre provides:

- consultation
- training
- information
- resources

We work to help local organizations:

- increase their knowledge about maternal and newborn health promotion
- link with other local, regional, provincial or national organizations and initiatives
- learn how to reproduce and/or adapt successful innovations
- determine ways to mobilize community members around local issues
- solve implementation problems
- explore opportunities to sustain their work.

The Resource Centre builds upon the work of the two Best Start demonstration sites. Between 1992-1998 the demonstration sites developed and tested hundreds of community-based interventions to promote the health of women and families before, during and after pregnancy.

The Best Start: Ontario's Maternal, Newborn and Early Child Development Resource Centre is funded by the Ontario Ministry of Health and Long-Term Care and is a key program of OPC. It is also a member of the Health Promotion Resource System in Ontario - a group of organizations sharing common goals, resources and expertise. The Resource Centre is an associate of the Canadian Health Network and an affiliate within the Sexual and Reproductive Health Information Network.

