REFLECTING ON THE TREND:
Pregnancy After Age 35

A guide to Advanced Maternal Age for Ontario service providers, including a summary of statistical trends, influencing factors, health benefits, health risks and recommendations for care.

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Ontario's maternal, newborn and early child development resource centre

Centre de ressources sur la maternité, les nouveau-nés et le développement des jeunes enfants de l'Ontario

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A collaborative project of: Best Start: Ontario's Maternal, Newborn and Early Child Development Resource Centre and the Halton Region Health Department

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The Advisory Committee:

- **Janette Bowie**, RN BScN, Public Health Nurse, Baby and Parent Program, Halton Region Health Department
- **Virginia Collins**, CAPD, CLD, CCE, Director, Antepartum Doula Program, CAPPA Canada
- **Laura Payant**, BScN MScN, Perinatal Coordinator, Perinatal Partnership Program of Eastern & Southeastern Ontario
- **Andrea L. Rideout**, MS, CCGC, CGC, Genetic Counsellor, Project Manager, The Genetics Education Project, Mount Sinai Hospital
- **Shirley Saasto-Stopyra**, RN, Public Health Nurse, Healthy Families Program, Thunder Bay District Health Unit
- **Hana Sroka**, MSc, CCGC, Genetic Counsellor, Mount Sinai Hospital

Key Informants and Expert Reviewers:

- **Dr. Sean Blaine**, BSc, MD CCFP, Lead Physician, STAR Family Health Team, Stratford, Assistant Professor, Department of Family and Community Medicine, University of Toronto, Researcher, Family Medicine Genetics Program, Mount Sinai Hospital
- **Janette Bowie**, RN BScN, Public Health Nurse, Baby and Parent Program, Halton Region Health Department
- **Dr. June Carroll**, MD CCFP FCFP, Sydney G Frankfort Chair in Family Medicine, Associate Professor, Department of Family and Community Medicine, Mount Sinai Hospital, University of Toronto
- **Donna Clarke-McMullen,** RN, BScN, Public Health Nurse, KFL&A Public Health
- **Dr. Sharon Caughey**, MD FRCS(C), Obstetrician/ Gynecologist, Department of Obstetrics & Gynecology, University of Ottawa, Federation of Medical Women of Canada
- **Virginia Collins**, CAPD, CLD, CCE, Director, Antepartum Doula Program, CAPPA Canada
- **Kathleen Cooper**, Senior Researcher, Canadian Environmental Law Association
- **Kathy Crowe**, RN, BSc, Supervisor, Reproductive Health, City of Ottawa Public Health
- **Mary Louise Drake**, EdD, RN, Adjunct Associate Professor, Faculty of Nursing, University of Windsor, Chairperson, Building Blocks for Better Babies (Canada Prenatal Nutrition Program)
- **Joyce Engel**, PhD, Vice-President, Academic Niagara College
- **Dr. Thomas Hannam**, BSc MD FRCSC Reproductive Endocrinology & Infertility, Director, Hannam Fertility Centre
- **Donna Launslager**, Health & Education Committee Chair, Multiple Births Canada
- **Dr. Patricia Mousmanis**, MD CCFP FCFP, Coordinator of Healthy Child Development Program for the Ontario College of Family Physicians, Clinical Tutor McMaster University
- **Kuy Ngo**, RN, BNSc. Public Health Nurse, Early Years Health Program, City of Ottawa Public Health
- **Dr. Nanette Okun**, MD BScN, FRCSC, Associate Professor, Obstetrics and Gynecology, Maternal Fetal Medicine, Mount Sinai Hospital
- **Laura Payant**, BScN MScN, Perinatal Coordinator, Perinatal Partnership Program of Eastern & Southeastern Ontario
- **Andrea Rideout**, MS, CCGC, CGC, Genetic Counsellor, Project Manager, The Genetics Education Project, Mount Sinai Hospital
- **Rosy Rosati**, RN, Cycle Monitoring Nurse, Hannam Fertility Centre
- **Dr. Vyta Senikas**, BSc MDCM, FRCSC, FSOGC, CSPQ, Associate Executive Vice-President, The Society of Obstetricians and Gynaecologists of Canada
- **Bobbi Soderstrom**, BA, MLS, BScN, RM, Associate Professor, Ryerson University, Midwifery Education Program, Member of the Professional Team of the Perinatal Partnership Program of Eastern and Southeastern Ontario
- **Hana Sroka**, MSc, CCGC, Genetic Counsellor, Mount Sinai Hospital
- **Lia Swanson**, BScN, RN, MSc(T), Reproductive Health Program Manager, Niagara Region Public Health Department

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Wendy Burgoyne was the project lead from the Best Start Resource Centre. For more information about Best Start, contact:

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

c/o Ontario Prevention Clearinghouse
180 Dundas Street West,
Suite 1900
Toronto, ON M5G 1Z8
Phone: 416-408-2249 or
1-800-397-9567
Fax: 416-408-2122
Email: beststart@beststart.org
Website: www.beststart.org

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1.0 Introduction

Importance of Prenatal Care for Women Over Age 35

The proportion of women 35 and older in prenatal medical and obstetrical services has increased significantly over the past 30 years. This demographic change has important implications to women planning a pregnancy, their partners and families, their future children, the service providers who work with pregnant women, and to the health care system.

With advances in preconception and prenatal care, most women over the age of 35 can expect to have a healthy pregnancy and a healthy baby. However, there are some concerns in pregnancy that may increase the risk for this population. Many of these risks can be successfully managed through preconception and prenatal care. Focused care for women over age 35 plays a vital role in minimizing health risks, sensitively meeting their unique psychosocial needs, and maximizing health opportunities to achieve the best possible outcome, a healthy baby and a healthy mother.

Advanced Maternal Age

The focus of this manual is advanced maternal age, i.e. pregnancies in women aged 35 and older. For simplicity, this manual uses "after age 35" and "over age 35" when discussing advanced maternal age.

Previously, this population has been described as "elderly primips", "elderly or older moms", "elderly multips", "delayed pregnancies", or "late maternal age". This older terminology is no longer considered to be supportive or appropriate for this growing population.

The term "advanced maternal age" is commonly used by health care providers to describe pregnancies in women aged 35 and older.

Purpose of this Manual

The purpose of this manual is to bring together relevant information about prenatal care for pregnant women over age 35. It is intended for use by service providers who work with pregnant women, including public health nurses, nutritionists, mental health workers, genetic counsellors, occupational health nurses, doulas, prenatal educators, midwives, physicians and nurses.

This manual is designed as a reference and does not duplicate best practice care guidelines. Where established guidelines exist, links and references are provided.

Women over age 35 having their first pregnancy are the main focus of this manual. First pregnancies are different from subsequent pregnancies. Women in their first pregnancies need different information and have different concerns. First pregnancy also influences the frequency of different modes of delivery. However, not all of the information found in the literature or from key informant interviews was specific to women having their first baby. Where possible, the information in this manual is separated for women having their first or subsequent babies after age 35.

Manual Development

The information in this manual was obtained through a literature review in the fall of 2006. The following databases were searched for journal articles between 1996 to 2006: Academic Search Premier, Global Health, CINAHL, MEDLINE, Health Source: Nursing/ Academic Edition, Psychology & Behavioural Sciences Collection, PsycINFO, Nursing & Allied Health: Comprehensive Edition. Also included in the review are reports from various Canadian organizations, some U.S. organizations, and statistical data from Statistics Canada found through an Internet search. Journal articles prior to 1996 were used in the development of this manual if they were recently re-referenced.

Keywords used in the search of these databases include: "delayed pregnancy", "advanced maternal age", "older mother", "pregnancy", "obstetrics", "obstetrical outcomes", "primip", "elderly primip", "elderly primagravid", "older gravida", "elderly gravida", "maternal age", "maternal health services", "later pregnancy", "maternal age, 35 and over", "risks", "pregnancy", "pregnancy outcomes", "risk factors", "amniocentesis", "interventions", "genetic counselling", "stillbirths", "spontaneous abortion", "ectopic", "obstetric labour/labour complications", "infant, mortality", "down syndrome", "genetic screening", "screening", "preconception care", "preconception health", "fetal death", "ultrasound, neck".

In addition to the literature search, information was also obtained through interviews with Ontario service providers with expertise in providing prenatal services for women over age 35. Fourteen key informant interviews were completed.

Limitations

The information in this manual has some limitations due to lack of research in some areas and lack of Ontario specific data. Some aspects of pregnancy over age 35 have not been studied, and more research is needed. While the main focus of this report is Ontario populations, in some areas the manual relies on data from other provinces, Canada, the United States and other countries, which may have limited relevance for Ontario. In addition, there were few opportunities to include the voices of pregnant women over age 35 in the development of this resource.

Using This Manual

This manual shares information that is relevant to the care of pregnant women over age 35, focusing on statistical trends, social context, health risks, health advantages and service provider strategies. However, age 35 is not an absolute number at which to expect risks for women in pregnancy and childbirth. Rather, age is merely one factor for service providers to consider in the context of prenatal care. Other factors include health status of the mother, nutrition, medical and family histories, and access to prenatal care. It is also important to recognize that while there are some increased health risks associated with advanced maternal age, there are also psychosocial and health advantages. Most pregnant women over age 35 would be considered "low risk" and would be able to choose among a variety of care providers and birth options.

This manual encourages service providers to look at advanced maternal age in a comprehensive manner, considering health risks and advantages, preconception and prenatal care, and transition to parenting.

A range of service providers will use this manual, including physicians, midwives, nurses (family practice, labour delivery, postpartum, public health, and community nurses), and front line workers in pregnancy support programs. They, in turn, provide a range of antenatal services to pregnant women over age 35, including preconception and prenatal care, prenatal classes and drop-in programs for pregnant women. While some of the information and strategies in this manual are medical in nature, it is helpful if all service providers who work with women have a sense of the health risks, opportunities and recommended care for pregnant women who are over age 35. Service providers can refer women for more information, support or specific services, answer some questions and/or provide written information, even if they do not provide medical care. The information in this manual may help a wide range of providers to improve the services they offer to women over age 35, in a number of different ways. Small changes such as understanding the multitude of reasons why women may choose to delay their first pregnancy, and a non-judgemental attitude, can make a big difference to women over age 35.

The manual starts by discussing trends in the timing of first pregnancies and factors that influence these trends. It then reviews health advantages for pregnancy over the age of 35 and the range of health concerns. The manual moves on to considerations in emotional, preconception and prenatal care as well as the transition to parenting. It concludes with a discussion of overall implications and recommendations. A list of acronyms and a glossary are included at the end of the manual for readers who want to look up specific terms used in this manual. The reader may want to review the entire manual, or consult specific sections, depending on their knowledge and interests.

2.0 Pregnancy After Age 35: Trends in Timing of First Pregnancy

Birth statistics in Canada and many other industrialized countries indicate that the average age of childbirth for many women is increasing compared to previous generations (Health Canada, 2005). This chapter focuses on current birth trends in Canada and the many factors that influence these trends.

2.1 Current Trends for Pregnancy and Birth

Over the last 30 years in Canada, the average age at which women are having a first birth is increasing. In turn, women are also older for subsequent births compared to previous generations.

Women in Canada are having fewer children and having them later in life than ever before.

Average Age at First Childbirth

The average age for Canadian women having their first child was 23.4 years in 1976 and this increased to 28.0 by 2003 (Health Canada, 2005). A similar trend is apparent in Ontario. Figure 1 demonstrates the increase in the average age of first time mothers in Ontario, increasing from 25.6 in 1986 to 28.2 in 2003 (Ministry of Health and Long-Term Care (MOHLTC), 2006).

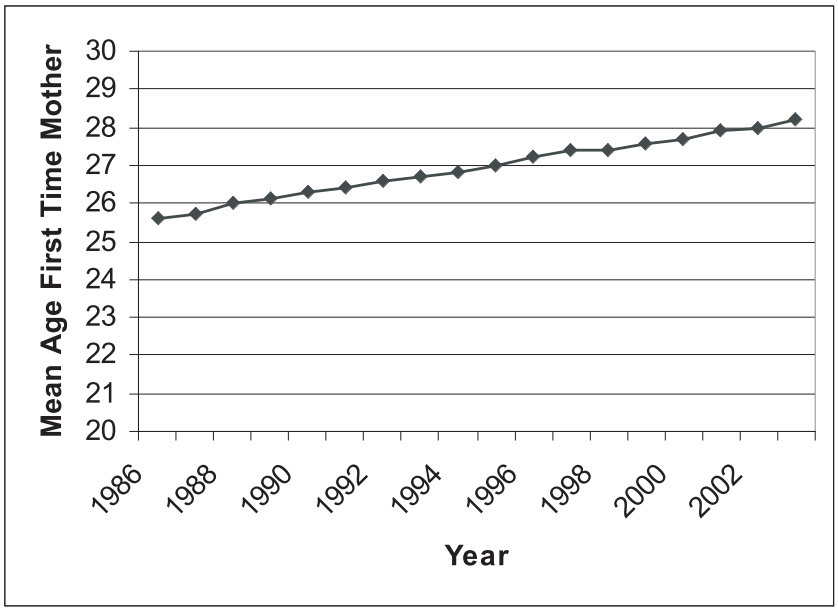


Figure 1: Mean Age of First Time Mothers, Singleton Live Births Only, Ontario, 2003 (MOHLTC, 2006).

Advanced Paternal Age

A similar trend towards later parenting is also seen in men. The median age of first time Canadian fathers was 28.1 years for men born between 1922 and 1940, 29.6 years for men born between 1941 and 1961, and 31.7 years for men born between 1961 and 1980 (Health Canada, 2005).

Percent of All Live Births to Mothers Age 35 or Older

Women are having first babies at older ages, and, as a result, the overall proportion of births to women age 35 and older has been increasing. Since 1981 age specific fertility (number of births per 1,000 women in a specific age group) has been decreasing for Canadian women aged 15-29 and increasing for Canadian women aged 30-39 (Health Canada, 2005). Approximately 26% of births to Canadian women over age 35 are a first birth (Health Canada, 2003). The percent of births to women over age 35 doubled between 1990 and 2003 in Ontario (MOHLTC, 2006).

In 2004 17.2% of Canadian live births were to women over age 35 (Statcan, 2006a). Figure 2 demonstrates the increasing proportion of births to Ontario women over age 35. Live births to women over age 35 increased from 7.9% in 1986 to 20.0% in 2003 in Ontario:

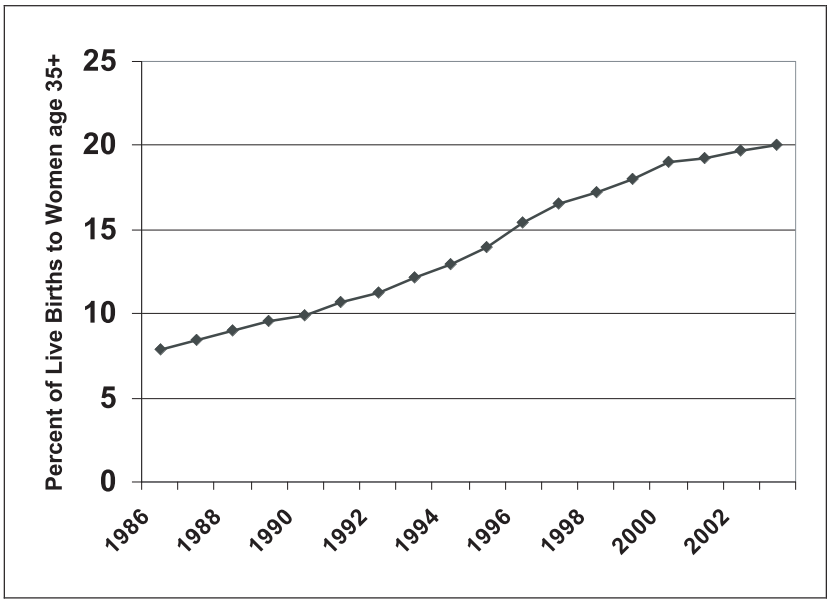


Figure 2: Percent of Live Births to Women age 35+, Ontario (MOHLTC, 2006).

Table 1 indicates the percent of live births for women age 35 and older by Ontario public health unit in 2003. The percent of live births to women over age 35 is highest in the urban areas of Halton, Ottawa, Toronto and York regions, and, in general, is lower in rural and remote areas of the province.

Ontario Health Unit	% Live Births to Women Age 35+ in 2003
Algoma	12.5%
Brant	12.9%
Chatham-Kent	9.5%
Durham	19.9%
Eastern Ontario	11.5%
Elgin St. Thomas	10.9%
Grey Bruce	13.3%
Haldimand-Norfolk	12.8%
Haliburton, Kawartha, Pine Ridge	14.9%
Halton	24.6%
Hamilton	18.5%
Hastings, Prince Edward	12.3%
Huron	12.9%
Kingston, Frontenac, Lennox and Addington	16.0%
Lambton	12.9%
Leeds, Grenville, Lanark	14.3%
Middlesex-London	18.0%
Niagara	16.3%
North Bay-Parry Sound	11.3%
Northwestern	7.8%
Ottawa	24.1%
Oxford	12.5%
Peel	20.6%
Perth	13.5%
Peterborough	16.5%
Porcupine	8.4%
Renfrew	14.1%
Simcoe-Muskoka	16.6%
Sudbury	12.2%
Thunder Bay	16.0%
Timiskaming	9.9%
Toronto	25.8%
Waterloo	16.1%
Wellington, Dufferin, Guelph	17.9%
Windsor Essex	14.9%
York Region	24.4%

Table 1: Percent of Live Births to Women Age 35+ by Ontario Health Unit (MOHLTC, 2006).

First Nations

On average, as compared to data from all Canadian women, First Nation women have children at a younger age. Reproductive delay is not currently a trend in First Nation populations (Health Canada, 2005).

2.2 Factors Influencing the Timing of First Pregnancy

Many factors influence the timing of a first pregnancy. Canadian women may be influenced by extended adolescence, access to contraception, interest in higher education, establishing a career, reaching financial stability, finding a life partner, the time needed to conceive etc.

Service providers can initiate a positive and respectful relationship with pregnant patients who are over the age of 35 by recognising the reasons why women may choose to delay parenting.

Key Life Transitions

The social climate in Canada embraces an extended adolescence for both males and females. The milestones of the adolescent years, including leaving the parental home, often extend well into a person's 20s. While in their 20s, women and men may complete education, leave home, establish a career and find a life partner. Delays in these key life transitions can influence the timing at which women decide to become parents.

Contraception

The widespread availability of effective contraceptives to control fertility is instrumental in the ability to influence the timing of childbearing. Increased access to effective contraceptives is considered the key factor enabling women to choose when and if they wish to enter the labour force, take advantage of educational opportunities and/or become parents. It is considered to be the strongest influencing factor in the trend towards increased maternal age in the first pregnancy.

Personal Freedom

Some couples choose not to start a family until they experience some personal freedom and pursue individual interests. For example, some couples choose to postpone having children until they have traveled the world or participated in other recreational activities.

Education

Today's first-time parent is better educated than the first-time parent of 30 years ago. Canadian women who pursue higher education often delay childbearing (Health Canada, 2005). In 1971, 61% of first-time Canadian mothers and fathers had less than Grade 12 education. In 1996, these numbers decreased to 21% for mothers and 23% for fathers (Lochhead, 2000). In 1971, 4% of first-time Canadian mothers and 11% of first-time fathers had a university degree. By 1996, these numbers increased to 18% for first-time mothers and 20% for first-time fathers (Lochhead, 2000).

Career Establishment

Men and women may choose to delay childbearing until they are well established in their careers (Statcan, 2002c). The current labour market is highly competitive. Educated women are able to secure better-paying employment. Canadian women have one of the highest labour force participation rates (81%) in the world (Statcan, 2006b).

Men and women are usually reliant on their income and at least some unpaid childcare (provided by the mother, father or extended family) to support their family. Men and women who do not have children may have more freedom to work overtime, travel for business and take promotions. Canadian women who delay childbirth accumulate more years of full time work experience (Health Canada, 2005). In addition, workplaces that do not have family friendly policies may make it difficult to combine parenting and work. These factors can impact advancement in many professions, and men and women may choose to delay parenting in order to establish their career.

Maternity/Parental Leave Benefits

The longer maternity/parental leave may influence women's decisions about the ideal timing of their first pregnancy. Most parents can now receive up to 50 weeks of combined maternity/parental leave benefits. Women have the option of more time at home with the new baby, but this also means a longer period of time with a lower family income. Many factors influence a woman's access to maternity/parental leave benefits, however, in 2007 the amount received was generally 55% of average insured earnings up to a maximum of $423 per week. Some women do not qualify for maternity/parental leave benefits, for example, women who are self-employed or unemployed. Women may choose to capitalize on this benefit at the most opportune economic time. The longer leave may give women more reasons to want to establish career and economic stability prior to taking a year off. Some women feel work and personal pressure to minimize the amount of time they spend on maternity leave, working as close to the delivery date as possible, and returning to work shortly after the baby is born. For more information on maternity/parental leave benefits: www.hrsdc.gc.ca

Economic Stability

The timing of a first pregnancy may be influenced by the degree of financial security that a woman or couple wishes to establish before having children. For example, they may choose not to have a baby until there is sufficient income to purchase a house. Financial status is influenced by a variety of factors including personal income, household income, assets, debts, and re-entering the workforce after having a child.

The timing of motherhood has a significant effect on the wages of women in Canada. There are growing socio-economic disparities between younger and older first time parents in Canada, and women who choose to delay childbearing tend to have a much higher economic status (Health Canada, 2005). Women who postpone having a family earn at least 6% more than women who have children earlier. The wage advantages of women who delay

parenthood persist after the birth of a first child. Women who exit early in their careers for childbearing, may find it difficult to recover economically (Statcan, 2002c). In addition, women who are older in their first pregnancy may have more assets (i.e. a home or car that is paid for) and less debt (i.e. loans).

Eighty-six percent of Canadian women return to work within a year of giving birth, and 93% within 2 years (Statcan, 1999), reflecting the economic importance of women's careers to the family, as well as the satisfaction that women may feel in their work and their role as a provider.

Family Structure

Women who are pregnant over the age of 35 may be single, in a same sex relationship, or may have a male partner. Women who are over age 35 and who have not yet found a life partner, may feel they cannot wait any longer before starting their family.

The dual income family is a social trend in Canada that has increased over the last 35 years. In 1971, 44% of first-time families were dual income earners. By 1996, the majority (72%) of first-time parents were dual income earners. This has led to a higher-income first-time family compared to 30 years ago (Lochhead, 2000).

An increasingly older age at first-time marriage is a long-established trend in Canada and childbirth often occurs after a couple marries. Canadian women who delay having children until later in life and who have higher education are more likely to be married. Resulting children can benefit from parental investment from both the mother and father (Health Canada, 2005). In 2003 the average age for first-time marriage to an opposite sex partner in Canada was 28.5 years for women and 30.6 years for men. In 1973, the average age of first marriage was 22.8 years for women and 25.2 years for men (Statcan, 2007).

One third of women in Canada will marry more than once. The average age at second marriage in Canada is 39 years of age (Statcan, 2006c). With second marriages, more couples are having a "second family". Women and partners in a second marriage may have a renewed interest in childbearing. The number of couples that blend their families and have children together is increasing in Canada. In 2001, 32% of divorced and remarried couples had children of their own, compared to 20% in 1995 (Statcan, 2006c).

Geographic Mobility

Geographic mobility is also associated with giving birth at advanced ages. Couples may choose to postpone having a baby while settling in a new geographic area and establishing new social networks. Women who are migrants have a higher childbearing average age. For women who give birth in their province of origin, the average age of childbirth is 29.0 years. Women who gave birth in a province they did not originate from had an average childbearing age of 30.1 years (Statcan, 2006a).

Advances in Assisted Reproductive Technologies

The advances in assisted reproductive technologies (ART) increase the options for women over the age of 35 who want to conceive. ART includes use of ovarian stimulating drugs, intrauterine insemination (IUI) and various forms of in-vitro fertilization (IVF). IVF may be completed with non-donor or donor eggs, and with or without intracytoplasmic sperm injection (ICSI).

ART makes it possible for women in traditional and non-traditional family arrangements to become pregnant. This may include women who have a same-sex partner or do not have a partner. ART costs can be financially prohibitive for women with lower incomes.

According to Dr. Roger Pierson, spokesperson for the Canadian Fertility and Andrology Society (CFAS) the average age of women in Canadian ART programs is 38.5 years and this appears to be increasing (Nicholson, 2005). This average age is influenced by demand and by inclusion criteria. As success rates improve with older women, ART programs adjust their inclusion criteria.

Key Points for Service Providers: Trends

1. ***Pregnancy after age 35 is a long-established trend that continues to impact birth trends in Canada.***
2. ***Many factors influence the growing trend of first pregnancy after age 35. These factors include career, marriage, geographic mobility, economics and advances in ART.***

3.0 Pregnancy After Age 35: Health Advantages

Women who are pregnant over the age of 35 have some distinct health advantages. This chapter discusses a few of these health advantages including increased rates of folic acid use, a purposeful approach, increased preparation for parenting, higher breastfeeding rates and higher socio-economic status.

3.1 Increased Use of Folic Acid

Women age 30 and older are more likely to have taken folic acid supplements in the preconception period. Health Canada recommends that all women who are pregnant or planning a pregnancy take a daily folic acid supplement, starting 3 months before conception and continuing throughout the first trimester of pregnancy, to decrease the risk of neural tube defects (Van Allen, McCourt & Lee, 2002). Some women benefit from a higher dose of folic acid. More information is available in Chapter 7.

In a national survey, an average of 45% of Canadian women reported having taken vitamin supplements containing folic acid prior to their last pregnancy.

Service providers often forget that there are health advantages to advanced maternal age, not just increased health risks.

The likelihood of women taking folic acid supplements increases with age:

Age of Mother in years	Use of Folic Acid
15-24	33%
25-29	43%
30-55	48%

Table 2: Age of Mother and Use of Folic Acid Supplements, Canada, 2000-2001 (Millar, 2004).

Use of folic acid was also related to education and income levels. Fifty-one percent of women with college or university education took folic acid in the preconception period and 56% of women with higher household income took folic acid in the preconception period (Millar, 2004).

3.2 A Purposeful Approach

Women who have waited to become pregnant until after age 35 are more likely to have carefully planned their pregnancy, which has some clear health advantages. By planning a pregnancy, women can improve their health in the preconception period, and can start to prepare themselves for parenthood.

In an Ontario survey, 75% of women aged 30 or older indicated their last pregnancy was planned.

Age of Mother in Years	Planned Pregnancy	Unplanned Pregnancy
Less than 30	63%	37%
30 or older	75%	25%

Table 3: Proportion of Planned Pregnancies by Maternal Age, Ontario, 2002 (Best Start, 2002)

Women who are age 30 and older are more likely to look for information prior to pregnancy, to talk with a health care provider before pregnancy, and to make health changes at least 3 months before they hope to be pregnant (Best Start, 2002).

Women who are pregnant after age 35 are also likely to actively seek information about pregnancy, evaluate what they read and to feel established in their personal and professional lives. This has a positive impact on how women participate in, and advocate for their own prenatal care. However, women in this age group may be overwhelmed by the amount of information available and the inconsistencies in recommendations (Pers com, 2007).

In a US study, women over the age of 35 were more likely to seek early prenatal care and to continue with regular prenatal visits throughout pregnancy (Fonteyn & Isada, 1988). Women who are pregnant after age 35 are also more likely to report having a positive experience with service providers in prenatal care, labour and birth (Windridge & Berryman, 1999).

3.3 Psychological Preparation for Parenthood

Postponing childbearing until after age 35 is associated with a sense of readiness for becoming a parent (Dion, 1995). In a Toronto study, women who were pregnant after age 35 were more likely to report feeling settled, stable, personally secure, prepared for the challenge, emotionally ready, adaptable and flexible in regards to childrearing (Dion, 1995).

Even with the benefit of preparation, some women pregnant after age 35 may find that their careful planning, research and life experience did not fully prepare them for the lack of control they have over fertility, pregnancy, birth and parenting. For some women over the age of 35, the combination of being accustomed to a high degree of personal control and the belief they should be able to cope with parenthood because of their knowledge and maturity, may result in stress when confronted with the reality of early parenting (Dion, 1995). Older parents report that they feel less confident in their parenting knowledge and skills (Invest in Kids, 2002).

3.4 Higher Breastfeeding Rates

Breastfeeding is the optimal method of infant feeding. Benefits to the infant include protection from gastrointestinal infections, respiratory infections and otitis media (Health Canada, 2003). Benefits to the mother include reduced postpartum bleeding, earlier return to pre-pregnancy weight, and a decreased risk of both breast and ovarian cancers (Health Canada, 2003).

Women over the age of 35 have higher rates of breastfeeding for 3 or more months. A Canadian survey reported the percentage of women of different ages who breastfed for 3 months or longer. Breastfeeding rates increased with the age of the mother:

Age of Mother in Years	Rate of Breastfeeding for 3 Months or More
25-29	60%
30-34	67%
35 and older	75%

Table 4: Age of Mother and Rate of Breasting for 3 Months or More, Canada, 1998-1999 (Health Canada, 2003).

3.5 Socio-economic Influences on Physical Health

The socio-economic gap between older first-time parents and younger first-time parents has grown in Canada (Health Canada, 2005). Women who have delayed pregnancy until after age 35 tend to have a higher level of education and a higher income (Health Canada, 2005). Education and income are key determinants of health. There are positive health implications for women who have a higher than average education and income, as well as for their children. Women who delay their first pregnancy may have more resources available to support their growing family.

Key Points for Service Providers: Health Advantages

1. ***Women who are pregnant after age 35 are more likely to have planned the pregnancy.***
2. ***Women who are pregnant after age 35 are more likely to use folic acid, access early prenatal care, take an informed approach to pregnancy, to prepare psychologically for pregnancy and to breastfeed their baby.***
3. ***It may take more time to answer questions and to respond to the concerns of women over age 35.***

4.0 Pregnancy After Age 35: Overview of Health Concerns

Women over the age of 35 generally consider the risks when making the decision to become pregnant (Pers com, 2007). However, they often have an incomplete understanding of the range of potential risks (Tough, Benzies et al, 2006). This may be influenced by the fact that age 35 is not considered "old" in contemporary Canadian society. There are some clear health disadvantages to delaying a first pregnancy until after 35. This chapter provides an overview of health concerns for pregnant women over the age of 35, and Chapter 5 provides more detailed information about specific complications in pregnancy. Information about how to address these age related risks is presented in Chapters 6-8.

Age 35 is not an exact number to expect an absolute change in pregnancy risk.

4.1 Declining Fertility

Age alone is the most important factor in declining fertility. For women, fertility begins to decrease significantly in the early 30s and continues to drop with increasing age. Fertility starts to dramatically decrease at age 35 (Institute for Clinical Evaluative Sciences (ICES), 2006). While 91% of women are physiologically able to become pregnant at age 30, this drops to 77% at age 35, and 53% by age 40 (Health Canada, 2005).

Assisted Reproductive Techniques and Fertility

Some women assume that with advances in assisted reproductive techniques (ART), declining fertility is a problem that can be easily solved. While advances in ART do allow many women with fertility problems to conceive, the success rates decrease with the age of the mother. In addition, the financial cost of ART is prohibitive for many women.

The success rates of a single IVF cycle to result in a live birth for women using non-donor eggs in Canadian ART clinics is:

Age of Mother in Years	Chance for Live Birth after 1 IVF Cycle
Less than 35	32%
35-39	22%
40 and older	10%

Table 5: Age of Mother and Chance for Live Birth after 1 IVF Cycle, Canada, 2004 (Canadian Fertility and Andrology Society, 2006).

One way to increase pregnancy rates in a single IVF cycle is to increase the number of transferred embryos. However, the increased pregnancy rate resulting from increased embryo transfer is associated with a higher rate of multiple pregnancies. Multiple pregnancies have an increased risk of pregnancy complications and of long-term health and intellectual concerns for the children.

Another way to increase pregnancy rates for women over age 35 after a single IVF cycle is through the use of donor eggs from a female under age 35 (Sin, 2006). When women's age approaches 42-43 most ART professionals recommend the use of donor eggs to increase the success rate of ART and to decrease the chance of chromosome anomalies.

The media has cited several examples of women far past the typical age of childbearing, even into their 60s, who had a successful live birth after ART with donor eggs. However, IVF with donor eggs is often restricted to women under age 50 (Nicholson, 2005).

The Assisted Human Reproduction Agency of Canada is the new federal regulatory body that oversees the area of assisted human reproduction in Canada.

Men and Fertility

Men remain fertile into their 60's and 70's, however, older men may have more sperm with abnormal shape, movement and genetic anomalies. Older men are also more likely to have no sperm or too few sperm (Health Canada, 2005).

4.2 Increased Use of Alcohol in Pregnancy

The use of any alcohol in pregnancy puts a fetus at risk for Fetal Alcohol Spectrum Disorder (FASD). FASD describes a series of birth defects and neurodevelopmental disorders caused by alcohol consumption in pregnancy. Children with FASD may have difficulties with learning, memory, attention span, communication, vision and hearing.

Canadian women who are over the age of 35 have a higher self-reported rate of alcohol use in pregnancy:

Age of Mother in Years	Rate of Alcohol Use in Pregnancy
25-29	12%
30-34	14%
35 and older	22%

Table 6: Age of Mother and Rate of Alcohol Use, Canada, 1998/1999 (Health Canada, 2003).

4.3 Risks Associated with Work

Working long hours (more than 8 hr/day), standing for longer than 4 hours at a time, stress at work and doing strenuous work can increase the risk for preterm labour and low birth weight (SOGC, 2005). Women who are pregnant over age 35 are more likely to be professionals employed in a career that regularly involves an increased number of work hours and a stressful work environment. Women who work in positions such as teaching or health care may be required to stand for extended periods of time.

4.4 Greater Likelihood for Pre-existing Medical Conditions

As all people age, the likelihood for developing medical conditions increases. Medical conditions that are more common with age include cancer, diabetes, hypertension and arthritis. A pre-existing medical condition may impact fertility, a pregnancy and/or the developing fetus, as may the associated treatments or medications.

Medications

Women over age 35 are more likely to be taking medications for a pre-existing medical condition (Cleary-Goldman et al, 2005). If women are using prescription drugs, over-the-counter (OTC) medications or herbal remedies, these may have harmful effects on a fetus. If medications are discontinued, decreased or changed, there may also be negative health consequences.

Cancer

Cancer is another factor to consider. There are an increasing number of cancer survivors who want to have children. Health care providers must consider the health impacts of a previous cancer diagnosis and the associated treatments.

Breast cancer is the most common cancer in young women. As women pass age 35, their chance for developing breast cancer increases significantly (Cancer Care Ontario, 2006). Women who are at higher risk for breast cancer may have already started routine mammograms by age 35.

4.5 Environmental Toxins

There are an increasing number of environmental toxins present in our communities, homes, food and water. They come from sources such as industrial pollution, pesticides, personal care products, home cleaning products etc. These chemicals include known or suspected teratogens as well as chemicals that may disrupt reproductive health in other ways. Some toxins bio-accumulate over time, and women over age 35 may have higher levels of some environmental toxins than younger women. The potential effects for the reproductive health of women over age 35 are a concern, and more research is required to fully understand the complex factors involved.

4.6 Increased Chance for Complications in Pregnancy

There are a number of complications in pregnancy that are associated with advanced maternal age. These include an increased risk for fetal loss, chromosome anomalies such as Down syndrome, multiple pregnancy, hypertension, diabetes, placenta previa, placental abruption, Caesarean birth, preterm labour and low birth weight. Each of these risks is discussed in detail in Chapter 5.

Key Points for Service Providers: Health Risks

1. ***Women over the age of 35 generally have an incomplete understanding of the range of potential risks for advanced maternal age.***
2. ***Fertility declines dramatically around age 35.***
3. ***Pregnancy after age 35 is associated with increased alcohol use in pregnancy, increased risk for pre-existing medical conditions and associated use of medications, and increased chance for complications in pregnancy.***

5.0 Pregnancy After Age 35: Specific Prenatal Risks

Certain prenatal complications occur more frequently in pregnant women over age 35. With the excellent prenatal care available in Ontario, most of these pregnancy complications can be successfully addressed to minimize the risk for the pregnant woman and the fetus. This chapter reviews the risks for specific prenatal concerns including fetal loss, chromosome anomalies, multiple births, maternal medical risks and complications in labour and birth. Information about how to address these concerns is presented in Chapters 6-8.

For most of the pregnancy complications discussed in this chapter, age is only one contributing factor. However, age alone is an important risk factor for chromosome anomalies in pregnancy.

For some pregnancy complications, the level of risk depends on whether the mother is giving birth to a first baby or has given birth previously. For these complications, risk for first-time mothers is compared to risk for all women.

While there are increased risks with advanced maternal age, most pregnant women over the age of 35 will give birth to a healthy baby.

5.1 Greater Risk of Fetal Loss

For all pregnant women, the risk of fetal loss is approximately 14%. However, the rate of fetal loss increases with age and there is a steep increase after age 35 (Nybo Anderson et al, 2000). Fetal loss can result from a number of different causes including genetic factors (i.e. chromosome anomalies), anatomic factors (i.e. abnormalities of the uterus), endocrine factors (i.e. diminished progesterone secretion), immune factors (i.e. generation of auto-antibodies), microbiologic factors (i.e. group B streptococcus, toxoplasmosis or rubella), environmental factors (i.e. alcohol, tobacco and drug use), diminished ovarian reserve and nutrition issues (i.e. folic acid deficiency and elevated homocysteine). Only some of these factors can be positively influenced through prenatal care. Most cases (60%) of single miscarriage are due to fetal chromosome anomalies. Deterioration in the quality of the egg with increased maternal age is thought to be responsible for the rise in chromosomal anomalies (Heffner, 2004).

Fetal loss can be devastating to a mother of any age. However, for women over age 35, fetal loss can be complicated by the concurrent reality of declining fertility. In general, it takes longer for women over the age of 35 to conceive. In addition, women who have conceived using ART, may be grieving a pregnancy loss while undergoing another series of ART. Fetal loss can occur through miscarriage, ectopic pregnancy or stillbirth.

Additional Information:

- *Recurrent Pregnancy Loss*, Family Beginnings Website, 2007. Available at: www.ivf-indiana.com

Miscarriage

Miscarriage (spontaneous abortion) is the loss of pregnancy before 20 weeks gestation. In a Denmark study the rate of miscarriage was shown to increase with maternal age:

Age of Mother in Years	Rate of Miscarriage
25-29	12%
30-34	15%
35-39	25%
40-44	51%
45 and older	93%

Table 7: Age of Mother and Risk for Miscarriage, Denmark, 1978-1992 (Nybo Anderson et al, 2000).

The rise in chromosomal anomalies with increasing maternal age likely leads to the rise in miscarriage rates. In addition, advanced paternal age (> 45 years) is associated with abnormal sperm (Heffner, 2004). Abnormal sperm also carry an increased risk for some single gene and epigenetic mutations. Unlike advanced maternal age, there is no special screening recommended for the single gene and epigenetic mutations associated with advanced paternal age.

Ectopic Pregnancy

Ectopic pregnancy leads to fetal loss and may result in maternal death. The rate of ectopic pregnancy in Canada is 13.8 per 1000 reported pregnancies (Health Canada, 2003).

The incidence of ectopic pregnancy increases with maternal age. This is likely due in part to an increased prevalence of fallopian tube scarring as women age (Nybo Anderson et al, 2000). The rates of ectopic pregnancy in Canada, per age category are:

Age of Mother in Years	Rate of Ectopic Pregnancy per 1000 Reported Pregnancies
25-29	12
30-34	14
35-39	21
40-44	26

Table 8: Age of Mother and Rate of Ectopic Pregnancy, Canada, 2000/2001 (Health Canada, 2003).

Stillbirth

Stillbirth, or fetal demise, is the intrauterine loss of a fetus after 20 weeks gestation or a fetus weighing 500 grams or more. The overall stillbirth rate in Canada is 6.1 per 1000 births (Statcan, 2002b)

Studies show that stillbirth rates rise with maternal age (Nybo Anderson et al, 2000; Reddy, 2006). The stillbirth rates in Canada when compared by maternal age are:

Age of Mother in Years	Rate of Stillbirth per 1000 Births
20-34	5.5
35 and older	8.3

Table 9: Age of Mother and Rate of Stillbirth, Canada, 1999 (Statcan, 2002b).

5.2 Higher Chance of Chromosome Anomalies

Major congenital anomalies are detected in 2 to 3% of all births. Major congenital anomalies can be structural or due to chromosomal anomalies. The chance for a pregnancy in which the fetus has a chromosome anomaly increases with maternal age (Hook, 1981). The most common chromosome conditions associated with advanced maternal age involve an extra chromosome. Common examples are: Down syndrome, trisomy 18, trisomy 13, or an extra X chromosome such as in Klinefelter syndrome (SOGC, 2007).

The most common chromosomal anomaly in Canada is Down syndrome (trisomy 21), which occurs in about 1 in 800 live births (Health Canada, 2002).

The age-related rate of Down syndrome in Alberta is compared in the following table:

Age of Mother	Rate of Down Syndrome per 10,000 Births
Less than 20	4.8
20-24	6.7
25-29	7.2
30-34	12.7
35-39	28.3
40-44	63.0
45+	428.6

Table 10: Age of Mother and Rate of Down Syndrome, Alberta, 1990-1998 (Health Canada, 2002).

5.3 Greater Chance of Conceiving Multiples

For every 100 births in Ontario, approximately 3 of these are multiple births (Health Canada, 2003). Although multiples represent only 3% of births, they account for 20% of preterm births, 25% of low birth weight births and 29% of very low birth weight births (Best Start, 2005). Between 1994 and 2003, the rate of multiple births (per 100 total births) increased by 35%. Multiple births are more frequent among women in their 30s and 40s. In 2002, approximately 55% of multiples were born to women over the age of 30 (Statcan, 2004).

Fertility treatments are considered to be the major factor contributing to the rate of multiple births. Women over the age of 35 with multiples are more likely to have undergone ART. Approximately 30-50% of twin pregnancies and at least 75% of triplets result from ART (Health Canada, 2003).

There are a number of risks associated with a pregnancy with multiples. Risks include perinatal death, preterm birth, low birth weight, infant death, and intellectual, social or physical disabilities. The stillbirth rate for multiple birth pregnancies is 20 per 1000 births compared with the stillbirth rate for singleton pregnancies of 5.7 per 1000 (Statcan, 2002b).

In pregnancies with multiples there is also an increased risk for pregnancy complications for the mother including gestational hypertension, proteinuria, anaemia, gestational diabetes, premature rupture of membranes (PROM) and postpartum haemorrhage.

Additional Information:

- *Guidelines for the Number of Embryos to Transfer Following In Vitro Fertilization*, clinical practice guideline, Society of Obstetricians and Gynaecologists of Canada (SOGC), 2006. Available at: www.sogc.org
- *Low Birth Weight & Preterm Multiple Births*: A Canadian Profile, report, Best Start Resource Centre, 2005. Available at: www.beststart.org

5.4 Increased Risk for Maternal Medical Complications

Women over the age of 35 are at higher risk for some maternal medical complications including hypertension and diabetes.

Hypertension

There are various types of hypertension to consider in pregnancy. Pre-existing hypertension is high blood pressure that can be detected before pregnancy. Gestational hypertension is high blood pressure that starts during pregnancy. Hypertension in pregnancy occurs in about 6-8% of all pregnancies (www.heartandstroke.ca).

For all women, the chance of developing hypertension increases with age. Older women are more likely than younger women to have pre-existing hypertension in pregnancy (Cleary-Goldman et al, 2005; Joseph et al, 2005). However, all types of hypertensive disorders in pregnancy become more common with maternal age (Joseph et al, 2005).

A provincial study in Nova Scotia found hypertensive disorders in pregnancy were more common as maternal age increased:

Age of Mother in Years	Risk of Hypertensive Disorder in Pregnancy
25-29	2.3%
30-34	2.6%
35-39	3.2%
40 and older	5.2%

Table 11: Age of Mother and Rate for Hypertensive Disorder in Pregnancy, Nova Scotia, 1988-2002 (Joseph et al, 2005).

All types of hypertension in pregnancy are of concern in prenatal care. Hypertension can lead to intrauterine growth restriction (IUGR), preterm delivery and low birth weight.

Pre-gestational Diabetes

There are 2 kinds of diabetes to consider in pregnancy. Pre-gestational diabetes starts prior to pregnancy. Gestational diabetes starts in pregnancy and resolves after birth. Diabetes affects approximately 3.5% of all pregnancies (www.diabetes.ca).

With the trend in Canada toward an increasingly obese population, diabetes is more prevalent. In addition, the likelihood of developing diabetes increases with age. Women over 35 are more likely to have pre-gestational diabetes than younger women.

A national U.S. study of pregnant women found a difference in pre-gestational diabetes rates as maternal age increased:

Age of Mother in Years	Risk for Pre-gestational Diabetes
Less than 35	0.9%
35-39	1.4%
40 and older	1.7%

Table 12: Age of Mother and Rate of Pre-gestational Diabetes, US, 1999-2002 (Cleary-Goldman et al, 2005).

For women with pre-existing diabetes, the risk of major fetal congenital anomalies is twice that of the general population. In particular, the risk for congenital heart disease is increased 3 times and the risk for neural tube defects is increased 3 to 4 times (Macintosh et al, 2006). For this reason, a fetal echocardiogram at 18-20 weeks gestation is beneficial for pregnant women with pre-existing diabetes. In addition to fetal anomalies, women with pre-existing diabetes have a 3 times higher risk for perinatal mortality compared to other women (Macintosh et al, 2006).

Gestational Diabetes

The risk of developing gestational diabetes also increases with maternal age (Cleary-Goldman et al, 2005; Johns et al, 2006). A national U.S. study found the rates of gestational diabetes were 2.5 times higher for women over 40 compared to women under 35:

Age of Mother in Years	Risk for Gestational Diabetes
Less than 35	3%
35-39	5%
40 and older	7%

Table 13: Age of Mother and Risk for Gestational Diabetes, US, 1999-2002 (Cleary-Goldman et al, 2005).

Risks to women with diabetes in pregnancy (regardless of type) include large for gestational age (LGA) infant (> 4500grams at birth), higher risk of shoulder dystocia, higher risk for Caesarean birth, and gestational hypertension (Johns et al, 2006).

5.5 Increased Risk for Labour and Birth Complications

With higher maternal age, there is an increased risk for some complications in labour and birth. These include placenta previa, Caesarean birth, preterm and very preterm birth, placental abruption and low birth weight.

Placenta Previa

Placenta previa is the implantation of the placenta covering or partially covering the cervical opening. The risk for placenta previa increases with maternal age (Cleary-Goldman et al, 2005; Joseph et al, 2005).

A provincial study in Nova Scotia found a difference in placenta previa rates as maternal age increased:

Age of Mother in Years	Risk for Placenta Previa
25-29	0.3%
30-34	0.4%
35-39	0.7%
40 and older	1.1%

Table 14: Age of Mother and Risk for Placenta Previa, Nova Scotia, 1988-2002 (Joseph et al, 2005).

Placenta previa increases the chance that a woman will require a Caesarean birth.

Caesarean Birth

Caesarean sections can be elective or due to a medical emergency. Caesarean birth rates increase with the age of the mother (Cleary-Goldman et al, 2005; Joseph et al, 2005; Prysak, Lorenz & Kisley, 1995), particularly for women having their first baby (Joseph et al, 2005). Many things influence the rate, including the demand for elective Caesarean sections. In addition, service providers may believe that women giving birth to a first baby over age 35 to have a more "valued" pregnancy or a "higher-risk" pregnancy. As a result, service providers may intervene more readily with Caesarean birth (Bobrowski & Bottoms, 1995).

In Canada, the Caesarean birth rate increases with maternal age:

Age of Mother in Years	Primary Caesarean Birth Rate
Less than 25	13.4%
25-34	15.6%
35 and older	19.4%

Table 15: Age of Mother and Risk for Caesarean Birth, Canada, 2000/2001 (Health Canada, 2003).

Many of the high-risk conditions of pregnancy previously addressed in this chapter are associated with Caesarean birth. Caesarean birth is more common in women with multiples, hypertensive disorders in pregnancy, diabetes and placenta previa.

Preterm Birth

A live birth before 37 completed weeks of gestation is considered preterm. The rates of preterm birth increase with the age of the mother (Joseph et al, 2005; Prysak, Lorenz & Kisley, 1995; Tough et al, 2002).

A provincial study in Nova Scotia found rates of preterm birth were higher for women of advanced maternal age, and also higher for those women having their first baby compared to all women:

Age of Mother in Years	Risk for Preterm Birth All Women	Risk for Preterm Birth First Births
25-29	5%	6%
30-34	5%	7%
35-39	6%	9%
40 and older	7%	8%

Table 16: Age of Mother and Risk for Preterm Birth, Nova Scotia, 1988-2002 (Joseph et al, 2005).

Preterm birth is the single most important cause of perinatal mortality and morbidity in Canada.

Additional Information:

- *Preterm Birth: Making a Difference*, online report, Best Start Resource Centre, 2002. Available at: www.beststart.org

Very Preterm Birth

Very preterm babies are born before 32 weeks completed gestation. The provincial study in Nova Scotia found that rates for very preterm birth were higher for women of advanced maternal age and also for women having their first baby:

Age of Mother in Years	Risk for Very Preterm Birth – All Women	Risk for Very Preterm – First Births
25-29	0.6%	0.8%
30-34	0.7%	1.0%
35-39	0.8%	1.3%
40 and older	1.5%	2.4%

Table 17: Age of Mother and Risk for Very Preterm Birth, Nova Scotia, 1988-2002 (Joseph et al, 2005).

Very preterm birth is associated with even higher risk for perinatal mortality and morbidity (SOGC, 2000). The risk of long-term intellectual, emotional or physical disabilities is directly related to the gestational age of the infant (SOGC, 2000).

Placental Abruption

Placental abruption is the separation of the placenta from the wall of the uterus during pregnancy. Women of advanced maternal age are at an increased risk for placental abruption (Cleary-Goldman et al, 2005; Joseph et al, 2005; Sheiner et al, 2003).

In a national U.S. study, placental abruption was found to increase as maternal age increased:

Age of Mother in Years	Risk for Placental Abruption
Less than 34	0.7%
35-39	0.8%
40 and older	1.6%

Table 18: Age of Mother and Risk for Placental Abruption, US, 1999-2002 (Cleary-Goldman et al, 2005).

Placental abruption can have serious consequences including fetal death and maternal hemorrhage.

Low Birth Weight

A weight of less than 2500 grams at birth is considered low birth weight. Very low birth weight is a weight of less than 1,500 grams at birth. Women at advanced maternal age are at higher risk for low birth weight and very low birth weight (Statcan, 2006a). In particular, women over age 40 are at a greater risk (Cleary-Goldman et al, 2005).

Canadian statistics show that rates of low birth weight and very low birth weight increase with maternal age:

Age of Mother in Years	Risk for Low Birth Weight	Risk for Very Low Birth Weight
15-19	6.6%	1.3%
20-34	5.6%	0.9%
35-49	6.9%	1.2%

Table 19: Age of Mother and Rate of Low Birth Weight as Percent of Total Live Births, Canada, 2004 (Statistics Canada, 2006a).

Low birth weight is associated with specific conditions in pregnancy including multiple pregnancies, hypertensive disorders in pregnancy, preterm birth and very preterm birth. Some known risk factors for low birth weight include occupational stress in pregnancy and pregnancy achieved through ART (Tough et al, 2002).

Key Points for Service Providers:
Risks in Pregnancy

1. *Women pregnant after age 35 are at increased risk for some prenatal complications.*
2. *For chromosome anomalies, age alone is an important risk factor. This directly impacts the frequency of fetal loss, which also increases with maternal age. The increase in fetal loss over age 35 corresponds with declining fertility.*
3. *Women who are pregnant after age 35 are more likely to have pre-existing hypertension or diabetes.*
4. *Pregnancy after age 35 is also associated with complications of labour and birth. These include increased risk for placenta previa, placental abruption, preterm and very preterm birth, low birth weight and Caesarean birth.*

6.0 Pregnancy After Age 35: Considerations for Emotional Care

Pregnancy after age 35 can be emotionally challenging. This chapter reviews many of the emotional concerns related to pregnancy over the age of 35 and shares strategies that service providers can use when addressing these concerns.

6.1 Emotional Concerns

Women over the age of 35 may have concerns about their fertility or about their ability to parent. They may experience stress if difficult decisions have to be made regarding their fertility and pregnancy. Pregnant women over the age of 35 may worry more because they are more aware of the increased possibility of complications. They may also be concerned because they are more aware of inconsistencies in recommendations. Additional stress is likely to be present in the case of an unintended or mistimed pregnancy, a higher risk pregnancy or low socio-economic status.

The aspects of pregnancy that are significantly impacted by age alone are declining fertility (ICES, 2006), increased chance for fetal loss (Nybo Anderson et al, 2000) and increased risk for chromosome anomalies (Hook, 1981). All require sensitivity and support from service providers.

Fertility

Many women struggle with decisions about the timing of their first pregnancy, balancing concerns about their own declining fertility with issues such as career advancement, economic stability and finding a life partner. Women may make the difficult choice to start a family without a life partner, or to adopt instead of having their own child, in response to the tension of decreasing fertility and the desire to advance their socio-economic status.

Some women over age 35 experience difficulty conceiving, and they often feel that time is running out. Women in this situation may be desperate to conceive a baby and to find answers. Difficulty in conceiving a baby can create feelings of shock, disbelief and helplessness.

Children provide a unique satisfaction and fulfillment for many women.

Fetal Loss

The fetal loss rate is higher for women over age 35, whether they conceive a pregnancy naturally or through ART. For women who have taken some time to conceive, grieving the loss of a highly desired baby may also be accompanied by a desperate desire to conceive again as soon as possible. The process of grieving is very individual. If a woman conceives soon after a fetal loss, this may interfere with grieving the previous perinatal loss.

In the case of multiple births, fetal and infant death rates are much higher. Women may lose one, more or all of their babies, either in the perinatal or postpartum period. If there are survivors, the parents may find it hard to celebrate the life of some babies and mourn for other babies at the same time. As a result, some parents find it difficult to attach emotionally with surviving infants. For women over age 35 who are concerned about their ability to conceive another pregnancy, the loss of one or more babies can be particularly heartbreaking (Best Start, 2005).

Difficult Decisions

Woman may have to make difficult decisions prior to and during pregnancy, which may result in short and long term psychological consequences. Some examples include decisions about the use of donor versus non-donor eggs, decisions about multi-fetal pregnancy reduction in a higher order multiple pregnancy, decisions about whether or not to have diagnostic tests that are associated with increased chance of miscarriage, and decisions about termination of the pregnancy if there are identified congenital anomalies.

The use of donor eggs increases the success rate of ART and decreases the chance for fetal chromosomal anomalies. However, the use of donor eggs in IVF is not always an easy decision for women. Many women find that achieving pregnancy through the use of donor eggs requires a big adjustment to their ideal family plan.

Women who are over 35 are more likely to have a multiple pregnancy. At least 75% of higher order multiple births (pregnancies with 3 or more fetuses) result from ART. Multi-fetal pregnancy reduction aims to increase a woman's chance of a near term delivery of a singleton baby or twins, instead of 3 or more babies, to reduce the risk of maternal and fetal complications. Women who undergo fetal reduction have a higher risk of miscarrying the entire pregnancy. Decisions about multi-fetal pregnancy reduction can be profoundly distressing.

Women who conceive a child with an identified disorder are faced with a series of time-sensitive decisions. In addition to making these difficult decisions, women need to grieve the loss of their dream of a "healthy" baby, in relation to the fetus with an identified disorder. If women choose to terminate the pregnancy, there may be an added dimension of grief, guilt and loss.

Perinatal Mood Disorders

Mood disorders are one of the most common concerns in pregnancy and postpartum. They affect up to 20% of pregnant and postpartum mothers (Ross et al, 2005). While maternal age is not in itself associated with increased risk for postpartum mood disorders, women in this age category have some concerns that are linked with a higher risk. Risk factors with a strong association to postpartum mood disorders include depression or anxiety in pregnancy, history or family history of depression, recent stressful life events and lack of social support (Ross et al, 2005). Health care providers may overlook the possibility of postpartum mood disorders in women who are older, professionally dressed, and appear to have a "successful career".

Social Support

Like all women in the postpartum period, women over age 35 need support. Some women over age 35 have fewer family supports than younger women. This may be related to their geographic distance from their own extended family, or because their parents are elderly, coping with their own changing needs and/or health issues, or perhaps have passed away.

Some women over age 35 who have conceived using ART may find entering prenatal care a difficult transition. In ART, women are seen frequently and are often well supported through regular contact with service providers. Once ART is successful, by 7-8 weeks of pregnancy, women begin regular prenatal care and the client contact is less frequent. Women who have experienced fetal losses or have taken some time to conceive may be looking for reassurance that their pregnancy is going well. They may feel anxious about the shift to regular prenatal care, due to the reduced health care provider contact.

Unintended Pregnancy

The main focus of this manual is women who have chosen to delay their first pregnancy. However, pregnancies in any age group can be unintended. Unintended pregnancies may be a first or subsequent pregnancy. Women with unintended pregnancies may say that they did not want to be pregnant, or that they wanted to be pregnant at a later time. Unexpected or mistimed pregnancies may interrupt previous life plans. Decisions about the pregnancy and about life plans may be stressful.

When confirming a pregnancy, or when a woman initiates a prenatal service or program, it is helpful to ask her how she feels about the pregnancy. Women with unintended or mistimed pregnancies may want to discuss and explore their feelings and options. Women in any age group may choose to terminate an unintended pregnancy, or may choose to place their baby for adoption. Some women feel that their family is already complete and do not feel they have the energy, time, desire or resources to start over with a new baby. It is important not to make assumptions about how a woman feels about her pregnancy or about how she may want to proceed.

Low Socio-economic Status

There are women of low socio-economic status in any age group, and women of advanced maternal age may be struggling with issues such as under-employment and poverty. While the trend towards advanced maternal age appears to be driven by women who want to advance their education and careers prior to starting a family, service providers must recognise that some pregnant women over the age of 35 may benefit most from basic supports such as nutrition programs. For more information on caring for women who live in difficult life circumstances, see the manual "Reducing the Impact", available at: www.beststart.org.

6.2 Responding to Emotional Concerns

Women who are pregnant or planning a pregnancy after age 35 may have psychological needs that can be met in perinatal care or through referrals to appropriate services. Service providers have an important role in supporting women through the difficult aspects of pregnancy after age 35. While emotional concerns are common with advanced maternal age, some women are not open to emotional care and their wishes need to be respected.

"These women want to be seen first of all as mothers, and not as problems."

Key Informant

"Problem Pregnancy"

Women pregnant after age 35 often have an increased appreciation of service providers' efforts to respond to their health concerns (Windridge & Berryman, 1999). However, they want their decision to become pregnant after the age of 35 to be respected, and they do not want to be seen primarily as a "problem pregnancy" (Pers com, 2007). Because of their knowledge, their research prior to becoming pregnant, higher levels of education and career achievement, most women pregnant after age 35 know there are some risks and if anything, need to be reassured.

Sharing Sensitive Information

Communicating sensitive information can be challenging because of the details of the case, the patient's reactions, and the caregivers own reactions, experience and beliefs. Consider the timing, location and circumstances when preparing to impart sensitive information. Ensure privacy, physical comfort and offer tissues. Adequate time for these appointments is critical, as well as a prompt follow-up, in case the woman needs to clarify the information she has received, or is ready to act on available options.

When sharing sensitive information with women, an effort should be made to involve the partner or another supportive individual. Information should be presented in a factual and frank manner. Information may have to be repeated because shock or denial interferes with listening. Ask women what the information means to them. Ask what women are thinking and feeling. Service providers should listen sensitively and answer questions in a factual manner.

Discussion and offering of any options should be in a nondirective manner. Service providers need to show respect for women's choice to accept or refuse further testing or other options based on their own values and goals (Strong, 2003). Service providers can help women by giving the message that they are supported no matter what they decide.

Grieving

There are benefits to having a protocol in place regarding grieving, so that employees recognise the staff roles and process that should be followed in the case of fetal or infant loss.

Referrals

Women dealing with difficult aspects of pregnancy after age 35 need support and information. Some possible partners in supporting women through difficult aspects of pregnancy after age 35 include genetic counsellors, bereavement counsellors, adoption services, organizations for parents of multiples, psychologists, support groups that focus on perinatal loss or infertility, or associations such as Down Syndrome Association.

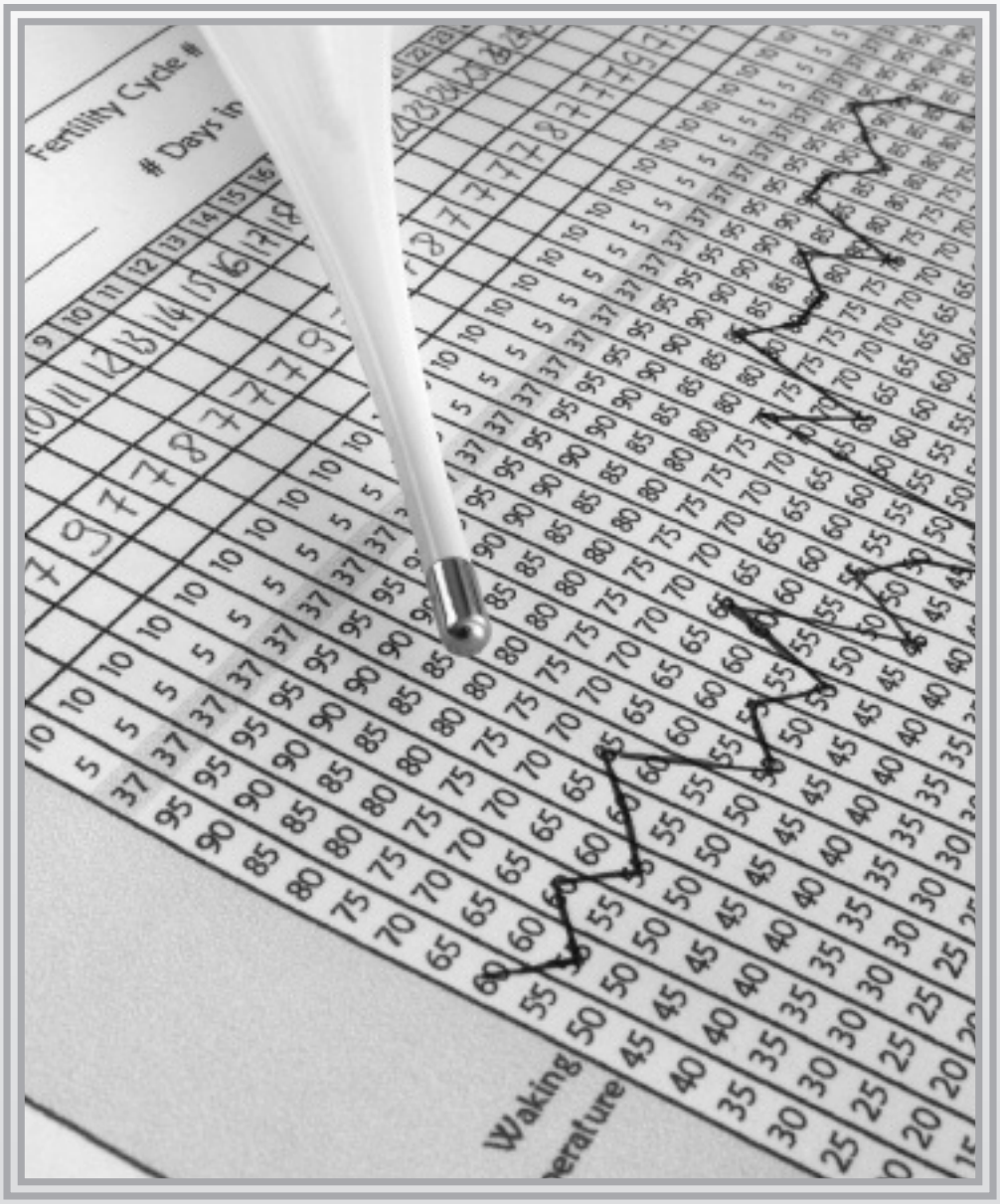
Service providers have a role in encouraging women to attend counselling and in linking women to counselling services and additional resources. Consider the need for service co-ordination and for follow-up care.

Additional Information

- *IAAC Support Groups & Counsellors*, website, Infertility Awareness Association of Canada. (A list of support groups and counsellors specializing in infertility). Available at: www.iaac.ca
- *Perinatal Bereavement Support Services of Ontario*, website. (PBSO facilitates support groups for parents who have experienced miscarriage, ectopic pregnancy, medical termination, stillbirth or neonatal death). Available at: www.pbso.ca
- *Centre for Loss in Multiple Birth* (CLIMB), website. (CLIMB offers support for families losing one, more or all multiple birth babies). Available at: www.climb-support.org
- *How to Obtain Genetic Counselling*, website, Canadian Association of Genetic Counsellors, 2006. Available at: www.cagc-accg.ca
- *Down Syndrome Association of Ontario*, website. (DSAO website includes contact information for local chapters across Ontario). Available at: www.dsao.ca
- *Ontario March of Dimes*, website. (Website provides information on programs and services across Ontario that promote independence for people with physical disabilities). Available at: www.dimes.on.ca
- *Stillbirth and Bereavement*: Guidelines for Stillbirth Investigation, clinical practice guideline, 2006. Available at: www.sogc.org
- *Postpartum Mood Disorders resources*, posters, tear off sheets, brochures, etc., Best Start Resource Centre, 2007. Available at: www.beststart.org
- *Multiple Births Canada*, website. Available at: www.multiplebirthscanada.org

Key Points for Service Providers:
Emotionally Difficult Aspects

1. *Present information in a factual way. Repeat information if needed. Allow sufficient time.*
2. *Ask what the information means to the person involved. Listen with sensitivity.*
3. *Offer options in a non-directive manner. Women need to make decisions based on their own goals and values.*
4. *Make appropriate referrals for counselling.*
5. *Be supportive and non-judgemental as women work through their options.*
6. *Link women to available supports.*
7. *Develop a plan for follow-up.*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7.0 Pregnancy After Age 35: Considerations for Preconception Care

Preconception care is important for all men and women who are planning a pregnancy. It has significant benefits for women over age 35, especially in relation to higher risk of fertility concerns, pre-existing health concerns, teratogenic exposures and chromosome anomalies. The preconception period is an opportunity for the service provider to provide information about how to plan a healthy pregnancy and to determine any potential risks.

The information in this chapter is included for service providers to consider when providing preconception care based on identifying the increased risks or concerns for pregnant women over age 35. It is not a full exploration of all preconception topics or strategies.

Women over age 35 are more likely to present for preconception counselling since they are more likely to plan their pregnancy than younger women.

Some women planning a pregnancy will not access preconception care, and other women will have unintended or mistimed pregnancies, missing the opportunity for preconception care. The information in this chapter can be provided or reinforced during the first prenatal visit.

Additional Information

- *Preconception and Health: Research and Strategies*, online report, Best Start Resource Centre, 2001. Available to order at: www.beststart.org
- *Health Before Pregnancy*, workbook, brochures, posters, etc., Best Start Resource Centre, 2005. Available to order at: www.beststart.org

7.1 Declining Fertility

A survey by Tough, Benzies et al (2006) found that women are unaware of many of the risks of delaying pregnancy until after age 35. However, one exception is that women are usually aware that fertility declines with age (Tough, Benzies et al, 2006). Women may not know that fertility begins a significant decline at age 35 and that the success rate of ART also declines with maternal age.

Service providers have an important role in raising awareness of declining fertility with women in their 30s so that they can make informed choices about planning the timing of future pregnancies.

Conceiving a pregnancy is not the only issue with declining fertility. Fetal loss also increases with maternal age. The decreased chance for conceiving and increased chance of fetal loss combine to make fertility issues a serious concern for women after age 35. Women over age 35 who experience difficulty with fertility have real fears that their last chance for conceiving a baby is quickly slipping away.

"My patients often ask me, "How long can I wait before starting a family?"

Key Informant

The problem of declining fertility should be taken seriously for women who are over age 35. In the preconception period, service providers can collect a detailed health history, measure serum levels of hormones, complete a pelvic ultrasound for a follicle count and an examination of the anatomical structures.

Women over age 35 who have fertility problems should be referred to a fertility specialist earlier than younger women with fertility problems. Women over age 35 should be referred to a fertility specialist, if:

- After 6 months of trying to conceive, pregnancy is not achieved, or
- After experiencing 1-2 fetal losses.

Additional Information

- Guidelines for early intervention by gathering a detailed history, bloodwork, ultrasound and specialist referral. Available at: www.fertility.ca
- *Pregnancy Outcomes After Assisted Reproductive Technology*, clinical practice guideline, SOGC, 2006. Available at: www.sogc.org

Key Points for Service Providers: Declining Fertility

1. ***Ask women in their 30s about their plans for childbearing.***
2. ***Tell women in their 30s that fertility generally starts a significant decline around age 35 and ART success also declines with age.***
3. ***Preconception care for women over age 35 should include a detailed history, basic testing of blood level hormones and an ultrasound with a follicle count to screen for women with declining fertility.***
4. ***Intervene sooner for women over age 35 having difficulty conceiving. Intervention should begin for women over age 35 that have been trying to conceive for 6 months and are unsuccessful, or, have experienced 1-2 fetal losses.***

7.2 Folic Acid for Women at Risk

Health Canada recommends that all women who are of childbearing age take a daily supplement of folic acid to reduce the risk of neural tube defects and other congenital anomalies. This supplementation should start at least 3 months before conception and continue throughout the first trimester of pregnancy (Van Allen, McCourt & Lee, 2002).

It is recommended that women with an increased risk for neural tube defects take a higher dose of folic acid. Women pregnant after 35 are more likely to have pre-existing diabetes (Cleary-Goldman et al, 2005; Joseph et al, 2005). Babies of mothers with pre-existing Type 1 or Type 2 diabetes are at 3 to 4 times higher risk for neural tube defects (Macintosh et al, 2006).

Additional Information

- *The Use of Folic Acid for the Prevention of Neural Tube Defects and Other Congenital Anomalies*, clinical practice guideline, SOGC, 2003. Available at: www.sogc.org

Key Points for Service Providers: Folic Acid

1. ***It is recommended that all women take a daily folic acid supplement, especially in the preconception period and first trimester of pregnancy.***
2. ***Some women over age 35 may be at a higher risk for neural tube defects and will benefit from a higher dose of folic acid.***

7.3 Workplace Reproductive Risks

Women over the age of 35 who are planning a pregnancy should be provided with information about reproductive risks in the workplace, including the effects of long work hours and strenuous work, for example standing more than 4 hours at one time. Encourage women to reduce or eliminate workplace risks where possible.

Women may be able to make significant changes, based on information alone, in their desire to increase their chances of having a healthy term baby. Service providers also need to understand the social, occupational, financial and personal pressure on women to not allow their pregnancy to negatively affect their performance at work. Services providers can advocate for pregnancy friendly workplace policies to better accommodate the needs of all pregnant women.

Additional Information

- *Work & Pregnancy Do Mix*, brochure, Best Start Resource Centre, 2004. Available at: www.beststart.org
- *Workplace Reproductive Health: Research and Strategies*, online manual, Best Start Resource Centre, 2001. Available at: www.beststart.org

Key Points for Service Providers: Workplace Reproductive Risks

1. ***Provide women with information about workplace reproductive risks, and encourage them to reduce or eliminate risks where possible.***
2. ***Recognize that there is pressure on women to not allow pregnancy to negatively affect work performance.***
3. ***Advocate for pregnancy friendly workplace policies.***

7.4 Alcohol Use

Women over age 35 report a higher rate of alcohol use in pregnancy compared to other women (Health Canada, 2003). Women over the age of 35 may drink socially at work functions or with co-workers. Social drinking can influence earnings and opportunities for advancement. Women who drink alcohol with co-workers earn 14% more than those who do not (Moscatello, 2006). Pregnant women may continue to drink alcohol at work functions to conceal pregnancy from work colleagues.

Since there is no known safe level of alcohol exposure at any time in pregnancy, service providers need to address this issue in preconception and early prenatal care. A recent Canadian study found that fewer than 60% of service providers regularly obtain a detailed history of alcohol use in preconception care (Tough, Clarke et al, 2006). In addition, health care providers may be more likely to ask women of low socio-economic status about alcohol use, while neglecting to ask women of higher socio-economic status. It is recommended that service providers ask all women who are planning a pregnancy about their alcohol use, using a screening tool such as T-ACE. Referrals to detox and/or treatment may be required in some cases.

Additional Information

- *Motherisk Alcohol and Substance Use in Pregnancy Helpline*, website, The Hospital for Sick Children. (Provides information to pregnant women and to health care providers about the safety or risk of drugs, chemicals and disease during pregnancy and lactation). Available at: www.motherisk.org
- *Alcohol and Pregnancy*, manuals, desk references, brochures, posters, etc., Best Start Resource Centre. Available at: www.beststart.org
- *Online CME* for physicians and other health care providers about alcohol use and pregnancy. Available at: www.MDcme.ca

Key Points for Service Providers: Alcohol Use

1. ***Alcohol use is more common in pregnant women who are over age 35.***
2. ***Screen all women who are planning a pregnancy for alcohol use.***
3. ***Recommend no alcohol use when planning a pregnancy and during pregnancy.***

7.5 Pre-existing Medical Conditions

Pregnant women over the age of 35 are more likely to present with pre-existing medical conditions, such as hypertension, arthritis, diabetes or breast cancer. The health care provider must assess impact of the medical condition and the associated medical treatments on the future pregnancy.

Prescription Drugs, Over the Counter Drugs (OTC) and Herbal Remedies

As a result of pre-existing medical conditions, women of advanced maternal age are more likely to be taking medications (Cleary-Goldman et al, 2005). Common examples are cholesterol-lowering medications and medications to control the symptoms of arthritis.

Women of advanced maternal age may also be using OTC medications or herbal remedies to manage chronic medical conditions. Women may not know that these may have harmful effects on a developing fetus.

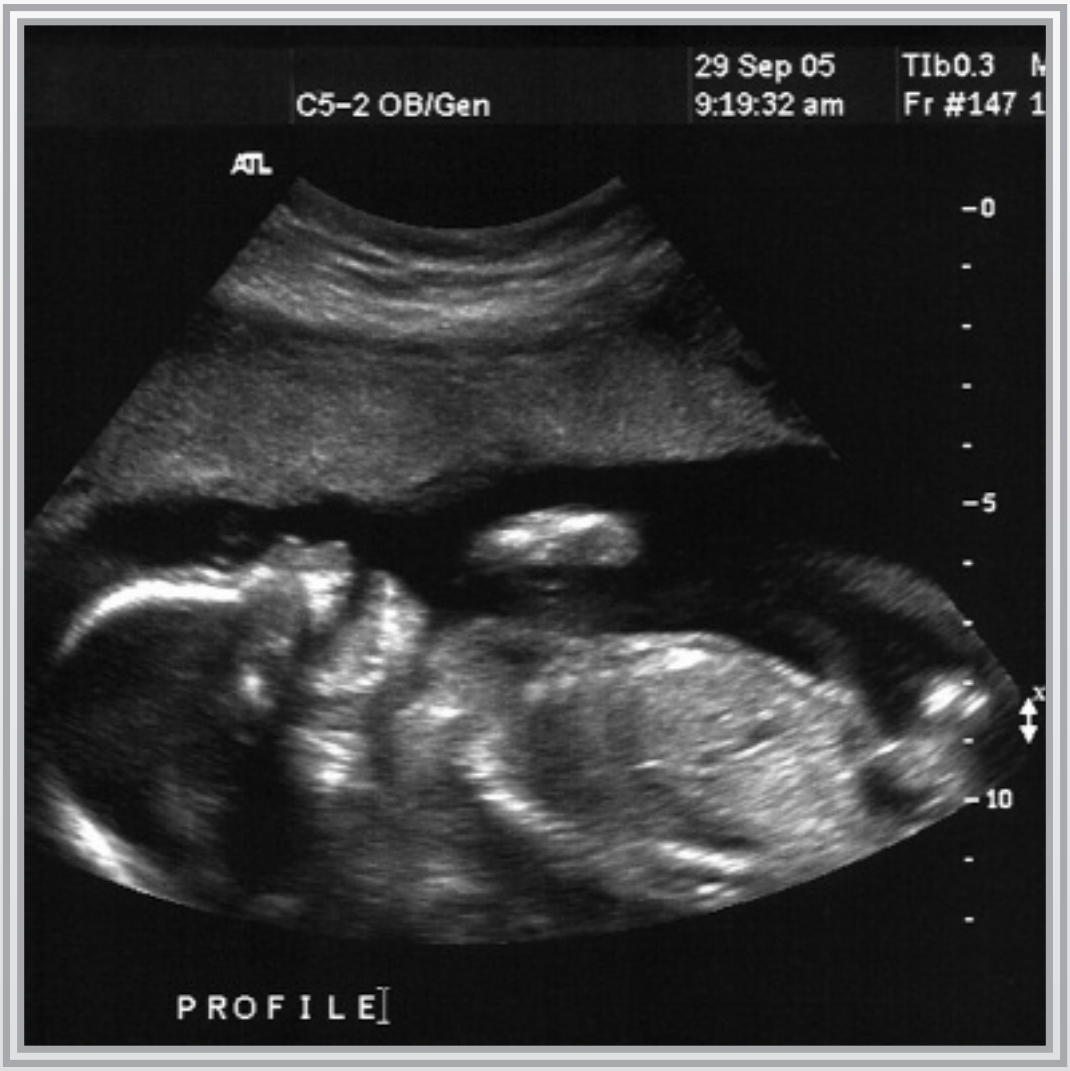
Service providers can work with women to identify possible risks from medications and to reduce, remove or substitute harmful medications as needed.

Additional Information

- *The Motherisk Program*, The Hospital for Sick Children. (The Motherisk Program offers research and counselling on reproductive risks, safety of drugs, and chemicals and maternal diseases in pregnancy. Service providers can access the services of Motherisk in preconception or prenatal care for women with any potential harmful exposures). Available at: www.motherisk.org
- *Organization of Teratology Information Specialists* (OTIS), website. (Offers research studies and fact sheets). Available at: http://otispregnancy.org
- *Breast Cancer, Pregnancy and Breastfeeding*, clinical practice guideline, 2002. Available at: www.sogc.org

Key Points for Service Providers: Pre-existing Medical Conditions

1. ***Pre-existing medical conditions are more common in women after age 35.***
2. ***Use of prescription medications, OTC medications and herbal remedies may be higher in women pregnant after age 35.***
3. ***Ask women about medication use.***
4. ***Reduce, remove or substitute harmful medications as needed.***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8.0 Pregnancy After Age 35: Considerations for Prenatal Care

This chapter covers specific considerations in prenatal care for pregnant women who are over age 35. While the information in this chapter is predominantly medical in nature, all service providers who work with pregnant women can benefit from a review of this information as they may have a role in providing support, referrals or written information.

Some of the preconception information provided in Chapter 7, should be introduced or reinforced in the first prenatal visit, depending on whether or not the woman accessed preconception services.

8.1 Similarities and Differences in Prenatal Care

For the most part, prenatal care is the same for women of all ages. However, there are a few differences, especially in the area of screening tests and diagnostic tests.

Process of Care

Overall, the process of prenatal care for women pregnant after age 35 does not differ from prenatal care for other women. Service providers such as physicians and midwives are guided by Ontario's Antenatal Record and the Antenatal Psychosocial Health Assessment (ALPHA) screening tool. The Antenatal Record and ALPHA tool direct the practice of service providers to standardized prenatal care for all women. With women of advanced maternal age, a service provider might expect to find more risk factors in the medical history and physical exam sections of the Antenatal Record because all women are more likely to develop medical conditions with age. When answering questions on the ALPHA screening tool, women with more life experience might have more to say. In general, prenatal care should be based on personal risk factors identified by the Antenatal Record and ALPHA tool rather than using age alone as a risk assessment.

> *"Service providers need to focus on health assessment not age assessment."*
>
> **Key Informant**

Risk for Pre-existing Health Concerns

While the prenatal care process does not change based on the age of the pregnant woman, the health care provider should expect to spend an increased amount of time on specific health concerns that are more frequent in this population, for example diabetes and hypertension. However, the care provided for each of these concerns would be the same for all pregnant women, regardless of age.

Risk for Prenatal Complications

Women who are pregnant over the age of 35 are at higher risk for many prenatal complications. These include miscarriage, ectopic pregnancy, stillbirth, multiple births, hypertension, placenta previa, Caesarean birth, preterm birth, placental abruption and low birth weight. Each of these complications would be managed in the same manner for all pregnant women, regardless of age.

Risk for Fetal Chromosome Anomalies

The one aspect of prenatal care that does change for women pregnant after age 35 is information and referral regarding chromosome anomalies. Women pregnant after age 35 must be informed that the chance of having a baby with a chromosome anomaly is higher for women over age 35 and they must be offered the option for prenatal screening tests. Prenatal screening tests consider multiple maternal factors including maternal age, to estimate the chance of a chromosome anomaly in the developing fetus. Prenatal screening is offered to all pregnant women. However, women pregnant after age 40 have the option to complete a diagnostic test without completing prior screening tests. The main focus of this chapter is information about the screening tests and diagnostic tests available in Ontario. It is recommended that pregnant women over age 35 access prenatal care early in pregnancy so that they have the option of first trimester screening if they choose to do so.

Cord Banking

Women over age 35 are more likely to access IVF, and their package of services may include the costs of cord banking for private use. There are also public services that store cord blood for public use. The stem cells in cord blood can be used to treat diseases such as leukemia. Cord stem cells are not the same as embryonic stem cells. Pregnant women over age 35 may have questions about cord banking. SOGC has guidelines and patient resources on this topic, see: www.sogc.org

Additional Information

- *Clinical Practice Guidelines*, SOGC, 2007. (A range of SOGC clinical practice guidelines related to specific prenatal complications, as well as screening and diagnostic tests). Available at: www.sogc.org
- *A Guide to the 2005 Revised Ontario Antenatal Record*, online document, Ontario Medical Association, 2005. (Document outlining the revisions made to the Ontario Antenatal Record). Available at: www.oma.org
- *Antenatal Psychosocial Health Assessment* (ALPHA), online Form and Guide, Faculty of Medicine, University of Toronto, 2000. Available at: http://dfcm.utoronto.ca/
- *Pregnancy After 35*, quick references and fact sheets, March of Dimes, 2006. Available at: www.marchofdimes.com
- *Best Start Resource Centre*, a range of patient and provider resources. Available at: www.beststart.org

8.2 Screening Tests

Prenatal screening tests are non-invasive (i.e. they have no direct risks to the mother and baby) and are not diagnostic (i.e., they do not rule in or rule out the condition). The purpose of a screening test is to determine if there is an increased chance for fetal aneuploidy (a fetus with additional or missing chromosomes, for example Down syndrome or trisomy 18) or an open neural tube defect. All women in Ontario, regardless of age, should be offered a prenatal screening test. Women should be made aware of the option to have these screening tests through an informed consent process. To make an informed choice about whether or not to have the tests, women need timely information from service providers about the screening tests.

A screening test takes various factors into consideration and from these variables calculates the individual risk for women to have a baby with Down syndrome, trisomy 18 or an open neural tube defect. Maternal factors include age, weight, ethnicity and the presence of pre-gestational diabetes. Fetal factors include gestational age and the number of fetuses. All of these factors are combined with the levels of maternal serum biochemical markers (either made by the fetus or the placenta) to calculate the woman's individual risk of having an affected baby.

The results of a screening test are expressed in risk categories and as a percent chance. For example, women's test results may indicate an increased risk for having a baby with Down syndrome. This might be expressed as having a "1 in 100 chance" for having a baby with Down syndrome.

Prenatal screening tests are offered to help identify pregnant women who have a higher chance of having a baby with a specific chromosome anomaly or neural tube defect.

Detection Rate and False Positive Rate

All screening tests have a calculated detection rate and calculated false positive rate. They indicate how reliable the test is in screening for the disorder it is meant to identify. The reliability of a screening test increases with higher detection rates and lower false positive rates.

The detection rate (also known as sensitivity) is the proportion of affected individuals that screen positive for the test. The detection rate is usually expressed as a percentage. For example, if a screening test for Down syndrome has a detection rate of 85%, the test is reliable for identifying a fetus with Down syndrome 85% of the time. This means there is 15% chance a fetus with Down syndrome will not be detected by the test.

The false positive rate is the proportion of unaffected individuals that screen positive for the test. For example, if a screening test for Down syndrome has a false positive rate of 5%, this means that for every 100 individuals who have the test, 5 will screen positive. The true positive rate, the proportion of individuals who actually have Down syndrome is much lower.

Sharing Results of Screening Tests

The results of screening tests can be confusing and may cause a significant amount of concern for expectant parents. Service providers in prenatal care can address these concerns by explaining the purpose of screening tests and the relevance of the results.

Expectant parents should be prepared by the service provider for the possibility that a screening test could come back with a "screen positive result". A screen positive result indicates that the individual's estimated risk is higher than the expected risk and there is an increased chance for the fetus to have Down syndrome, trisomy 18 or an open neural tube defect.

Because the false positive rate of screening tests is much higher than the true positive rate, many more women will screen positive than the actual number of women with an affected baby. Tests with lower false positive rates are preferred because of the anxiety that screen positive results can generate for pregnant women (Carroll et al, 1997).

For expectant parents that screen positive, service providers can relieve some concern by re-stating that a positive screen is not a diagnosis, only an identification of increased risk. The results of the test can be expressed in an alternate way to reassure expectant parents. For example, if a positive screen result estimates a "1 in 100 chance" for a baby with a chromosome anomaly, the results can be alternately expressed as having a 99% chance of having a healthy baby, or a 1% chance for an affected baby.

Women who screen positive can be referred to genetic counsellors to discuss their options for further testing. Their choice may be to have no further testing, or to undergo specific tests. Genetic counselling is a nondirective, educational and support process. The etiology, inheritance, risk, testing options and medical/psychological/social implications of a genetic anomaly are discussed in a balanced way that helps women make informed choices that are right for them. When talking to women about the chance of having a child with a specific disability, service providers should show respect for the needs and quality of life of individuals with disabilities.

Screening Options

Women's options for prenatal testing may be limited by gestational age and their geographical location in Ontario. The options for prenatal screening tests in Ontario can be categorized as first trimester screening tests, second trimester screening tests and two-step integrated prenatal screening tests which include first and second trimester screening. Each of these will be described in the next section.

Additional Information

- *Ontario Multiple Marker Screening* (MMS) *Program*, website, London Health Sciences Centre. Available at: www.lhsc.on.ca
- *Canadian Association of Genetic Counsellors*, website. Available at: www.cagc-accg.ca
- *Fetal Alert Network*, website. (Website provides information on finding a Genetics Centre or fetal medicine centre in Ontario). Available at: www.fetalalertnetwork.com
- *Congenital Anomalies in Canada: A Perinatal Health Report*, online report, Canadian Perinatal Surveillance System, 2002. (Information about risk factors, prevalence and prevention of common congenital anomalies). Available at: www.phac-aspc.gc.ca
- *Prenatal Screening for Fetal Aneuploidy*, clinical practice guideline, SOGC & Canadian College of Medical Geneticists, 2007. Available at: www.sogc.org

Key Points for Service Providers: Screening Tests

1. ***Explain to women that screening tests are not the same as diagnostic tests.***
2. ***Screening tests estimate the chance that a fetus may have for Down syndrome, trisomy 18 or open neural tube defects based on a number of risk factors. Tests with the highest detection rates and the lowest false positive rates are the most reliable.***
3. ***Women need timely information about screening tests and enough time to make an informed decision about whether or not to have a screening test.***
4. ***Women who choose to have screening tests need preparation for the possibility of a positive screen.***
5. ***For women who have screen positive results, re-stating the results in an alternate way can offer reassurance. For example, a "1 in 100 chance" of an affected baby means a 99% chance for a healthy baby.***
6. ***Women with screen positive results can be referred for balanced genetics counselling.***
7. ***When talking to women about the risk of having a child with a specific disability, do so in a way that respectful of individuals with disabilities.***
8. ***Counselling should be non-directive and should not be framed from the provider's personal beliefs.***

8.3 First Trimester Screening Tests

The screening tests available in the first trimester give women results earlier in pregnancy. For women who screen positive, the early results give women more time to receive balanced genetic counselling, complete a diagnostic test, or to meet with a specialist to discuss a specific fetal condition. Some women may choose to have an early termination of pregnancy.

A significant challenge with respect to first trimester screening is that the tests are performed as early as the 11th week of pregnancy. This requires a change in practice for many providers. The completion of the steps in each test is very time sensitive. Therefore, women need to visit a service provider very early in pregnancy, as early as 6-8 weeks gestation, to take advantage of first trimester screening tests. At the first prenatal visit the service provider needs to discuss screening tests through an informed consent process. Women then need to make a timely decision about whether to have the test in order to allow the service provider to coordinate with the testing facility. This may be a particular challenge for women without a family physician or women who are waiting for a first appointment with a prenatal service provider. If the first prenatal appointment is close to or after the 13th week of pregnancy, the only remaining screening option is a second trimester screening test.

Results from first trimester screening tests are available earlier in pregnancy.

First trimester screening tests combine results from nuchal translucency with the collection of maternal serum markers.

Nuchal Translucency (NT)

NT is an ultrasound examination, which measures the amount of fluid behind the neck of the developing fetus. NT is completed as one aspect of a screening test protocol that also includes measurement of serum markers. NT without serum biochemistry should not be offered as a screening test (SOGC, 2007).

NT is measured in the first trimester between 11 weeks, 0 days and 13 weeks, 6 days. The NT measurement is used primarily to assess the chance of Down syndrome. NT screening has a detection rate for Down syndrome of 69 to 75% with a false positive rate of 5 to 8% (SOGC, 2007)

NT measurements that are larger than 3.0 or 3.5 mm (depending on the testing facility) indicate a fetus that has an increased chance of chromosome anomalies and other congenital anomalies, especially congenital heart defects. A fetus with a normal karyotype but an increased NT measurement measured between 11 to 14 weeks gestation is at an increased risk for a major cardiac defect. In most cases, a fetal echocardiogram is recommended (SOGC, 2007).

The use of NT without measurement of serum markers is recommended to screen for Down syndrome in multiple gestation pregnancies (SOGC, 2007). This is because blood serum markers are not a reliable estimate of the chance for Down syndrome in a pregnancy where there is more than one fetus. In multiple pregnancies with monochorionic twins, NT is also useful to determine the risk of Twin-to-Twin Transfusion Syndrome (TTTS). To estimate the chance for Down syndrome with monochorionic twins, the NT measurements are averaged to give one estimated risk for both of the identical twins. For dichorionic twins, the majority of which are dizygotic, NT measurements are interpreted as they are for singleton pregnancies and each fetus is given a separate estimated chance for Down syndrome. Maternal age combined with NT measurement, can detect 75% of Down syndrome cases with a 5% false positive rate (SOGC, 2007).

Availability of NT is limited to some areas of Ontario. Since the NT measurement is in millimetres, it is difficult to measure with accuracy. NT screening requires highly specialized sonographers and sonologists who have been trained and are accredited to complete NT measurements and undergo ongoing quality assurance monitoring (SOGC, 2007).

Additional Information

- *The Use of First of Trimester Ultrasound*, clinical practice guideline, SOGC, 2003. Available at: www.sogc.org

Key Points for Service Providers: Nuchal Translucency and Down syndrome

1. ***Nuchal translucency (NT) is one aspect of first trimester screening protocols. Risk is usually estimated by combining the estimated risk from NT measurement with the estimated risk from measurement of maternal serum markers.***
2. ***NT without measurement of maternal serum markers is the most accurate screening test for Down syndrome in multiple pregnancies.***

First Trimester Screening (FTS)

FTS consists of one blood test and an NT ultrasound. FTS is useful to determine fetal risk for Down syndrome and trisomy 18. It does not screen for neural tube defects.

There are 2 steps to the test:

1. The blood test is done between 11 weeks, 0 days and 13 weeks, 6 days of pregnancy. The biochemical markers used to calculate risk include pregnancy associated plasma protein A (PAPP-A) and free-beta human chorionic gonadatropin (free B-hCG).
2. The NT ultrasound is completed between 11 weeks, 0 days and 13 weeks, 6 days gestation.

FTS calculated by using maternal age, NT, PAPP-A, and free B-hCG will detect 83% of Down syndrome cases (SOGC, 2007). This means that 17% of fetuses with Down syndrome will not be detected by FTS.

FTS has a false positive rate of 5% (SOGC, 2007). This means that for every 100 women who have FTS, 5 will screen positive. However, the actual number of fetuses with Down syndrome is much lower than 5%. Most women who screen positive on the FTS will have a healthy baby.

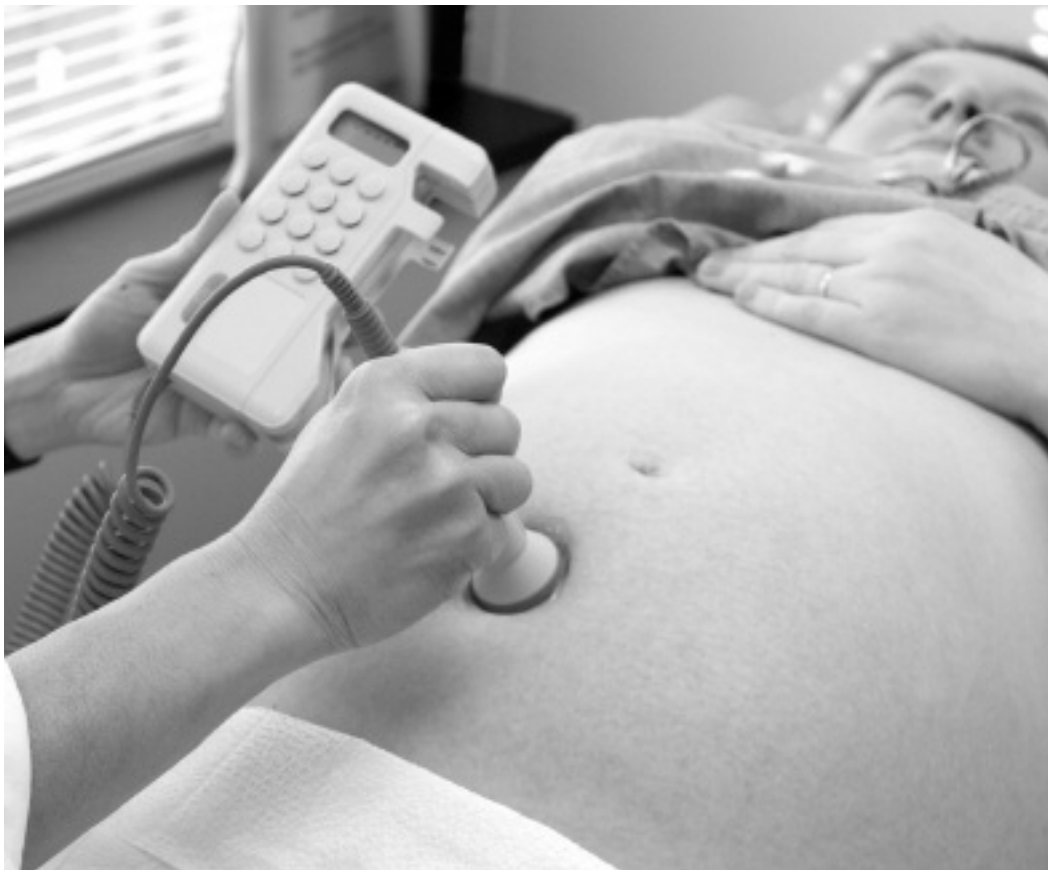
The advantage of FTS is that women receive results earlier in pregnancy compared to other screening tests. The tests are completed between the 11th-13th weeks of pregnancy and results are usually available within 2 weeks. This means women can have the results of FTS by 13-14 weeks of pregnancy. This allows the option of earlier diagnostic testing via chorionic villus sampling (CVS).

A disadvantage of FTS is that the test does not screen for open neural tube defects. A follow-up screening test that measures maternal serum alpha feto protein (AFP) is completed between 15-22 weeks gestation. A fetal anatomy ultrasound completed between 18-20 weeks gestation can also determine the risk for an open neural tube defect.

Another disadvantage of FTS is that women in certain areas in Ontario may have limited access to NT screening. In addition, access to CVS diagnostic testing may also be limited to certain parts of Ontario.

Key Points for Service Providers:
First Trimester Screening

1. *The First Trimester Screening test (FTS) combines NT with the measurement of maternal serum markers.*
2. *FTS has the advantage of results early in pregnancy, 13-14 weeks gestation.*
3. *NT and serum markers for the FTS have to be completed by 11 weeks, 0 days and 13 weeks, 6 days of pregnancy. This requires an early visit with a service provider.*
4. *FTS does not screen for open neural tube defects. A follow-up screening test measuring maternal serum AFP is recommended between 15-22 weeks gestation.*



8.4 Second Trimester Screening Tests

Second trimester screening tests include triple and quadruple maternal serum screening. An ultrasound scan of fetal anatomy can also serve as a screening test.

Second trimester maternal serum screening tests are useful for women who have initiated prenatal care too late for tests that require first trimester ultrasound or blood testing.

Triple and Quadruple Maternal Serum Screening (MSS)

MSS screening is useful for determining risk for Down syndrome, trisomy 18 and open neural tube defects. The MSS screening test consists of 1 blood test done between 15-22 weeks gestation.

The MSS triple screen measures 3 maternal biochemical serum markers: Alpha fetoprotein (AFP), human chorionic gonadotrophin (hCG) and unconjugated estriol (uE3). With a detection rate for Down syndrome of 71% and a false positive rate of 7%, this test is not recommended for use by service providers (SOGC, 2007).

The MSS quadruple screen (Quad screen) consists of the same 3 markers from the triple screen but adds a 4th marker, dimeric inhibin-A (DIA). The addition of DIA improves the detection rate and lowers the false positive rate compared to MSS triple screen.

The Quad screen has a detection rate for Down syndrome of 77% (SOGC, 2007). This means that there is a 23% chance a fetus with Down syndrome will not be identified by the test. There is a 5% false positive rate (SOGC, 2007). This means that for every 100 women who take the test, 5 will screen positive. The majority of those who screen positive will not have a baby with Down syndrome.

The advantage of Quad screening is that women who present late for prenatal care can still have prenatal screening. Disadvantages of Quad screening compared to FTS are the lower detection rate and results are received later in pregnancy. Results are usually available 2 weeks after the test. This means women may receive the results of Quad screening between 17-22 weeks of pregnancy.

The biochemical markers measured in the second trimester serum screen are also useful to predict complications in pregnancy. If AFP is elevated (> 2.0 Multiples of the Median (MoM) or 2.5 MoM) in a pregnancy with a normal fetus, the elevated markers can help predict the conditions of IUGR, PROM, preeclampsia, preterm labour and preterm birth (Dugoff, Saade & Malone et al, 2003).

Fetal Anatomy Ultrasound

An ultrasound of fetal anatomy between 18 and 20 weeks of gestation is regarded as standard practice. The anatomic scan is recommended by the SOGC (SOGC, 2005).

The anatomy scan at 18 to 20 weeks gestation is useful for detecting:

1. Major fetal structural anomalies such as neural tube defects, heart defects and abdominal defects. This scan can detect many minor anomalies such as cleft lip and limb deformities. The ultrasound is also useful for assessment of placental location and amniotic fluid volume. Not all abnormalities can be detected with an 18 to 20 week scan.
2. "Soft markers" which are associated with an increased risk for Down syndrome. However, soft markers are ultrasound findings that are often not anomalies, but variations of normal. Therefore, these markers are not useful as a screening test on their own but can be correlated with other risk factors such as maternal age and prior screening results (SOGC, 2007).

Boutique Ultrasounds

Ultrasounds are available on a commercial basis to women who want to know the gender of their fetus and/or have video pictures of the fetus. SOGC feels that while ultrasounds are useful for medical purposes, they should not be used for non-medical purposes such as sex determination, non-medical photos or videos, or for commercial purposes. For more information, see the SOGC Guideline, 2005, Obstetric Ultrasound Biological Effects and Safety, www.sogc.org

Additional Information

- *Diagnostic Imaging*, a number of clinical practice guidelines, SOGC, 2005. Available at: www.sogc.org

Key Points for Service Providers: Second Trimester Screening

1. ***The Quad MSS screen is useful for women who have presented for prenatal care after the gestational dates for screening that incorporates first trimester serum sampling or NT ultrasound.***
2. ***Serum markers from blood testing in the second trimester, either during the second portion of the IPS or during Quad screening are also useful in predicting pregnancy complications.***
3. ***A fetal anatomy ultrasound between 18 and 20 weeks is also useful for detecting major and minor fetal anomalies and some complications in pregnancy.***

Integrated prenatal screening tests combine the first and second trimester screening tests for improved performance.

8.5 Two-Step Integrated Screening Tests

Two-step integrated screening tests involve testing in both the first and second trimesters. The integrated screening tests can be completed with or without the use of NT ultrasound. The advantage of the two-step integrated screening test is the increased accuracy achieved by testing in both the first and second trimesters of pregnancy.

One potential difficulty with the test is that the first trimester portion of the test needs to be completed by the end of the 13th week of pregnancy. This means women need to have a visit with, and referral from a service provider early in pregnancy.

Integrated Prenatal Screening (IPS)

Integrated Prenatal Screening (IPS) combines the NT and first trimester serum screen with the second trimester triple or quad screen. The results determine fetal risk for Down syndrome, trisomy 18, trisomy 13 and open neural tube defects. There are 3 steps to this test:

1. The first blood test is done between 11 weeks, 0 days and 13 weeks, 6 days gestation. One biochemical marker is measured: PAPP-A.
2. The NT ultrasound is completed between 11 weeks, 0 days and 13 weeks, 6 days gestation.
3. A second blood test is completed between 15-22 weeks gestation. Three biochemical markers are measured: AFP, uE3 and hCG. This test may or may not also include the measurement of a fourth biochemical marker, (DIA).

The detection rate for Down syndrome with IPS is approximately 87% (SOGC, 2007). This means that if a fetus has Down syndrome there is a 13% chance the test will not detect it.

The IPS has a 2% false positive rate if completed with DIA measurement. Without DIA, the false positive rate increases to approximately 3% (SOGC, 2007). The majority of women with positive screens will have a healthy baby.

The advantage of the IPS is its improved performance in the detection and false positive rates, which means that fewer women will receive a false positive result. The disadvantage of IPS is that it is not completed until approximately 17 to 22 weeks of pregnancy and therefore results are received later in pregnancy. This means women have less time to receive balanced genetic counselling, complete a diagnostic test, and if chosen, terminate a pregnancy.

Serum Integrated Prenatal Screening (Serum IPS)

If a NT measurement is not available, an IPS risk can be generated by using maternal serum only (Serum IPS). Serum IPS consists of 2 blood tests. The results will determine fetal risk for Down syndrome, trisomy 18 and open neural tube defects. There are 2 steps to this test.

1. The first blood test is done between 11 weeks, 0 days and 13 weeks, 6 days gestation. One maternal serum marker is measured: PAPP-A.
2. A second blood test is completed between 15-20 weeks gestation. Three maternal serum biochemical markers are measured: AFP, uE3 and hCG. A fourth maternal serum marker may also be measured, DIA.

The detection rate for Serum IPS is 85% (SOGC, 2007). This means that if a baby has Down syndrome there is a 15% chance the test will not detect it.

The Serum IPS has a 4% false positive rate (SOGC, 2007). This means that for every 100 women who have the IPS test, 4 will have a screen positive result. Women with screen positive results may choose to have balanced genetic counselling and diagnostic testing. The majority of women with positive screens will have a healthy baby.

One advantage of the Serum IPS is its potential for use in areas where there is limited or no access to NT screening. A disadvantage of Serum IPS is the increased gestational time needed to complete the test. Although results are generally available within 2 weeks, the later time at which the blood test is completed means women may receive the results of Serum IPS at 17-22 weeks gestation.

Additional Information

- *Ontario Multiple Marker Screening* (MMS) Program, website, London Health Sciences Centre. (Information about Ontario Multiple Marker Screening Program). Available at: www.lhsc.on.ca
- *The Prenatal Diagnosis and Medical Genetics Program*, information brochure, Mount Sinai Hospital, 2004. Available at: www.mtsinai.on.ca
- *Fetal Alert Network*, website. (Website provides information on finding a Genetics or fetal medicine centre in Ontario). Available at: www.fetalalertnetwork.com

Key Points for Service Providers: Two-Step Integrated Screening Tests

1. ***The IPS improves performance by combining first and second trimester screening tests.***
2. ***Women need to complete the NT and the first maternal serum test between 11 weeks 0 days and 13 weeks, 6 days of pregnancy. This requires an early prenatal visit with a service provider.***
3. ***IPS and Serum IPS results are received later in pregnancy compared to first trimester screening tests (17-22 weeks gestation).***
4. ***IPS and Serum IPS include screening for open neural tube defects.***

8.6 Diagnostic Tests

Women who screen positive may choose to have a diagnostic test. Unlike a screening test which estimates risk, diagnostic tests can confirm the presence of a specific chromosome anomaly. Diagnostic tests rely on testing a sample of amniotic fluid or chorionic villi to analyze the chromosomes of the fetus.

Diagnostic tests indicate the presence of specific chromosomal anomalies.

By analyzing the amniotic fluid or chorionic villi, the fetal karyotype (number of chromosomes) is determined. The most common chromosome anomalies associated with advanced maternal age involve the presence of an extra chromosome. These include Down syndrome (trisomy 21), trisomy 18, trisomy 13 and sex-chromosome disorders such as Klinefelter syndrome. Of these, Down syndrome is the most common. There are many other chromosome anomalies such as small pieces of extra or missing chromosome material that may be overlooked on routine karyotyping. The implications of complex chromosome rearrangements for the fetus are not always known. Even though diagnostic tests can detect chromosome anomalies, the tests may not be able to indicate how severely the fetus is affected. In addition, diagnostic tests cannot detect every possible fetal anomaly. This distinction is especially important when it comes to structural abnormalities, like club feet that occur in a chromosomally "normal" baby.

The probability of conceiving a fetus with a chromosome anomaly increases with maternal age. At maternal age 40, age alone is a factor that can be used as a screening test. Therefore, women over age 40 should be given the option, with informed consent, to complete a diagnostic test without the first step of a non-invasive screening test. Women over age 40 should be counselled to complete a non-invasive screening test to more accurately assess their risk before deciding on a diagnostic test because of age alone (SOGC, 2007).

The prenatal diagnostic tests available in Ontario are amniocentesis and chorionic villus sampling (CVS). Women's access to these diagnostic tests may be limited by gestational age and available facilities in her geographical area. Results from diagnostic tests can take up to 4 weeks.

Amniocentesis

Amniocentesis for fetal karyotyping is usually performed between 15 and 22 weeks gestation. In later stages of pregnancy, amniocentesis may be performed for other reasons, such as to assess fetal lung maturity.

Guided by ultrasound, a needle is inserted into the amniotic sac and a small amount of amniotic fluid is withdrawn. The fluid contains cells from the fetus which are used for karyotyping. The fluid can also be used to identify other problems such as an open neural tube defect. Other tests can be performed on the genetic material (i.e. genetic testing for cystic fibrosis) or on the amniotic fluid (i.e. testing for biochemical diseases). Amniocentesis does not detect every possible fetal anomaly.

SOGC recommends that service providers in Ontario offer women the option for amniocentesis when:

1. A prenatal screening test is screen-positive for aneuploidy or open neural tube defect, or,
2. The mother is age 40 years or older, or,
3. There is a strong family risk factor for a specific genetic disorder.

The advantage of amniocentesis is that it is the safest and most accurate diagnostic test for chromosome anomalies. The major disadvantage of amniocentesis is that results may take 2-3 weeks and are generally not available until 17-20 weeks gestation (SOGC, 2001). There are risks associated with amniocentesis (SOGC, 2001):

1. Fetal loss after amniocentesis is typically estimated at 1 in every 100-200 procedures.
2. Infection introduced by amniocentesis is estimated at 1-2 in 3000 procedures.
3. Fetal injury is rare and usually limited to the skin.
4. Minor complications such as bleeding, cramping and leakage of amniotic fluid occur after an estimated 1-5 in 100 procedures.

Amniocentesis is generally available at hospitals in Ontario that have genetic counselling clinics.

Chorionic Villus Sampling (CVS)

CVS is performed after 10 weeks, and up to 13 weeks gestation. Timing may vary depending on the centre performing CVS. Two methods are available for completing CVS: transcervical and transabdominal. In the transcervical method, a thin biopsy catheter or forcep is guided by ultrasound and inserted through the cervix and into the placenta. The transabdominal method uses a thin needle guided by ultrasound and inserted through the abdomen into the placenta. A small piece of tissue, or villi, is removed from the placenta. The genetic material in the villi is used to analyze the fetal chromosomes.

A service provider may offer CVS in prenatal care when:

1. There is a screen positive result on the FTS test, or,
2. The mother is age 40 or older, or,
3. There is a strong family risk factor for a specific genetic disorder.

The major advantage CVS has over amniocentesis is the earlier gestation at which the test can be performed. This means women will have definitive results earlier in pregnancy.

There are several disadvantages to CVS (SOGC, 2001).

1. CVS does not test for open neural tube defects. Second trimester serum sampling and/or ultrasound is recommended to screen for neural tube defects.
2. The chromosomes in the chorionic tissue may not be reflective of the fetal chromosomes. This occurs with approximately 1% of CVS samples. Women may then be recommended to have an amniocentesis, which then introduces the risks associated with amniocentesis.
3. Fetal loss is estimated at 1 to 2 in every 100 procedures.
4. There is a risk for limb or facial anomalies in the fetus if CVS is done before 10 weeks gestational age.
5. There is a narrow window for performing CVS.

CVS is not widely available at Ontario hospitals or genetic centers.

Genetic Pre-implantation Test

In some ART clinics it is now possible for women undergoing IVF to choose to have the embryos tested for chromosome anomalies prior to implantation in the uterus.

Additional Information

- *Techniques for Prenatal Diagnosis*, clinical practice guideline, SOGC, 2005. Available at: www.sogc.org
- *Fetal Alert Network*, website. (Website provides information on finding a Genetics or fetal medicine centre in Ontario). Available at: http://www.fetalalertnetwork.com/

Key Points for Service Providers: Diagnostic Tests

1. ***Diagnostic tests karyotype the fetus to identify chromosome anomalies.***
2. ***Women who screen positive on screening tests, or women pregnant after age 40 may choose to have a diagnostic test.***
3. ***Since CVS is completed in the first trimester of pregnancy, early discussion is required in order for women to make an informed decision about CVS.***
4. ***Diagnostic test results are specific and women and their partners need to be prepared for the results.***
5. ***Women need to be informed of the risks specific to each diagnostic test.***

9.0 Pregnancy After Age 35: Preparation for Parenting

The needs of new parents who are over 35 should be considered when planning services related to parenting. Older first time mothers may experience transition to parenting differently than younger first time parents. There are unique stressors for older first time mothers arising from higher perception of risk for the baby, lower levels of confidence, high expectations of motherhood, and transition from the work environment, all of which can affect the transition to parenting. This chapter includes information about some of the differences in transition to parenting for women over the age of 35, as well as information about how to support this transition.

Women over the age of 35 can experience some difficulties in their transition to parenthood.

Perception of Risk

Women who have delayed parenting and recognize that their reproductive years are coming to an end, have even more reasons to think of their baby as precious and irreplaceable. Women over the age of 35 tend to research and prepare for parenting and are more aware of possible concerns for the baby. Women over age 35 are more likely to believe their baby's life could be at risk (Health Canada, 2005).

Work and Social Support

Women over age 35 may lack social support in the postpartum period. They may have well established work networks, but few social supports related to their new role as parents. Women over age 35 may be accustomed to regular social interaction with friends, but these connections can be limited while parenting a new infant. Women who have been in the workforce for a long period of time may miss the challenges of work, the social connections and the sense of satisfaction they felt on the job. They may move from feeling knowledgeable and confident in their work environment, to feeling not at all confident or competent as new parents. Being at home full time with a new baby may be isolating. Women over age 35 may not have the support of family because of geographic distance, or because their parents are elderly, ill, or have passed away. Only 28% of parents over the age of 35 relied on their parents for childcare, as compared to 87% for younger first-time parents (Invest in Kids, 2002).

Realities of Parenting

Women over the age of 35 may eagerly anticipate their role as a mother and may have high expectations of themselves as a parent. A high level of preparation does not fully prepare women for the reality of caring for a new infant. For most women, early parenting brings joy and satisfaction, however, the postpartum period is also characterized by unpredictable demands, disorder and fatigue. The challenges of parenting an infant can cause anxiety for women who are accustomed to being in control. Parenting multiples can bring more stress and challenges. In addition, women over age 35 may be in the "sandwich generation", caring for aging parents while simultaneously caring for young children.

Confidence in Parenting

A study of Canadian parents compared older first time parents to younger first time parents in a number of areas and found many interesting trends (Invest in Kids, 2002). In particular, the high levels of information seeking behaviour in older first time parents did not equate with higher levels of confidence in parenting. Also, parents over age 35 placed a higher value on parenting and the early years, and showed higher rates of many positive parenting behaviours. As compared to younger first time parents, first time parents over the age of 35 were:

- Less confident in their knowledge of factors influencing healthy child development
- Less confident in their parenting ability
- More likely to rate parenting as the most important thing they can do
- Equally likely to rate parenting as enjoyable most of the time
- Less likely to feel they spent enough time with their children

Supporting the Transition to Parenting

Service providers have a role to play in helping to prepare women and their partners for parenthood. Parents want what is best for their children and planning for parenthood starts before pregnancy. Service providers can ask women about their "family plan" related to the number and timing of children. If they indicate that they want to be parents, service providers can stress the importance of health assessment and healthy choices prior to conception, as well as the importance of early prenatal care, early prenatal classes and parenting services.

During prenatal care, ask about the support systems women have in place for the postpartum period. Prenatal classes can help women develop social connections with other expectant parents. Service providers can share information about the transition to parenting and can encourage women and their partners to attend programs that provide parenting information and social support. Indicate that parenting programs are beneficial to all parents. Service providers can provide information about specific local parenting workshops, drop in centres, parenting groups etc., as these may also be useful in the transition to parenting. Find out about any parenting programs with services specific to parents over age 35.

Children with Special Needs

Pregnant women over the age of 35 may know in advance that they will have a child with special needs, or this may be an unexpected outcome at birth. If women give birth to a child with special needs at an advanced maternal age, they may blame themselves for putting the child at risk by delaying the pregnancy or for the choices they made during pregnancy. The special needs of the child, and the feelings of the parents, can impact the attachment process. It is important to assess the needs of the whole family and to offer support and referrals to appropriate services.

Concerns in Early Parenting

It is important to identify women early who have high expectations of themselves as mothers, lower satisfaction with parenting or inadequate social supports, to allow for early and appropriate intervention. Consideration should also be given for the possibility of postpartum mood disorders (see the Chapter 6).

Additional Information

- *Public Health Units*, website, Ontario Ministry of Health and Long-Term Care. (Locate a public health unit in Ontario). Available at: www.health.gov.on.ca
- *Ontario Early Years Centres*, website, Ontario Early Years. (Locate an Ontario Early Years Centre). Available at: http://ontarioearlyyears.ca

Key Points for Service Providers: Preparation for Parenthood

1. ***Ask women about the supports they have in place for the postpartum period.***
2. ***Encourage women to attend early prenatal classes.***
3. ***Provide information about parenting programs and services for families with young children.***

10.0 Pregnancy After Age 35: Looking Forward

The trend of increased average maternal age is expected to continue. The increased prevalence of pregnancies over age 35, and the unique needs of this population, have implications for service providers who work with pregnant women and the health care system in Ontario. This chapter reviews some of these implications.

Preconception and Prenatal Care

This population has distinct concerns, opportunities and health risks. Women who are pregnant over the age of 35 can benefit from care that is tailored to their needs. While most prenatal practices remain the same with this population, an understanding of issues related to advanced maternal age can help improve the services provided to women in this population.

Each service provider who works with pregnant women can make a difference. Even a few small changes such as understanding the context of pregnancy after age 35, providing print information or knowing when and where to refer women for additional care and support can have a significant impact on an individual woman's experience in prenatal care. There are specific roles for medical and non-medical providers. All providers can benefit from an understanding of the social context, risks, opportunities and strategies for women who are pregnant or considering a pregnancy after age 35. Non-medical staff can consider strategies for advanced maternal age such as having books available for loan to women, distributing brochures or fact sheets to interested women, developing a referral list of local services, or finding out where women can get more information.

It is recommended that all service providers who work with pregnant women learn more about the specific needs of pregnant women over the age of 35. This manual provides information and strategies that directly address the health concerns of this population. Additional training for prenatal care providers may also be beneficial.

Preconception care has advantages for all women planning a pregnancy. Women who are planning a pregnancy over the age of 35 can benefit from preconception services because of their higher risk of fertility concerns, pre-existing health concerns, teratogenic exposures and chromosome anomalies. Women over the age of 35 should be referred early to a fertility specialist if fertility problems become apparent.

It is recommended that all pregnant women access prenatal care early in pregnancy. For women over age 35, this is especially important, to ensure that they have the option of first trimester screening, and early intervention for possible health concerns.

To improve access to preconception and prenatal care for advanced maternal age, 3 things need to be in place:

- Women over the age of 35 need to be aware of the benefits of preconception care and early prenatal care.
- Health care providers need to make preconception care and early prenatal care a priority for this population.
- The health care system needs to have the capacity to accommodate these services.

Social Cost

Health care providers should respect women's decisions about the timing of their pregnancies. However, it is important to observe birth trends and to understand and prepare for their effects. There are social costs to advanced maternal age. The increasing trend towards higher average maternal age implies higher health care costs due to a higher risk of perinatal complications, increased demand for prenatal testing and ART, more multiple births, neonatal care for low birth weight infants and more children with immediate and long-term health and learning problems.

With an understanding of the trend towards increased average maternal age comes an obligation to consider strategies to support women in having the healthiest pregnancy possible, regardless of age. Health promotion and prevention strategies designed to reduce the risks have a positive impact on women and their growing families, and are often successful in reducing associated health care costs. Health care providers are encouraged to consider changes that they can make in their practices and programs, as well as at a broader level, in response to the growing trend of advanced maternal age.

Policy

Changing birth trends also have implications for policy-makers. Current policies need to be assessed or further developed to reflect this growing demographic and their unique needs for responsive, co-ordinated and supportive services. New policies in Ontario regarding the use of screening and diagnostic tests have direct implications to advanced maternal age. Pregnancy friendly employment policies, at the federal, provincial or individual workplace level, help to support all women in having the healthiest pregnancy possible, and may also make women feel that they have more choice in the timing of their pregnancies.

Research

Although information is available about the increased age of first childbirth and increased number of women giving birth after age 35, statistics are lacking in some areas. We need more information about the health risks and benefits of late maternal age. This information has important considerations for the physical and mental health of women over 35 in pregnancy and parenting. In addition we also need more research on effective care for this population.

Many of the statistics used in this report are not from Ontario, and better provincial data concerning advanced maternal age and associated health issues would help us better understand the context of this issue in this province.

There is also value in gathering additional information from the perspective of women in Ontario about their experience of preconception, pregnancy, labour and birth, as well as their satisfaction with the services they received. It would be helpful to hear how women in this population would like to be cared for, prior to and during pregnancy. Canadian print resources, designed for women over age 35 who are pregnant or planning a pregnancy, would be beneficial.

While this manual focuses on pregnancy in women over age 35, we also recognize the need for information about the challenges that women face in parenting children later in life, and the type of care and services they require during this time. In addition, there is little information about late paternal age, their genetic and fertility concerns, and the challenges and opportunities they may face in parenting at an older age.

Additional Information

- *Changing Fertility Patterns*: Trends and Implications, health policy research bulletin, Health Canada, 2005. (Includes policy implications of changing fertility patterns). Available at: http://hc-sc.gc.ca/sr-sr/pubs/hpr-rpms/bull/2005-10-chang-fertilit/index_e.html

The trend of pregnancy after age 35 has become well established in urban Ontario and now deserves the attention of policy makers, service providers who work with pregnant women, public health departments, prenatal care providers and the health care system as a whole.

Acronyms

AFP: alpha feto protein

ALPHA: Antenatal Psychosocial Health Assessment screening tool

ART: assisted reproductive technologies

CFAS: Canadian Fertility and Andrology Society

CINAHL: Cumulative Index to Nursing and Allied Health Literature

CLIMB: Centre for Loss in Multiple Birth

CVS: Chorionic Villus Sampling

DIA: Dimeric Inhibin A

FASD: Fetal Alcohol Spectrum Disorder

Free B-hCG: free-beta human chorionic gonadatropin

FTS: First Trimester Screening

hCG: Human chorionic gonadatropin

ICES: Institute for Clinical Evaluative Sciences

ICSI: intracytoplasmic sperm injection

IPS: Integrated Prenatal Screening

IUGR: intrauterine growth restriction

IUI: intrauterine insemination

IVF: in-vitro fertilization

LGA: Large for gestational age

MEDLINE: Medical Literature Analysis and Retrieval System Online

MOHLTC: Ministry of Health and Long Term Care

MoM: Multiples of the median

MSS: Maternal Serum Screening

NT: Nuchal Translucency

OTC: over-the-counter (e.g. over-the-counter medications)

OTIS: Organization of Teratology Information Specialists

PAPP-A: Pregnancy associated plasma protein A

PROM: premature rupture of membranes

Serum IPS: Serum integrated prenatal screening

SOGC: Society of Obstetricians and Gynaecologists of Canada

T-ACE: a four question screening tool used to assess for problematic alcohol use

TTTS: Twin to twin transfusion syndrome

uE3: Unconjugated estriol

Glossary

Advanced maternal age: women over the age of 35 who are pregnant.

Advanced paternal age: men over the age of 45 at the time of conception.

Age specific fertility: number of births per 1,000 women in a specific age group.

Alpha feto protein: alpha-fetoprotein (AFP) is a protein that is normally only produced in the fetus during its development. If high levels of AFP are found in amniotic fluid it can indicate a neural tube defect in the baby (e.g., spina bifida or anencephaly).

Amniotic fluid: the fluid in which the embryo and fetus is suspended within the amnion.

Amniocentesis: the surgical insertion of a hollow needle through the abdominal wall and into the uterus of a pregnant woman to obtain amniotic fluid especially to examine the fetal chromosomes for an abnormality and for the determination of sex.

Amniocytes: skin cells from the fetus found in the amniotic fluid that contain genetic material used for karyotyping.

Anaemia: a condition in which the blood is deficient in red blood cells, in hemoglobin, or in total volume.

Aneuploidy: is a condition in which the number of chromosomes is abnormal due to extra or missing chromosomes. It is a chromosomal state where the number of chromosomes is not a multiple of the haploid set.

Antenatal: existing or occurring before birth.

Assisted reproductive technology: a general term referring to methods used to achieve pregnancy by artificial or partially artificial means. It includes taking medications to induce ovulation, or in vitro fertilization among other techniques.

Auto-antibodies: an antibody active against a tissue constituent of the individual producing it.

Biochemical marker: is a quantifiable indicator of a condition.

Choroid plexus cysts: brain pockets or spaces containing a spongy layer of cells and blood vessels called the Choroid plexus. The Choroid plexus is located in the middle of the fetal brain and produces cerebrospinal fluid. Choriod plexus cysts can develop when fluid becomes trapped within this spongy layer of the cells, much like a soap bubble or a blister. These cysts are markers of chromosome abnormalities.

Chorionic villus: one of the minute vascular projections of the fetal chorion that combines with maternal uterine tissue to form the placenta.

Chorionic villus sampling: biopsy of the chorion frondosum (placental tissue) through the abdominal wall or by way of the vagina and uterine cervix at 10 to 12 weeks of gestation to obtain fetal cells for the prenatal diagnosis of chromosomal abnormalities.

Chromosome anomaly: an abnormality of chromosome number or structure.

Cognitive development: the development of intelligence, conscious thought, and problem-solving ability that begins in infancy.

Congenital anomaly: a hereditary defect acquired at birth or during uterine development, usually as a result of environmental influences.

Detection rate: measures the proportion of affected individuals that screen positive for the disorder in a specific screening test.

Diagnostic tests: a test that obtains a sample of amniotic fluid or chorionic villi to identify the chromosomes of the fetus. A diagnostic test provides a definite answer on whether a fetus has a chromosome disorder.

Diaphragmatic hernia: is a defect or hole in the diaphragm that allows the abdominal contents to move into the chest cavity. A fetus with a thickened nuchal fold is at high-risk for developing this condition.

Dizygotic twins: (Fraternal twins or "non-identical twins") usually occur when two fertilized eggs are implanted in the uterine wall at the same time.

Down syndrome: (trisomy 21) a congenital condition characterized by moderate to severe mental retardation, slanting eyes, a broad short skull, broad hands with short fingers, and by trisomy of the human chromosome numbered 21.

Echocardiogram: the use of ultrasound to examine and measure the structure and functioning of the heart and to diagnose abnormalities and disease.

Echogenic: containing structures that reflect high-frequency sound waves and thus can be imaged by ultrasound techniques.

Eclampsia: convulsions or coma late in pregnancy in an individual affected with preeclampsia.

Ectopic pregnancy: gestation elsewhere than in the uterus (as in a fallopian tube or in the peritoneal cavity).

Elevated homocysteine: an amino acid found in the blood that at high concentrations is believed to exert toxic effects and lead to pregnancy complications (e.g., including chromosomal abnormalities, congenital malformations, recurrent pregnancy loss, placental disease and preeclampsia).

Endocrine system: is a control system of ductless glands that secrete hormones that circulate within the body via the bloodstream to affect distant cells within specific organs.

Epigenetic mutations: modification in gene expression that is independent of the DNA sequence of a gene. Changes may be induced spontaneously, in response to environmental factors, or in response to the presence of a particular allele, even if it is absent from subsequent generations.

Etiology: the cause or causes of a disease or abnormal condition.

False positive rate: the proportion of unaffected individuals that screen positive for a given disease or condition.

Fetal alcohol spectrum disorder: describes a series of birth defects and neurodevelopment disorders caused by alcohol consumption in pregnancy (e.g., difficulties with learning, memory, attention span, communication, vision and hearing).

Fetal demise/ loss: the death of a fetus in utero.

Fetal factors: characteristics of the fetus including gestational age and the number of fetuses.

First trimester screening: consists of one blood test and a nuchal translucency ultrasound and is useful to determine fetal risk for Down syndrome and trisomy 18.

Folic acid: forms of the water-soluble Vitamin B9 found in leaf vegetables. Adequate folate intake during the periconceptional period, the time just before and just after a woman becomes pregnant, helps protect against a number of congenital malformations including neural tube defects.

Follicle count: a vesicle in the ovary that contains a developing egg surrounded by a covering of cells.

Gastrointestinal tract: GI tract, system of organs that takes in food, digests it to extract energy and nutrients, and expels the remaining waste.

Gestational age: is the age of an embryo or fetus (or newborn infant). It is most commonly calculated from the start of the woman's last menstrual period and is approximately two weeks older than when fertilization took place.

Gestational diabetes: diabetes that starts in pregnancy and resolves after birth.

Gestational hypertension: high blood pressure detected during pregnancy in a woman with previously normal blood pressure.

Group B streptococcus: is a type of bacteria that can cause serious illness and sometimes death, especially in newborn infants. This bacteria can be passed from a pregnant women to her baby during labour, is she is a carrier.

Human chorionic gonadatropin: is a peptide hormone produced in pregnancy that is made by the embryo soon after conception and later by the syncytiotrophoblast (part of the placenta).

Hypertension: abnormally high arterial blood pressure that is usually indicated by an adult systolic blood pressure of 140 mm Hg or greater or a diastolic blood pressure of 90 mm Hg or greater.

Hypoplasia: is an incomplete or arrested development of an organ or a part.

In-vitro fertilization: mixture usually in a laboratory dish of sperm with eggs which have been surgically removed from an ovary that is followed by implantation of one or more of the resulting fertilized eggs into a female's uterus.

Integrated Prenatal Screening: consists of two blood tests and a nuchal translucency ultrasound that determines the risk for Down syndrome, trisomy 18, and open neural tube defects.

Intracytoplasmic sperm injection: injection by a microneedle of a single sperm into an egg that has been surgically removed from an ovary followed by transfer of the egg to an incubator where fertilization takes place and then by implantation of the fertilized egg into a female's uterus.

Intrauterine growth restriction: when the estimated fetal weight is below the tenth percentile for its gestational age.

Intrauterine insemination: in this procedure, a small amount of concentrated sperm, first "washed" to remove most of the seminal plasma that surrounds it, is placed in the uterus through a thin plastic catheter that is passed through the vagina and cervix.

Karyotype: the number of chromosomes.

Klinefelter syndrome: an abnormal condition in a male characterized by two X chromosomes and one Y chromosome, leading to infertility, smallness of the testes, sparse facial and body hair.

Large for gestational age: an infant that weighs more than 4500 grams at its birth.

Low birth weight: a weight of less than 2500 grams at birth.

Maternal serum screening: consists of 1 blood test done between 15-22 weeks gestation and is useful for determining risk for Down syndrome, trisomy 18 and open neural tube defects.

Maternal serum triple screen: a screening test that measures three biochemical serum markers: AFP, hCG and uE3.

Maternal serum quadruple screen: a screening test that measures the same markers as the triple screen but also screens for a fourth marker, dimeric inhibin A (DIA).

Miscarriage: (spontaneous abortion) is the loss of pregnancy before 20 weeks gestation.

Monozygotic twin: (Identical twins) occur when a single egg is fertilized to form one zygote which then divides into two separate embryos.

Multi-fetal pregnancy reduction: a procedure used to decrease the number of fetuses a woman carries and improve the chances that the remaining fetuses will survive and develop into healthy infants.

Neonatal: the first four weeks after a child's birth.

Neural tube defects: any of various congenital defects (as anencephaly and spina bifida) caused by incomplete closure of the neural tube during the early stages of embryonic development.

Neurodevelopment: the development of the nervous system.

Nuchal translucency: an ultrasound examination that measures the amount of fluid behind the neck of the developing fetus and is used primarily to assess fetal risk for Down syndrome.

Otitis media: acute or chronic inflammation of the middle ear.

Ovarian reserve: the eggs a woman is born with. Some never mature, while others mature and are released during menstrual cycles.

Perinatal: occurring in, concerned with, or being in the period around the time of birth.

Perinatal morbidity: illness or disease afflicting a fetus at the time of birth.

Perinatal mortality: death of a fetus occurring in, concerned with, or being in the period around the time of birth.

Placental abruption: the separation of the placenta from the wall of the uterus before birth.

Placenta previa: is the implantation of the placenta covering or partially covering the cervical opening.

Postpartum hemorrhage: a copious discharge of blood from the blood vessels occurring after delivery.

Postpartum mood disorders: a condition occurring in the period following birth where a woman's prevailing emotional mood is distorted or inappropriate to the circumstances (e.g., depression).

Pre-gestational diabetes: diabetes that started prior to the pregnancy.

Preeclampsia: a serious condition developing in late pregnancy that is characterized by a sudden rise in blood pressure, excessive weight gain, generalized edema, proteinuria, severe headache, and visual disturbances and that may result in eclampsia if untreated.

Preexisting hypertension: high blood pressure detected before pregnancy.

Premature rupture of membranes: the rupture of the sac that holds the fluid surrounding the fetus before the full term of pregnancy (about 37 weeks).

Prenatal screening tests: tests that consider multiple maternal factors, including maternal age, to estimate the risk for a chromosome abnormality in the developing fetus.

Preterm birth: a live birth before 37 completed weeks of gestation.

Preterm labour: labour prior to 37 weeks of gestational age.

Proteinuria: the presence of excess protein in the urine.

Renal pyelectasis: dilation of the renal pelvis of a kidney.

Rubella: an acute contagious disease that is milder than typical measles but is damaging to the fetus when occurring early in pregnancy.

Sandwich generation: women over the age of 35 who are caring for aging parents while simultaneously caring for young children.

Serum: blood serum is the same as blood plasma (liquid component of blood) except that clotting has been removed.

Serum integrated prenatal screening: if nuchal translucency ultrasound is not available, the integrated prenatal screening (IPS) can be generated by using serum only biochemical markers and a second trimester marker inhibin.

Screen positive result: a screen positive result indicates that the estimated risk is higher than the expected risk and there is an increased chance for the fetus to have Down syndrome, trisomy 18 or an open neural tube defect.

Singleton: an offspring born singly.

Stillbirth: (fetal demise) is the intrauterine loss of a fetus after 20 weeks gestation or a fetus weighing 500 grams or more.

Teratogenic: the development of abnormal cell masses during fetal growth causing physical defects in the fetus.

Toxoplasmosis: infection with or disease caused by a sporozoan of the genus Toxoplasma (T. gondii) that invades the tissues and may seriously damage the central nervous system especially of infants.

Transabdominal chorionic villus sampling: in this method, a thin needle guided by ultrasound is inserted through the abdomen into the placenta where a small piece of tissue is removed.

Transcervical chorionic villus sampling: in this method, a thin biopsy catheter guided by ultrasound is inserted through the cervix and into the placenta where a small piece of tissue is removed.

Trisomy: the condition (as in Down syndrome) of having one or a few chromosomes triploid in an otherwise diploid set.

Trisomy 13: (Patau Syndrome) congenital condition that is characterized especially by usually severe mental retardation and by craniofacial, cardiac, ocular, and cerebral abnormalities, is caused by trisomy of the human chromosome numbered 13, and is typically fatal especially within the first six months of life.

Trisomy 18: (Edwards syndrome) a congenital condition that is characterized especially by mental retardation and by craniofacial, cardiac, gastrointestinal, and genitourinary abnormalities, is caused by trisomy of the human chromosome numbered 18, and is typically fatal especially within the first year of life.

True positive rate: the proportion of fetuses that actually have the disease/disorder in question.

Twin-to-Twin Transfusion Syndrome: is a complication with high morbidity and mortality that can affect identical twin or higher multiple pregnancies where two or more fetuses share a common placenta.

Two-step integrated prenatal screening tests: prenatal screening tests which occur in both the first and second trimester.

Unconjugated estriol: one of the three main estrogens produced by the human body. It is only produced in significant amounts during pregnancy as it is made by the placenta.

Very low birth weight: a weight of less than 1,500 grams at birth.

Very preterm birth: a birth before 32 weeks completed gestation.

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