Sexual and Reproductive Health

GUIDES FOR THE PHC-FOCUSED CONTINUUM OF CARE OF WOMEN AND NEWBORNS

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3rd. Edition

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Latin American Center for Perinatology
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Guides for the HPC-focused Continuum of Care of Women and Newborns
CLAP/WR
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SEXUAL and REPRODUCTIVE HEALTH

Guidelines for the PHC Focused

CONTINUUM OF CARE

of Women and Newborns

3rd. edition

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PROLOGUE

The attainment of Goals 4 and 5 of the Millennium Development Goals (MDGs) (reducing the 1990 baseline child mortality by two thirds and maternal mortality by three fourths by 2015) pledged by all member states requires training the health team in the framework of a maternal and newborn continuum of care; i.e., the very essence of perinatology.

With the renewal of the Primary Health Care strategy, evidence-based guidelines are needed to help health care providers develop standards that may contribute to improve the health of women and their children. Moreover, these interventions must be cost/ effective, since a basic principle of primary care states they should include the entire population of pregnant women and their children.

The current guide follows the book “Prenatal Care and Low-Risk Childbirth”, published by CLAP in 1995 and the first edition of the *“Guidelines for the Continuum of Care of the Woman and Newborn”*, published by CLAP in 1995 and in 2008 respectively. All the topics in the book have been updated, broadening their scope and further deepening the contents of pre-gestational care. The promotion and prevention criterion seeks to improve the health of the woman, the couple and her child, using relatively simple measures. It also incorporates new aspects on family planning with a rights approach, including emergency contraception and the concept of integral care, to avoid any missed opportunities and to improve efficiency of the contact between the health care staff and the woman and her child.

ACRONYMS

Abd.C: Abdominal circumference.
ACEIs: Angiotensin II Converting Enzyme Inhibitors.
ACT: Artemisinin-based combined therapy.
AIDS: Acquired Immunodeficiency Syndrome.
AP: Abruptio Placenta: Premature detachment of a normally positioned placenta.
ARA II: Angiotensin II Receptor Antagonists.
ARV: Antiretrovirals.
AZT: Zidovudine.
BCG: Bacillus Calmette - Guerin.
BhCG: Beta Fraction of the Chorionic Gonadotropic Hormone.
BMI: Body Mass Index.
BPD: Bi-Parietal Diameter.
CDC: United States Centers for Disease Control.
CGH: Chorionic Gonadotropic Hormone.
CH: Congenital Hypothyroidism.
CI: Cervix Incompetence.
CIC: Combined Injection Contraceptives.
CLAP/WR: Latin American Center for Perinatology / Women and Reproductive Health.
CM: Contraceptive Methods.
CMV: Cytomegalovirus.
CNS: Central Nervous System.
COC: Combined Oral Contraceptives.
CRS: Congenital Rubella Syndrome.
CSF: Cerebro Spinal Fluid.
CU: Uterine Contraction.
D: Diameter.
d: diameter.
DFO: Fronto Occipital Diameter.
DIPs I: Drop of the FHR coinciding with the uterine contraction.
DIPs II: Late deacceleration of FHR related to uterine contractions.
DLM: Date of Last Menses.
DM: Diabetes Mellitus.
ECLAMC: Spanish acronym for the Collaborative Latin American Study on Congenital Malformations.
EDD: Expected Date of Delivery.
FAS: Fetal Alcoholic Syndrome.
FHR: Fetal Heart Rate.
FO2: Oxygen tension.
FTA- Abs: Immunofluorescence Test for the detection of specific antibodies against Treponema pallidum.
GA: Gestational age.
GBS: Group B Streptococcus.
GD: Gestational Diabetes.
GDA: Gender and Development Approach.
GTT Glucose Tolerance Test.
H. Cr.: Head circumference.
Hb : Hemoglobin.
HIV: Human Immunodeficiency Virus.
ICPD: International Conference on Population and Development (ICPD).
Ig G: Immunoglobulin G.
Ig M: Immunoglobulin M.

IHA Test: Indirect Hemagglutination Test.
IIF: Indirect Immunofluorescence.
IM: Intramuscular.
IUD: Intra Uterine Device.
IUGR: Intrauterine Growth Restriction.
IV: Intravenous.
LAM: Lactation Amenorrhea Method.
LBW: Low Birth Weight.
MHA – TP: Micro-Hemagglutination Assay for Treponema pallidum.
MMAC: Mean mid arm circumference.
NICU: Neonatal Intensive Care Unit.
NNT: Neonatal Tetanus.
NVP: Neviparine.
P. *falciparum:* *Plasmodium falciparum*.
PAHO: Pan American Health Organization.
PAP: Pap smear, oncology colpocytology.
PCR: Perinatal Clinical Record.
PCR: Polimerase Chain Reaction.
PD: Periodontal Disease.
PG: Prostaglandins.
PHC: Primary Health Care.
PO: Per os.
PROM: Premature Rupture of Membranes. RPRT: Rapid Plasma Reagin Test.
RDS: Respiratory Distress Syndrome.
RDTa: Rapid Diagnostic Tests.
RR: Relative risk.
RTI: Reproductive Tract Infection.
SGA: Small for Gestational Age.
SIP: Perinatal Information System.
STI: Sexually Transmitted Infections.
T. *pallidum:* *Treponema pallidum.*
T4: Thyroid hormone 4.
TBC: Tuberculosis.
Td: Tetanus plus diphteria.
TP – PA: Treponema pallidum Particle Agglutination Detection Test.
TPI: Intermittent Preventive Therapy
T. cruzi Trypanosoma cruzii.
TSH: Thyroid Stimulating Hormone.
TT: Tetanus Toxoid.
UH: Uterine Height.
UNAIDS: Joint United Nations Programme on HIV/AIDS.
UNGASS: United Nations General Assembly on AIDS Special Session.
UNICEF: United Nations Child das para la Infancia.
USR: Unheated Serum Reagin.
Variable DIPs: Drops of the FHR probably originating in the umbilicus, with variable duration, amplitude and onset in relation with uterine contractions.
VDRL: Venereal Disease Research Laboratory.
VPH: Human Papilloma Virus.
WHO: World Health Organization.

CHAPTER I

Renewing Primary Health Care in the Americas

A Family and Community Health Approach / Sexual and Reproductive Health

Sexual and Reproductive Health

Although the Region of the Americas has shown evidence of significant progress in the field of health in recent decades, advances are still insufficient and all countries continue to have challenges and inequities to be solved.

Nations link health improvement to the inclusion or broadening of social protection (within the framework of the reforms undertaken in that sector) to the implementation of primary health care (PHC). Primary health care as such was defined in 1978 in the Alma Ata Declaration, and after almost 30 years of experience it is possible to conclude that the health systems that comply with the PHC principles have achieved better health results and have increased their efficiency in health care, both at an individual and at a collective level, improving relations and streamlining involvement between users and private or public health care providers.

In spite of the time elapsed since its inception, the current implementation of Primary Health Care (PHC) across the region is very uneven; consequently, in September 2003, the 44th Meeting of the Pan American Health Organization's Directing Council urged the Member States to adopt a series of recommendations aimed at strengthening primary health care. This finally led to the "Regional Declaration on the New Guidelines for Primary Health Care" in September 2005, at the 46th Meeting of PAHO's Directing Council.

The renewal of Primary Health Care in the Americas is based on the newly emerged epidemiological challenges. PHC should succeed in correcting some of its weaknesses, by developing and applying new knowledge and technologies on better practices, incorporating them to increase effectiveness. This is a tool that directly strengthens the society's capacity to reduce health inequalities. Furthermore, the need for renewing the programme is essential if we intend to meet the commitments in the Declaration of the Millenium (MDGs) signed by the countries in the Region.

On the basis of this renewal, PHC is defined as the ... "essential health care based on user-friendly methods and technologies that are scientifically based and socially acceptable, accessible to individuals and families in the community through their full involvement, and at maintenance costs that can be afforded by the community and the country… Together with the community's social and economic development, PHC represents a part of a country's health system. It is intended to take health care as close as possible to the places where people live and work, becoming the first element in an ongoing health care process."

Continuum of Care

The process called “Continuum of care” implies the sensible and appropriate use of the newest and best evidences available to date, putting them at the service of individuals and communities throughout all stages of life.

Sexual and reproductive health is a good example of such continuum of care, showing how the introduction of health promotion and protection activities that targets adolescents contributes to deciding the most appropriate time to engage in sexual relations, free from any coercions, and reducing the risks of diseases (STI/HIV/AIDS). It also succeeds in improving people’s knowledge and the use of contraceptive methods, which contributes to respecting their right to decide about the proper time to become pregnant.

Following the rationale of continuum of care, the system encourages women to seek advice before conception, so that they eventually become pregnant under the best conditions possible, thus reducing their risk of getting sick or even dying. Once the woman is pregnant, she should be able to receive the best quality of care throughout pregnancy, childbirth and puerperium. Birth is not the end of that commitment to providing care to the woman, since subsequently there is a need to address topics such as contraception, prevention of breast and genital cancer, and menopause, among other issues. Furthermore, it marks the beginning of infant and child care which continues until adolescence at which point the cycle begins anew.

Familiy and Community Health Approach

“Continuum of care” is not fully effective if it is exclusively limited to people’s individual responsibility to take care of their health. Hence, the Family and Community Health Approach integrates the notions of life cycle and continuum of care into the new PHC strategy, working on the basis of three different complementary dimensions. The first dimension starts from the person’s home, where is a key element in preserving health, or restoring it when it is impaired. The second dimension is that of the community, where social empowerment and solidarity play a decisive role. The third dimension involves all the services in general and health services in particular. The guiding premise is that the first level of care services will effectively solve more than 80% of the consultations merely using their local human and technological resources, while referring the severe cases or those with diagnostic difficulties to facilities capable of providing more complex services, when required. This sequence implies having a tier-organized health system that provides information to guide those who seek advice or care, as well as communications, transportation systems, and other ways to facilitate access to such services. Apart from guaranteeing access to health services and health care coverage, care must be based on the quality of that intervention. The interaction between the health care services and the other services provides the efficacy required by the Family and Community approach to attain its goals and maintain its achievements for a long time.

Values, Principles and Elements of a PHC-Based Health System

It is important to acknowledge that PAHO’s new orientation for PHC considers a range of values, principles and elements that are essential for the construction of PHC-Based Health Systems. The Organization claims that those systems are indispensable tin advancing to the completion of the “unfinished health agenda”, to consolidate it and maintain the progress reached. The figure below summarizes those aspects.

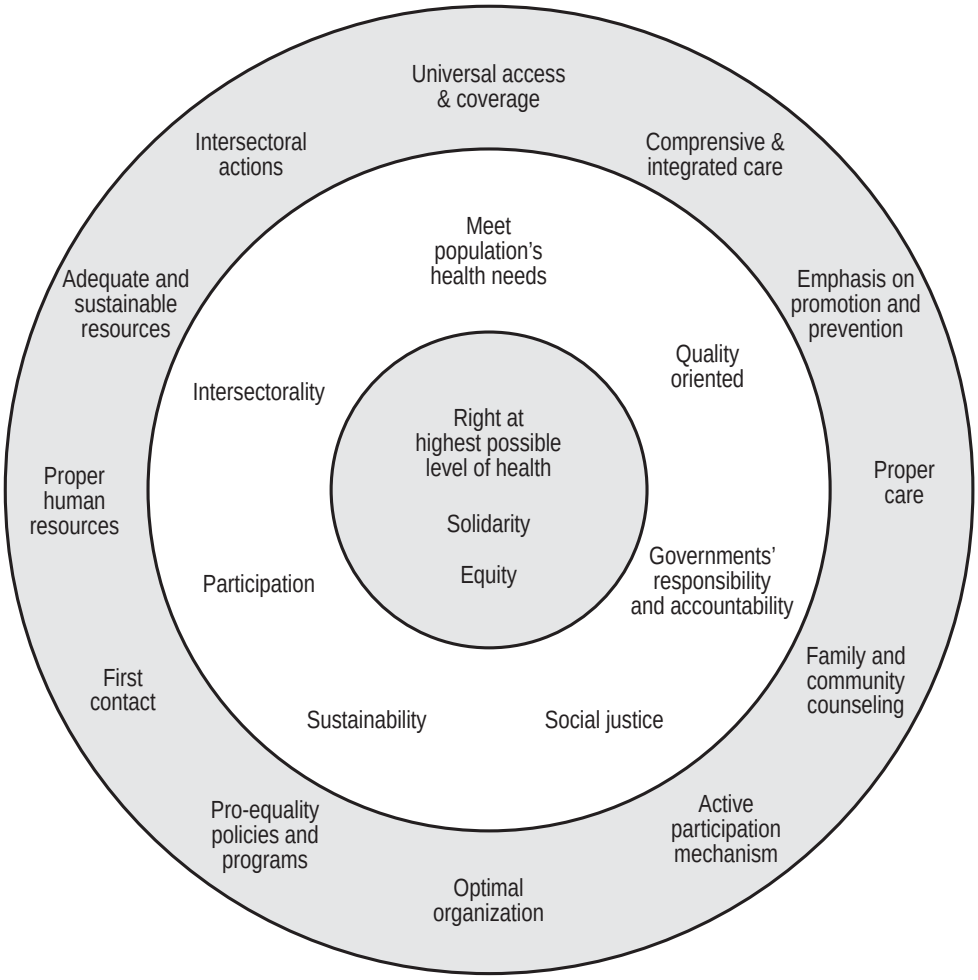

Fig. 1. Values, Principles and Elements essential to a PHC-Based Health System (Intersectorality – Participation - Sustainability)

Below we will limit the discussion to the issues concerning values and the way they relate to sexual and reproductive health. The values are based on three key approaches:

1. People's right to the highest level of health
2. Equity
3. Solidarity

1. People's right to the highest level of health

Considering health as a right implies a substantial paradigm shift. The new paradigm conceives health as a human right that requires addressing the social and political factors that condition it.

The right to health involves an individual and collective commitment to preserve health, as well as the responsibility of States and other players to guarantee compliance with that pledge. However, it also empowers citizens by enabling them to claim for their right through the "appeal path" whenever they feel the commitments assumed by the States and other players have not been fully met.

Added to the above issues, the Health and Human Rights approach sustains that if

countries are to attain the improvements in health equity proposed at Alma Ata, they must move toward developing “inclusive, dynamic and transparent policies supported by legislative and financial commitments”, rather than targeting issues specifically related to the disease.

Sexual and Reproductive Rights

The health and human rights approach has a special impact when it is applied in the field of Reproductive Health and Reproductive Rights. At the International Conference on Population and Development (ICPD), held in Cairo in 1994, sexual and reproductive health was introduced to the international political agenda. The perspective was complex and comprehensive, but closely related to the exercise of rights. In the case of sexual and reproductive health, too, the exercising of rights involves people’s individual responsibility for self-care, and the responsibility to generate the required social and political conditions.

The ICPD Program of Action states that the reproductive rights are among the human rights recognized in national laws, in international documents on human rights and other United Nations documents approved by consensus. *“These rights are based on the recognition that couples and individuals have the basic right to freely and responsibly decide the number of children they wish to have and the spacing between their births. Existing information should be made available for those purposes, providing them the right to reach the highest level of sexual reproductive health. It also includes the right to adopt reproduction-related decisions without suffering from discrimination, coercion or violence. The promotion of a responsible practice of these rights must be the prime goal of the state and community policies and programs in the area of reproductive health, including family planning. As part of that commitment, a special effort must be made in promoting relations of mutual respect and equality among men and women”*

The sexual and reproductive rights propose new foundations and a redefinition of the relations between the state-owned and the private sector. They imply a change in the paradigms of sexuality and reproduction, understanding that there is an overlap between the intimate-personal (private), and the public-social spheres. This dichotomy between the public and the private sectors has been and continues to be one of the difficulties in the promotion and the defense of the sexual and reproductive rights.

2. Equity in health

Among other issues, guaranteeing rights implies reducing the existing gap in people’s health status, their access to care and healthy environments and the treatment they receive at the social and health services systems. Equity is the cornerstone of social values, and as it occurs with a chain, it is as strong as its weakest link; the way a specific society treats its members who are in the worst conditions reflects that society’s strength. People must be capable of correcting inequities through the practice of moral and legal rights to demand health and other social assets. The idea underlying the statement that equity is the core value of a PHC-Based Health System is that health policies and programs should be equity-oriented.

Gender Equity

One of the main dimensions of equity is based on incorporating the gender approach in health, since it is an essential reference in the analysis of the role played by men and women in the everyday production of health. From that perspective, in operational

terms health equity translates into reduction of the avoidable disparities between human groups with various levels of social privilege, as well as the factors that cause them.

The Gender Approach in Development (GAD) mainstreaming allowed to focus on the role of health as a criterion of equity between sexes (Gender, Health and Development) The analysis of the distribution of social functions between men and women is one of the key points in the gender perspective, introducing into the analysis the power of male-female relations or the way the male and female social and historical construction has unfolded. No in-depth analysis is needed to see that sexuality and decisions concerning reproduction are the main areas reflecting the relations of power between genders; furthermore, the area in which those power relations become evident materialize in the woman's body; most decisions have to do with the woman's body and have impact on it. The Gender, Health and Development approach seeks to identify and change the causes that embody the relations of power that place women in a subordinate position, impinging on their access and control of the health resources for their own benefit. This approach conceives woman as a comprehensive being (in her multiple condition as a sexed being with sexual, biological, socio cultural and political domains), that requires a comprehensive "look", favoring the woman's strength as a subject of right (autonomy and empowerment).

"With regards gender inequality, both in practical terms and from the legal and moral perspective, the differences become more dramatic in situations of poverty. The assistentialism logic prevails as a social policy in the reproductive field, thus contributing to maintaining social exclusion, instead of overcoming it. That logic can be destroyed precisely by changing needs into rights".

The Gender Approach in Development should have replaced the approach that supported the classical family-planning and mother-and-child models. This latter approach prioritizes the woman's condition as a mother, in an attempt to obtain the best neonatal outcomes by providing care to the "mother-child couple". This idea of a "couple" depersonalizes the two members, for it focuses on the figure of the woman as a mother and the figure of the child as a son or daughter, while ignoring man's involvement in fatherhood. In this approach, not only are women assigned maternity as their main role, but they are also considered to be passive receivers of development and childrearing, conceiving the family care function as their main contribution to development. In general terms, this has contributed to strengthen a male role that does not include responsibilities on issues related to family planning and the family's health care.

The gender analysis is barely one of the relevant dimensions in the health-disease construction processes, while social class, ethnic group and generation are additional dimensions that enable us to analyze the existing differences that will suggest the input required to reduce the gaps existing even among women.

3. Solidarity

Solidarity is the degree at which the members of a society commit themselves to work jointly in the pursuit of common wellbeing. Social solidarity is one of the means through which collective action may succeed in solving the common problems; the health and

social security systems are mechanisms that express the solidarity between individuals of different social conditions and generations. The PHC-based Health Systems require that social solidarity to ensure that investment in health is sustainable, to provide financial protection and joint management of health risk, and to enable the health sector to work successfully in coordination with other social players, whose involvement is essential to improve health and the conditions that determine it. This requires involvement and accountability at all levels, not just to guarantee solidarity, but also to maintain it along time.

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CHAPTER II

Preconceptional Care

Objective *To identify and provide counseling on preconceptional risk.*
Activity *Visit prior to pregnancy*

Whenever a woman gets pregnant, there is a potential that either she or her future child may suffer an adverse phenomenon during the reproduction process. This is known as the Reproductive Risk. Historically, attempts have been made to reduce this risk through good quality prenatal control, ensuring that childbirth care is provided by qualified staff, and including the care of puerperium. Although the Region is far from providing universal and good quality services, preconceptional care should be implemented as an effective measure to reduce reproductive risk.

In Latin America, immediate postpartum is an optimum time to implement activities that may contribute in providing the best conditions possible for a future pregnancy. It might be the ideal time to acquire healthy habits, or to seek the opinion of specialists that may in the short term prevent congenital defects in future pregnancies

Preconceptional care
Preconceptional care is recognized as a critical component of health care of women at child-bearing age. It is defined as a set of interventions aimed at identifying and modifying the risk factors whenever possible.

Preconceptional visit
The preconceptional visit is defined as a scheduled appointment where a woman and/or couple meet the health team before pregnancy, to correct, eliminate or reduce reproductive risk factors or behaviors and/or to treat the conditions that may alter the normal course of a future pregnancy. The goal of preconceptional counseling is to provide the couple all the information required to make informed decisions with regard their reproductive future.

The ideal time for counseling is before pregnancy

In some communities more than half the pregnancies are not planned, and the pregnancy is detected one or two weeks after a delay of the menses, which is after a critical stage of the embryo's development. Consequently, the embryo may have been already exposed to harmful agents in the environment, thus losing the opportunity to promote health and prevent congenital defects. A large number of the women that plan their pregnancy have no access to adequate preconceptional advice that may enable them to face pregnancy under better conditions. Some seek specific advice, but that advice

is usually not standardized or it is limited. For all the above, women at childbearing age must receive assistance before conception. They should be warned about the factors that increase their likelihood of falling ill or dying, or that of their children. The new proposal recommends the implementation of the classical preconceptional approach developed by Level and Clark, with its levels of prevention (primary, secondary and tertiary). It is worth clarifying that the approach by levels of prevention will be applied at the same time to two individuals, on one hand the woman that wants to be a mother, and her unborn child on the other. In this case, recommendations or actions of one level of secondary prevention for the woman may represent a primary prevention level for the child, for instance, starting a correct therapy for diabetes in a woman may prevent the occurrence of more severe complications due to a poor metabolic control, or vascular damage produced by the disease (secondary prevention), while the adequate use of insulin (that keep her euglycemic) would protect the embryo from suffering congenital defects during gestation (primary prevention).

Reduction of maternal, fetal and neonatal morbi-mortality

Preconceptional visits aim to provide wellbeing to the mother and to ensure the birth of a healthy child. The concept of health is extremely broad, with definitions that have evolved from the concept of absence of disease, to the current more comprehensive and more complex approaches. This chapter includes recommendations aimed at preventing the loss of the healthy status of fetuses and newborns, including the prevention of death or other damages.

Reducing congenital defects

Definition

In an attempt to unify criteria, in the 80s PAHO proposed the definition of congenital defect as the defect in which there are fetal functional and/or structural abnormalities resulting from factors that act before birth; this would include genetic or environmental defects or unknown defects, even when this is not apparent in the newborn and only manifests itself until later. Therefore, blindness, deafness, mental retardation and other neurodevelopment disorders are encompassed in this concept.

Frequency

The frequency of clinically significant malformations in newborns ranges around 3%. However, congenital defects are typically more frequent, affecting from 5% to 10% of all births.

Etiology

Even today, in more than 50% of the cases, the cause of congenital defects remains unknown. Of all the known causes, the combination of environmental and genetic factors (multifactor inheritance) account for approximately 20% of the morphological defects. Other causes include maternal conditions (2.5%) and maternal medication (2%).

Table 1: Risk of Down's Syndrome in neonates born alive according to mother's age

Age in years	Risk	Age in years	Risk
18	1:1458	33	1:507
19	1:1744	34	1:392
20	1:1444	35	1:282
21	1:1369	36	1:269
22	1:1572	37	1:192
23	1:1381	38	1:148
24	1:1752	39	1:126
25	1:1336	40	1:80
26	1:1317	41	1:76
27	1:1270	42	1:52
28	1:1182	43	1:49
29	1:1143	44	1:31
30	1:685	45	1:35
31	1:756	> 46	1:33
32	1:734		

Source: ECLAMC

Cinical record
All medical visits must start with a proper clinical history and an analysis of the epidemiologically relevant data.

Patronymic Data

Age
Maternal age – especially close to the extremes of childbearing age – has for a long time been associated with adverse maternal and neonatal outcomes.

Advanced Maternal Age
Older women have been associated with a higher risk of hypertension and diabetes, which in turn leads to increased odds of acute and/or chronic fetal distress. Another risk of advanced maternal age is related to developmental abnormalities, being the Down syndrome the first example reported. Maternal age is the most important risk factor related with that syndrome in our region. In Latin America, women aged 40 or older account for 2% of all births and 40% of the cases of Down syndrome. While not ignoring Reproductive Rights, it is possible to say that any campaign discouraging conception in women over 39 years of age, (which would not impact birth rates), could prevent almost half the cases of a severe and incurable genetic disorder.
Table 1 shows the increased risk of the Down syndrome as age progresses.

Low maternal age
Being under 20 years of age is also a risk factor for prematurity and for some specific malformations such as gastroschisis and other defects. Women in early adolescence (under the age of 15) have a higher morbi-mortality risk related to pregnancy and especially childbirth.

Advanced Paternal Age
From the perspective of preconception, and seeking to reduce the risk of presenting a range of congenital defects, knowing the age of the sexual partner is important, since having a father older than 45 years has been associated with an increased risk for having children with new dominant mutations.

Consanguinity

When estimating the risk for congenital defects, not only is it important to know the father's age; it is also necessary to define the degree of kinship between the two members of the couple. Individuals are consanguineous if they have at least one common ancestor. This information becomes even more important among isolated populations, since the odds of consanguinity are greater in closed groups.

Ethnicity

Just as with age and consanguinity, the incidence of some congenital malformations is increased in specific ethnic groups. Some classical examples of that increased frequency is polydactyly, cleft palate, hypospadias and globin disorders (such as sickle cell anemia) among African Americans, and an increased frequency of heart disease in white children, or Beta Thalassemia, which is more frequent in people of Mediterranean origin.

Occupation: There are certain labor conditions that have been associated with an increased number of adverse perinatal outcomes (abortion, fetal death, preterm childbirth, low birth weight and some congenital defects). Some of the many factors include:

- Working more than 10 hours a day
- Having to stand for more than 6 hours uninterruptedly
- Exposure to chemical toxics (including anesthetics, solvents and pesticides). Women that may be exposed to these substances at work should be advised to change their assigned tasks as soon as they know they are pregnant. To date there is no evidence of teratogenic risk due to the father's exposure to these same agents

Reproductive history

When attempting to reduce the reproductive risk, completion of a proper anamnesis may identify factors related to poor outcomes in earlier pregnancies. At times these factors can be corrected, or even eliminated; that should lead to a safer new pregnancy. To date the evidence permits to state that measures such as spacing pregnancies, smoking cessation, using progesterone in case of previous preterm births, or other medications for specific diseases, as well as certain surgical treatments, reduce the risk of adverse maternal and neonatal outcomes. It has been shown that some factors, such as short intervals between births, spontaneous abortions, preterm delivery, restricted intrauterine growth, fetal or neonatal death, surgical childbirth, gestational diabetes, pregnancy-induced hypertension and uterine malformations, comprise a long list of factors that may be related with the occurrence of complications in a future pregnancy.

Short intergenesic intervals

Every woman has the right to decide when she considers it appropriate to have her next child. In fact, "timeliness" should be defined among other issues, by the actual awareness of the risk involved in a new pregnancy with an excessively short or long intergenesic period. To date, there are not enough studies available addressing the ideal interval between births after a live birth; some evidence suggests that an interval shorter than 18 months entails a higher maternal and perinatal morbi-mortality risk, while others argue that the risk is raised until the 27th month. Based on these discrepancies, a group of experts convened by the WHO arbitrarily established the recommendation of a minimum interval of 24 months. Meanwhile, in the cases of pregnancies ended in abortion, an interval longer than 6 months is recommended as safer. This evidence is based on data drawn from CLAP-WR's SIP databank, reflecting research conducted in Latin America.

Parity
Parity has been described as one of the risk factors for perinatal mortality and maternal morbi-mortality. A high parity (four or more pregnancies) doubles the risk of fetal death during childbirth. Being a non modifiable risk factor, women should be warned against this. Awareness will help them decide whether a new pregnancy is advisable. If they still opt for that new pregnancy, the case will demand special attention throughout the antenatal period, but especially during childbirth and postpartum.

Previous abortion
It has already been mentioned that it is important to counsel women who want a new pregnancy to ensure an intergenesic period longer than 6 months following miscarriage, to reduce the risk of maternal or neonatal disease or death. However, it is also important to know the history of the earlier abortions. Recurrent miscarriages - defined as the occurrence of 3 consecutive spontaneous abortions - should guide the attending professional to actively rule out the presence of certain conditions, including uterine abnormalities, an incompetent cervix, hormone defects, or even infectious diseases such as syphilis, since the latter STI is increasing and it typically produces a placentitis that can kill embryos and fetuses. Old obstetricians used to define syphilis as the "ascending the ladder to life", in the understanding that in the early years of infection fetal deaths occurred increasingly early, and that over the years the disease became less aggressive to the fetuses, allowing them to reach older and older ages.

Previous stillbirth
At a preconception visit, the HCP must assess the woman's risk of having a new stillbirth in a future pregnancy, advise her on the potential for repeating the phenomenon, and plan the care she should receive in the future pregnancy. Not always is it easy to make this assessment based on the clinical history, even having the fetal autopsy report with the histology and gross pathology of the placenta or other organs. At times it will be necessary to conduct laboratory tests, such as glucose tolerance tests, anticardiolipin antibodies and specific clotting testing. These tests may be repeated on a future pregnancy, and antenatal care should be strengthened, incorporating, morphological and functional ultrasound evaluations, among other tests.

Preterm birth
Preterm birth is one of the leading causes of neonatal death. Women who have a history of giving birth to a preterm baby before week 35 of geastation have a 10 to 15% higher risk of repeating another preterm birth. This risk may increase to 40% after 2, and even 60% after 3 preterm births. In addition to a history of preterm delivery, there are other factors that have also been associated with the risk of having a preterm delivery, including:

- Woman's weight below 50 kilos at the start of pregnancy, or a body mass index less than 18.5 kg/m2
- Smoking
- Intergenesic interval shorter than 12 months
- Evidence of shortening of the cervix in the ultrasound

The significance of these factors should lead HCPs to implement corrective measures prior to a new pregnancy.

Intrauterine growth restriction (IUGR)
Other risk factors that are also related to the possibility of presenting IUGR in a future pregnancy include, but are not limited to low pre-pregnancy weight, being younger than 16 years or older than 35 years, a short intergenesic interval, smoking and substance abuse, as well as other conditions, such as cardiovascular disease, hypertension, renal failure, immunopathies and anemia.

Previous cesarean section
The cesarean section is increasingly common in our region and globally as a form of terminating pregnancy. Thanks to the improvement of the surgical and anaesthetic techniques, the poor outcomes associated with it have been diminished. But still, the caesarean section continues to be more risky than a normal delivery, and when repeated several times, it increases the risk of uterine rupture and abnormal insertions of the placenta, which can in turn lead to severe bleeding, even in women in whom the caesarean section was planned. It is necessary to know some aspects of the history of previous cesarean section(s) of women seeking to get pregnant, so they can be counselled on the potential risks in future pregnancies, such as:

- Type of incision (T incisions involve a greater risk of uterine rupture than the longitudinal sections, while the latter pose higher risks than transverse segmentary sections)
- History of surgical wound infection, especially deep infections of the abdominal wall, which could cause abnormal scarring, which in turn entails an increased risk of uterine rupture or bleeding due to an abnormal insertion of the placenta
- Time elapsed since the last cesarean section; intervals shorter than 18 months entail a higher risk for the mother
- Number of previous cesarean sections; the risk of uterine rupture seems to be more influenced by the type of incision than by the number of caesarean sections. Based on all these aspects, a woman attending a pre-pregnancy visit should be informed about the increased risk of uterine rupture and bleeding from abnormal placentation; she should be warned of the risk of using oxytocin to induce labour, and to be especially careful with Misoprostol

Uterine malformations
Malformations may be found in women with a normal reproductive history, but they are much more frequent in those with poor obstetric outcomes, in particular those that have suffered recurrent miscarriages between the first and second trimesters of pregnancy. It is estimated that up to 1 in 4 women with recurrent miscarriage may have a malformation of the uterus, being uterine hypoplasia and intrauterine septa the most common abnormalities.

The clinical history of recurrent miscarriage characterized by the onset of spontaneous premature contractions (as opposed to cervical isthmic incompetence where delivery or abortion usually start or even occur with no contractions) should suggest an abnormality of the uterus. Imaging studies such as ultrasonography, hystero salpyngogram, computerized axial tomography and magnetic resonance may help to reach the correct diagnosis. Once the diagnosis has been made, the decision to undergo surgical therapy should be evaluated jointly with the woman, her partner (if available) and the specialist.

General History
For the purpose of the analysis of the record, diseases can be divided into:

- Medical non-communicable diseases and
- Medical communicable diseases.

Medical non-communicable diseases
They affect one in 20 pregnant women, i.e., 5% of the women in childbearing age. They occur prior to pregnancy and may worsen during its course, and they may be life-threatening to the mother. The mother's condition and/or the medication she receives can also affect the fetus as a result of potential changes induced in the mother's physiology. Below is a list of the most conditions that are more relevant, both due to their frequency and their impact.

Diabetes

Diabetes is the most studied non-communicable disease in terms of its impact on gestation, because of the high prevalence rates observed in women of childbearing age. The primary objective of treatment is to ensure that the woman who gets pregnant does so while she has normal glucose levels, and that such levels are kept throughout the periconceptional period. Doing otherwise would increase the risk of maternal and fetal death, prematurity, macrosomia and fetal malformations. Mothers with type I diabetes have a 6- to 8-fold risk of fetal neonatal damage than the general population; mothers with type 2 diabetes mellitus have a 3-fold risk, and mothers with gestational diabetes have twice the risk versus the general population. Diabetic women, especially those with Type I diabetes, have a greater lability, and they are exposed to serious complications such as keto-acidotic coma or hypoglycemic coma.

The best obstetric outcomes are seen when these women seek counseling from 3 to 6 weeks before conception, and when they manage to establish the optimal levels of blood glucose. Routine screening for diabetes before conception might be recommended for women with a history of gestational diabetes in a previous pregnancy, or when they are overweight (BMI 25 kg/m2) or obese (BMI 30 kg/m2), as well as to those with two or more risk factors. Once pregnant, the diabetic woman will require care from a specialized team.

Thyroid disease

The incidence of maternal and neonatal morbidity in women with uncontrolled hyperthyroidism is significant, despite the low frequency of this condition (one every 500 pregnant women). Morbidity may consist of pre-eclampsia, congestive heart failure, thyroid storms, placental abruption, stillbirth, IUGR, LBW and preterm delivery.

The other extreme - hypothyroidism - is associated with morbidity characterized by intellectual deficit, pre-eclampsia and placental abruption also, stillbirth, IUGR, LBW and preterm delivery. There is clear evidence confirming good outcomes in the women that started treatment of their thyroid dysfunction prior to pregnancy. The treatment of the thyroid disorders should be made jointly by the treating doctor and the endocrinologist in both cases (hyper- and hypothyroidism); the goal will be to achieve euthyroidism before pregnancy.

The antithyroid of choice for treating hyperthyroidism is propyl thiouracil; radiation therapy or even surgery may be required at times. Hypothyroidism should be treated with thyroid hormone, and women should be warned not to discontinue hormone therapy when they get pregnant.

Heart disease

It is estimated that from 1 to 4% of pregnancies are associated with heart disease, which would be one of the leading causes of indirect maternal mortality.

Regardless of the type of heart disease, it is crucial to establish the woman's baseline functional status before she gets pregnant, because it has been extensively demonstrated that the hemodynamic changes that occur in the cardiovascular system (detectable from the 10th week of pregnancy) may be life threatening to the women living with heart disease.

Therefore, the patient must be referred to a cardiologist, who will conduct functional heart assessments, based on which the HCPs should advise those women about the right timing for a safe pregnancy, or about the convenience of avoiding pregnancy altogether, depending on the functional cardiovascular impairment found. The cardiac functional capacity is classified in 4 classes following the "New York Heart Association

Classification." Pregnancies should be discouraged in groups III and IV. Below is an adaptation of this classification:

- **Class I.** Asymptomatic patients with regular physical activity; they only show symptoms with very intensive exercise
- **Class II.** Asymptomatic at rest. Symptoms occur with moderate efforts
- **Class III.** Asymptomatic at rest but occurrence of symptoms following mild efforts
- **Class IV.** Patients who have symptoms even at rest

If the woman gets pregnant, she must receive care at a high risk clinic, where the treating team should implement the recommendations developed by the "Consensus of Experts from the European Society of Cardiology" in 2003 on how to handle cardiovascular conditions during pregnancy. Women with heart disease that requires the use of oral anticoagulants during pregnancy must refrain from using them because of their teratogenic effect.

Chronic hypertension

This condition is becoming increasingly frequent. Hypertensive disorders during pregnancy tend to be one of the leading causes of maternal mortality. Indeed, the onset of pre-eclampsia or eclampsia is more likely in women with chronic hypertension. There is evidence showing that this ratio can be as high as 1 case of pre-eclampsia for every 4 women with chronic hypertension. When a woman with chronic hypertension seeks the advice of the health team for guidance on a future pregnancy, the professional that sees her should take a proper anamnesis, conduct a thorough physical examination, and evaluate aspects related to treatment, such as the drugs she is on, dose, adherence and effectiveness of the therapy she is receiving. Finally, laboratory testing should be made to establish the degree of functional impairment caused by hypertension on the patient's organs and systems. Some antihypertensive drugs can be teratogenic and they must be replaced by a medication that is safe for the fetus. Pregnancy should not be allowed until the minimum effective dose to control blood pressure figures has been found. An example is that of the angiotensin converting enzyme inhibitors (see antihypertensives on page XX). Systemic hypertension is associated with IUGR, low birth weight, prematurity and high perinatal mortality. The risk is greatest when there is fetal proteinuria. Refer to the chapter on antenatal care for further aspects related to this issue in the pregnant woman.

Thrombophilias

Thrombophilias are classified as inherited or acquired; they are different entities that share the fact that they both cause a hypercoagulable state that may adversely affect pregnancy. The most common inherited thrombophilia is due to a mutation of factor V Leiden, while among the best known acquired forms is the anti-phospholipid syndrome. The most outstanding morbidity the latter causes involves deep venous thrombosis, pulmonary embolism, heart attacks and strokes, placental abruption, preeclampsia, recurrent miscarriages, stillbirths, IURG and preterm delivery. Due to the number and complexity of the diagnostic tests available, primary care professionals should make a proper interrogation to reach a presumptive diagnosis, but the lab tests must be ultimately in the hands of the lab expert. Women who are known to carry thrombophilia should be properly advised on the risks posed by pregnancy and the need for strict monitoring if pregnancy does occur. Those who decide to postpone pregnancy or not to have a baby at all must be properly counseled about contraceptive methods, but they should be made aware of the fact that the estrogen present in some contraceptives promotes hypercoagulable states. In these cases it is preferable to use progesterone-only contraceptives, IUDs or barrier methods. Before and during pregnancy, low-molecular weight heparin is the treatment of choice. This implies training women to self-administer the injections. Despite being extremely secure, they require laboratory coagulation controls as prescribed by the specialist.

Anemia
Anemia is one of the most prevalent conditions among women in our region. Treatment will depend on the etiology: iron deficiency anemia is usually the most frequent (80% of all anemias); it is associated with placenta previa, placental hypertrophy or abruption placentae, pre-eclampsia and postpartum hemorrhage. If severe, it may be associated with IUGR and neonatal mortality. Any woman that suffers from iron deficiency anemia when she is planning to get pregnant should receive 120 mg of elemental iron per day. Pregnancy in itself is often an anemia-prone period, so making women reach pregnancy with good circulating and stored levels must be one of the premises of preconceptional control. Women with anemia have a reduced tolerance to anemia, and they are at a higher risk of life-threatening bleeding complications during pregnancy, childbirth or postpartum.

Asthma
Women with asthma who become pregnant and do not suffer asthma attacks during pregnancy have the same obstetric and neonatal outcomes as non asthmatics. Conversely, pregnant patients with a poorly-controlled disease tend to have worse obstetric outcomes, including complications such as pre-eclampsia, hypertension, hyperemesis gravidarum, spontaneous abortion, IUGR, prematurity and low birth weight. The course of the previous pregnancy has proven to be a good indicator of what will happen with asthma in a future pregnancy, so it is rare for women that had no attacks in the first pregnancy to have any in a subsequent pregnancy, while it is highly likely for those that had worsening of the attacks to present them again.Women planning to become pregnant should use preventive therapy with inhaled corticosteroids, which have been shown to be safe. However, the risk of cleft palate, cleft lip and low weight is increased 3- to 6-fold among those who receive oral corticosteroids. Theophylline continues to be a safe drug.Women with asthma who do not wish to become pregnant should be advised on the use of adequate contraception.

Seizures
Among the chronic neurological conditions that cause seizures, epilepsy affects one in 300 women at childbearing age, and it is the neurological disorder most commonly seen during pregnancy. There is a 1/15 proven increase of birth defects in the epileptic women's offspring, both due to the condition itself and to the use of the drugs used to control it. Repeated episodes of generalized tonic clonic or partial complex seizures are associated with spontaneous abortions, fetal hypoxia, bradycardia, and perinatal death, in addition to the risk of preterm labour and IUGR, either as a result of the course of the condition itself, or of the poor management of therapy. The course of the disease during pregnancy remains unchanged in half the cases; it may improve in 5% of the pregnant women and it worsens in 45%.

Psychiatric disorders
Among other things, pregnancy has been characterized as a period of marked emotional lability. During pregnancy, childbirth or postpartum, many women will present psychiatric disorders of various severity for the first time, or they will suffer recurrence of previous psychiatric conditions. Psychiatric disorders have been associated with poor maternal and perinatal outcomes. The range of poor outcomes varies, from episodes of anxiety that are not well tolerated, severe major depression that may cause the mother to neglect the care of her child as well as her own, and even reaching suicide or infanticide. Due to the increasing frequency of these disorders and their potential severity, professionals should investigate suspicious symptoms exhaustively.

- **Mood disorders and anxiety.** These disorders are very frequent, and they include, but are not limited to depression and anxiety disorders. Women planning to get pregnant should be warned about the risks of relapses, which can exceed

50% of cases, if they discontinue their medication. The teratogenic effects of many of the medications used to treat these conditions have been confirmed; such is the case of lithium salts. Other drugs are not recommended, because despite the lack of compelling data, the evidence seems to suggest an association between some drugs (such as selective serotonin reuptake inhibitors) and adverse effects on the fetus. Owing to the high levels of relapse, it is often impossible to suggest abandoning treatment; in such cases, the doctor should choose mono-drug schemes at the lowest effective dose

- **Schizophrenia.** This chronic disease is characterized both by its severity and the high likelihood of decompensation during pregnancy. As a result of the continued use of medication, addictions and personal neglect, these women are more prone to have children with birth defects, abortions, IUGR, malnutrition and fetal or maternal death. Decompensations may be of such magnitude so as to lead to infanticide or to self-injury. It is unusual for schizophrenic women to seek preconception controls; their pregnancies tend to be unplanned. The preconception visit should include taking a thorough history, asking about family history of psychotic disorders, a history of affective disorders or the woman's personal history of psychosis. From the moment the woman is diagnosed as suffering (or potentially suffering) from schizophrenia, her pregnancy should be planned jointly with the treating psychiatrist, ensuring a strict clinical monitoring, and with the ability to communicate with the woman, her family, psychiatrist and other members of the health team. Treatment of schizophrenia requires the use of antipsychotics, which are known to be highly teratogenic. Hence, whenever possible, and under strict clinical control, it is recommended to discontinue the drug right before the period at which the woman is planning to get pregnant, until she has completed her first trimester. If the condition is so severe as to prevent the woman from caring for herself, or if it poses a risk to another person, the medication cannot be discontinued and pregnancy should be discouraged. This woman should be assessed in conjunction with the treating psychiatrist, bearing in mind that even though all antipsychotics are potentially teratogenic, chlorpromazine has proved to be the most dangerous. Therefore, if medication is to be maintained, the recommended drugs would be haloperidol, phenothiazines and perazine-related drugs

Maternal communicable diseases

Most of the infectious diseases presented below have the potential of being teratogenic during the development of the embryo, and their deleterious action may continue beyond that period, and sometimes even after birth. An example of this is congenital syphilis. That is what makes it so important primarily to prevent its occurrence during pregnancy; however, if infection does occur, both the mother and the newborn should be treated, whenever necessary.

Rubella

It is recommended to evaluate the susceptibility to rubella, asking the woman whether she had the infection in the past or whether she has received immunization. If any doubts persist, rubella serology testing is justified in every woman of childbearing age. All susceptible women should be vaccinated before pregnancy or, if that did not occur, after delivery.

Varicella

It is recommended to evaluate the susceptibility to varicella based on the woman's history, ruling out the history of active disease or immunization. Even if the adult women declare not having had chickenpox, or not being sure, more than 85% are immune to it. In case of doubts the varicella serology testing should be carried out in all women of childbearing age. If serology testing is not available, immunization will be the strategy of choice. All susceptible women should be immunized before they get pregnant or after childbirth.

Cytomegalovirus
Cytomegalovirus (CMV) is the most common congenital infection, and it is the leading viral cause of neurosensorial deafness and mental retardation. CMV belongs to the group of herpes virus, and it is relatively little contagious, requiring close and prolonged contact. The infection does not have any serious clinical consequences in adults, except in immunosuppressed patients. This infection occurs in 1% of births (80% are asymptomatic). All women, especially mothers with small children and those who have contact with children because of their occupation (teachers, health care professionals) should be advised to be careful about hygiene (hand washing) giving them instructions as to how to handle the diapers impregnated with urine of young children, who are usually the main source of infection

Toxoplasmosis
All women willing to get pregnant should receive counseling about ways to avoid acquiring toxoplasmosis during pregnancy, and about the risks it can cause. In countries where the screening of Toxoplasmosis is implemented, women with positive toxoplasma antibodies should be warned that the mother with a chronic infection transmits the parasite to the fetus (reactivation) only exceptionally. See “Toxoplasmosis” in the chapter on antenatal care. All women, aware or not of their HIV status, should be given general advice on the prevention of toxoplasmosis.

Chart 1. Education measures in case of negative antibodies for toxoplasmosis
• Eliminate the consumption of raw or undercooked meat
• Wear gloves and wash hands thoroughly after handling raw meat
• Wash thoroughly all the kitchen utensils that were in contact with raw meat
• Be thorough when washing the vegetables to be eaten raw
• Wear gloves whenever in contact with soil, and wash hands thoroughly after touching the ground
• Keep cats indoors and feed them with safe animal feed
• Wear gloves while cleaning the “doghouse” and wash your hands afterwards.

Syphilis
Knowing the syphilis status before pregnancy contributes to treat the woman and her contacts at an ideal time. Women with syphilis should be informed about the risks of vertical transmission of this sexually transmitted infection.

HIV
Women at childbearing age have the right to be screened for HIV after proper counseling; confidentiality must be ensured. It is advisable to suggest HIV screening to every pregnant woman who intends to get pregnant. If the test is positive, she should be informed on the risk of vertical transmission and the availability of prophylaxis to prevent it. Women who choose not to get pregnant should be offered safe contraceptive methods

Life-style
Some habits may determine a series of risks for women of child-bearing age. The identification and modification of such habits may benefit women and their future pregnancy.

Nutritional habits

Poor nutritional habits should be identified in the preconception evaluation, assessing any potential consequences, such as overweight, excessive slimness, anorexia, bulimia and inadequate vitamin supplementation. The quality of the diet received before and during pregnancy has an impact on some perinatal and maternal outcomes, therefore, maintaining a healthy and balanced diet is as important before as during pregnancy. For this reason all women seeking care at a preconception visit should receive oral and written instructions concerning the ideal quantity and quality of food to be consumed while preparing for pregnancy and throughout it. It is recommended to engage nutritionists to provide this counseling; they should actively participate in the team that provides preconceptional care, providing direct counseling or helping with her care.

The current evidence shows that more than half the cases of neural tube defects could be prevented if the mother had taken enough folic acid at least a month and a half before getting pregnant and through the first three months of pregnancy.

Spinal and brain congenital defects occur before the woman knows she is pregnant.

The recommendations below apply at an individual level before conception:

a) Folic day: 0.4 mg/day, to prevent the occurrence of Neural Tube defects
b) Women that have already had a child with a neural tube defect and intending to get pregnant must take 10 times that dosage to prevent recurrence: 4 mg of folic acid/day
Folic acid taken after pregnancy is known fails to prevent neural tube defects

At a population level, flour fortification has been implemented in some countries in the region. Even in the countries that have food fortified with Folic Acid, the women with a history of neural tube defects in earlier pregnancies shall receive a 4-mg/day dose of folic acid, as stated above.

Another example of congenital defect prevention at a population level is iodine supplementation in regions with a high frequency of endemic cretinism. This measure leads to a significant reduction of this condition, with no known adverse effects. Several countries in the Americas have a law establishing the mandatory iodine fortification of salt for human consumption. This has restricted the disorder to the areas with low resources, where people consume raw, unprocessed salt.

Obesity.

Obesity and overweight are increasingly common in our region. A woman is considered obese when her body mass index (BMI) is equal to or greater than 30 kg/m2. Among the unwanted consequences of obesity in pregnant women, we can see the development of pregnancy-induced hypertension, diabetes, thromboembolic disorders, increased surgical childbirth, infections, postpartum anemia and maternal death. On the other hand, newborns may present with defects of the neural tube, preterm delivery, fetal macrosomia, dystocia, neonatal depression and fetal death. It is advisable to provide information on the risks of obesity and overweight and to ensure their access to weight reduction programs. Start by suggesting a plan consisting of counseling, diet and scheduled exercise; these measures have proved to be more effective than surgery. Drug-alone treatments have not shown to be beneficial. Surgical procedures might be an option in some cases that fail to respond to dietary hygienic treatment.

Prepregnancy underweight
A person is underweight when his/her BMI is less than 18.5 kg/m2. Pregravidic underweight has been associated with preterm delivery, low birth weight and gastroschisis. An underweight woman attending a prepregnancy control should be evaluated to rule out intake deficits (related to problems in the access of food in good quantity and quality), eating disorders or concomitant diseases.

Eating disorders
Anorexia and bulimia are among the best known eating disorders. Women with severe anorexia have difficulties getting pregnant, while bulimics get pregnant easily. Both diseases are accompanied with high rates of abortion, low birth weight and a range of obstetric complications. With their emotional lability, these women have an increased frequency of postpartum depression. These disorders should be regularly questioned in the preconceptional visit, knowing that patients tend to hide them. When the diagnosis is made before conception, the woman should be suggested to postpone pregnancy until the disturbance is corrected. To that aim, she should be referred to a team specialized in this field.

Exercise
In general, exercise and sports are healthy activities, since they produce physical and psychological wellbeing both in women intending to become pregnant and in those that are already pregnant. In the latter, aerobic exercise is appropriate during and after pregnancy, to strengthen the women's muscles and to activate the venous circulation.

Substance use
The consumption of licit and illicit substances remains high, and it is deleterious to the woman and her child. Overall, the population is well informed about the risks of illicit substances and even about the impact of tobacco during pregnancy, but less informed about the damage caused by alcohol. The preconceptional visit has proved to be a better time to ask about the use and abuse of substances, there is a relationship between consumption before and during pregnancy. It has been shown that delaying pregnancy and treating the addiction are effective measures in women who intend to get pregnant.

Smoking
Tobacco smoking - active and second-hand - affects both fetus and mother. Harm attributed to smoking includes infertility, spontaneous abortion, low birth weight birth, fetal growth restriction, risk of preterm birth, abruption placenta, fetal and perinatal death, and increased risk of respiratory tract infections in the newborn. Discouraging smoking is a priority, and the woman should be offered an active cessation program designed for pregnant women.

Alcohol
Alcohol is a proven teratogenic agent, and no dose is considered safe during pregnancy. It is associated with intrauterine death, restriction of intrauterine and postnatal growth, low birth weight, abnormalities of the central nervous system and behaviour disorders. Excessive alcohol consumption early during pregnancy can cause the Fetal Alcohol Syndrome in about 10% of pregnancies. Education campaigns are extremely important, because there is complete unawareness of this risk in the population. Campaigns should focus on "alcohol" and not on "alcoholism." Until the woman succeeds in quitting alcohol, she should be advised to postpone pregnancy, and an effective contraceptive should be prescribed for that purpose.

Illegal drugs
Generally speaking, we can say that all drugs have a negative impact on the woman, her surroundings and her future pregnancy. Most illicit drugs cross the placental barrier and affect the fetus, which is very vulnerable. Very low molecular weight pass to the fetus easily, and a small amount can actually represent an overdose. The use of cocaine during pregnancy has been associated with defects caused by vascular disruption, expressed as central nervous system abnormalities, limb reduction defects and IUGR. The effects of marijuana hare similar to those caused by tobacco smoking. In addition to explaining the risks of substance consumption, a treatment plan for the abandonment of addiction should be proposed. Until that is achieved, the woman should be suggested to postpone pregnancy, and she should be offered a safe contraceptive.

Coffee, tea, "mate", cola soft drinks
These common stimulants should be consumed moderately. Their use at high doses in the first trimester of pregnancy has been associated with spontaneous abortion. During pregnancy they can cause low birth weight.

Drug consumption
When the normal consumption of drugs is required to cure or control specific conditions, the doctor should always assess the right time to recommend pregnancy. But in other cases the use of self-prescribed drugs may suggest an addictive pattern. In these cases, as was already mentioned in the cases of other substance abuses, the woman should be informed about the risks they represent for the woman's health and her future pregnancy. The premise all women that intend to become pregnant must receive is "Drugs should be avoided unless indispensable". When a medication is considered absolutely necessary for a woman, she should consult her health care team to carefully evaluate the potential risk to the fetus against the expected benefit.

The number of drugs available in the market is so great that we will only mention those that should be avoided by women planning pregnancy because of their deleterious effect.

Isotretinoin
Vitamin A and some of its by-products (retinoic acid) have very well proven teratogenic effects in humans. Isotretinoin for the treatment of cystic acne, and etretinate for psoriasis are highly teratogenic. Pregnancy should be discouraged until one year after discontinuing their use; safe contraceptives should be prescribed to ensure that. Birth defects caused by retinoids are mainly craniofacial, cardiovascular, of the central nervous system and thymus. Mental retardation has also been observed in half the cases of surviving children older than 5 years; one third of this group had no defects at birth. The contraindication of the use of this vitamin and its by-products during pregnancy must be disseminated among health care teams and the general population.

Thalidomide
Thalidomide is a proven teratogen that causes a typical picture (with phocomelia). It was banned for that reason until recent years, when the ban was lifted because it was found to be of benefit for the treatment of leprosy and HIV. Any woman on thalidomide must stop it before pregnancy.

Anticonvulsants
Many of the drugs used to treat seizures have been associated with multiple disorders, although there is some difficulty to determine if all the changes are due to drugs or if they are related with the underlying disease.

- Diphenylhydantoin is associated with an increased risk of neural tube defects; therefore, its use is discouraged (since they may interfere in the metabolism of folates). Consequently, the use of folic acid at a dose of 4 mg /day is specifically recommended during the periconceptional period. But the best known condition is the fetal hydantoin syndrome, consisting of IUGR, microcephaly, facial dysmorphism, cleft palate and cleft lip, distal digital hypoplasia and sometimes heart disease
- Carbamazepine has been associated with the risk of stillbirth, neural tube defects, heart defects and cleft palate, among other conditions
- Valproic acid has been associated with neural tube defects, IUGR, delayed development and learning disorders, as well as congenital heart disease

Coumarin
The use of anticoagulants is restricted mainly to the women with prosthetic heart valves or a history of deep venous thrombosis. The teratogenic effect is expressed as hypoplasia of the nasal cartilage, optic atrophy, epiphysis punctata (also known as warfarin embryopathy). Hence, switching to low molecular weight heparins is recommended as soon as the woman starts planning pregnancy.

Antihypertensives
All antihypertensive agents should be used carefully because of the potentially life-threatening risks they pose to women, for example by causing severe hypotension. The risk of severe hypotension tends to be more severe for the fetus. However, apart from the hemodynamic risks caused by the use of this medication, some of them have shown evidence of being teratogenic. Therefore, when a woman plans to get pregnant, or is undergoing the initial stages of pregnancy, she should shift to safer antihypertensive drugs, such as alpha methyl dopa in chronic hypertension and hydralazine in acute hypertension

Acute hypertension
Angiotensin converting enzyme (ACE) inhibitors and angiotensin II antagonists (ARA II). These antihypertensive agents have been associated with fetal kidney damage, especially when used during the second and third trimesters.

Lithium salts
This is an antidepressant agent that can cause congenital heart disease in human fetuses, and other malformations, including neural tube defects. It needs to be discontinued or replaced by safer antidepressants in women that are planning to get pregnant.

Antibiotics
The use of antibiotics is extremely widespread, and their safety level is quite high. Anyway, the general concept mentioned above still applies, i.e., their use should be restricted only to those cases where benefits outweigh risks.

Special care is required not to use the antibiotics below:

- Streptomycin and kanamycin. They have been associated with deafness due to their ototoxicity
- Tetracyclines. Their use during pregnancy has been associated with skeletal disorders and the abnormal formation of tooth enamel. They have also been associated with liver toxicity in women and with other neonatal disorders, such as neural tube defects, cleft palate, cleft lip, heart disease and limb shortening, among other conditions

Misoprostol
This drug has been associated with birth defects related to the interruption or changes of the embryofetal circulatory flow, a phenomenon also known as vascular disruption. Such malformations are: facial paralysis, lateral gaze palsy, hydrocephalus and heart disease.

Immunization
The preconception visit must be an environment designed to provide comprehensive health care to women. Immunization before pregnancy is a primary preventive measure that has proven to be highly effective in reducing maternal-fetal transmission of certain infections. Therefore, the immune status of every woman that seeks counseling at the preconception visit should be investigated, and she should be vaccinated accordingly, even if she is not planning pregnancy at the time.

Varicella
Ideally, all girls should be immunized against chickenpox at an early age. However, women that have not been vaccinated and have no evidence of having had chickenpox at some point may be immunized during the preconceptional visit. The administration of this vaccine is contraindicated during pregnancy.

Rubella.
Although this vaccine has proven to be quite safe, its application is contraindicated during pregnancy.

Hepatitis B, Tetanus and Flu
While it is ideal to administer these vaccines at the preconception visit, it is important to know that they can also be applied during pregnancy, as there is evidence that the benefits outweigh the risks involved. Many of the actions described to prevent birth defects have the virtue of improving maternal health (control of hypertension, diabetes, etc.), thereby reducing the risk of injury to women.

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CHAPTER III

Prenatal Control
Monitoring During Gestation
Assessment of Conception Risk and Behaviors

Efficacy of routine prenatal control

In 1994 Huntington stated that “prenatal control pays for itself” and in this century the critical evaluations of prenatal control have been consistent with that statement. Most authors currently agree with its efficacy and countries do their best to increase coverage and improve quality, while people demand it more firmly.

Even when the evidence is favorable, some factors have contributed to the poor reputation of prenatal control, care services that received that name, but were actually just visits in which providers did not meet the minimum quality standards, with a poor interaction between the user, her family and the health care workers. That reflects the need to establish the criteria that define quality prenatal control.

Definition and background
Prenatal control (antenatal control, prenatal care, prenatal visits) refer to the pregnant woman’s scheduled visits or appointments with health team members, to monitor the course of pregnancy and get a proper preparation for delivery and child rearing.

The aims of prenatal control are:

- Detection of subclinical maternal conditions
- prevention, early diagnosis and therapy of pregnancy-related complications
- monitoring of fetal growth and liveliness
- reduction of minor pregnancy-related derangements and symptoms
- psycho-physical preparedness for childbirth
- Provision of educational contents about health, family and child-rearing issues

An effective prenatal control must meet four basic requirements:

- Early
- Complete
- Periodical
- Broad coverage

Early
The first visit must take place early, preferably within the first trimester of pregnancy. This enables health providers to undertake timely health promotion, protection and recovery actions that are ultimately the core reasons for control. Furthermore, it enables an early identification of high-risk pregnancies, thus increasing the chances of effectively planning the way each case should be treated, i.e., defining the characteristics of the obstetric care they require.

Periodical
The frequency of prenatal controls varies depending on the pregnant woman’s risk. Women with low-risk pregnancies will require fewer controls (from 4 to 6) than those with high risk.

Complete
Minimal control contents must ensure the effective compliance with health promotion, protection, recovery and rehabilitation actions.

Broad coverage: The higher the percentage of the population under control, (ideally it should cover all the pregnant women) the more positive the impact on maternal and perinatal morbidity and mortality.

In general terms, an effective prenatal monitoring (essentially an outpatient follow-up), does not require costly facilities, complex paraphernalia or sophisticated laboratories; however, it does require the systematic use of a clinical record that may collect and document the relevant data, together with a sensible use of sensitive technologies that may give an early warning of the presence of a risk higher than expected.

A prenatal control that is adequate in terms of its number, quality, contents, timeliness, and differentiated according to risk, offers a huge potential contribution to family health, and it is a clear example of preventive medicine. Endowed with these characteristics and orientations, it is an area that has had a very significant development in the last forty years. When routinely and extensively applied, and together with other public health measures such as institutional childbirth care, the use of risk criteria to determine referral and levels of care, and the immediate care of newborns, contribute to prevent deaths and maternal and perinatal injuries.

Apart from the improvement in perinatal mortality rates and the causes of maternal death that may relate with the inclusion of the extensive prenatal control in the mother and child programs, there are additional potential effects whose impact is difficult to ascertain, but they are just as important. Clarifying the pregnant woman's doubts, clearing fears and taboos, while respecting the cultural patterns, getting closer to the pregnant women and making them trust the health system, achieving a more positive attitude toward maternity, toward childbirth spacing, improving family habits, increasing willingness to get a good control of the child's growth and future development, promoting a positive attitude toward natural breastfeeding, disseminating a vaccination plan, etc., these are all examples of the multiple advantages offered by a good prenatal control program.

However, there are barriers that hinder an effective prenatal control:

a) Cost (when control is not provided to the user free of charge), added to the transportation expenditures, loss of working hours, etc.
b) Inadequate capacity (quality, time, etc.) of the health team
c) Organizational issues that hinder the provision of prenatal control
d) Cultural barriers
e) Geographical access difficulties
f) Disbelief about the goodness of health systems and the need for control
g) Lack of promotion at a community level, and ownership of its significance

Objectives and activities proposed
The order chosen to present the specific objectives and the activities proposed for the quality prenatal control are consistent with the diagram presented in the CLAP/WR Perinatal Clinical Record. This record is intended to be the roadmap the health professional will have to follow when he/she wants to provide quality care to the pregnant woman and her child.

Chart 2. Specific Objectives and Activities Proposed for Prenatal Control

Specific Objectives	Proposed Activities
Confirm pregnancy	Conduct clinical and lab testing to diagnose pregnancy
Improve the quality of prenatal control	Utilización de algunas tecnologías apropiadas.
Obtain data to plan prenatal control, care of delivery, puerperium and newborn	Usage of the Perinatal Electronic System
Roadmap to guide the provider in the provision of good quality prenatal control	Usage of the Perinatal Clinical Record
Detect risks in the population	Evaluate perinatal risk
Getting information relevant for pregnancy	History
Set a timetable that may enable planning of the activities related to prenatal control	Determine gestational age and Estimated Date of Delivery
Assess the mother's nutritional status	Measuring mother's weight and height. Calculation of weight gain during pregnancy
Investigate hazardous life styles	Ask about smoking (passive and active), drugs, alcohol and violence
Reduce the negative impact of vertically transmitted infections	Prevention, detection and therapy of vertically transmitted infections
Prevent neonatal and puerperal tetanus	Antitetanic vaccine
Detect potential oral and dental septic processes	Oral and dental examination
Detect potential changes of nipple, inflammatory and/ or tumor conditions of breast	Breast examination
Rule out cervicl cancer, precursor lesions and evaluate cervical competence	Genital examination, oncological colpocytology, colposcopy
Screen for a potential maternal-fetal,newborn blood incompatibility	Determination of blood group and Rh factor
Prevent, detect and treat maternal anemia	Assess hemoglobin levels and provide iron and folic acid therapy
Rule out proteinuria, glucosuria and bacteriuria	Urinalysis and urine culture
Rule out diabetes mellitus and gestational diabetes	Assess blood sugar and glucose tolerance test
Provide educational contents and information preparing for childbirth and child rearing	Preparedness for childbirth; counseling for breastfeeding
Confirm existence of fetal life	Screen for fetal movements and heart rate
Anticipate diagnosis and prevent premature childbirth	Evaluation of uterine contractility patterns
Screen for blood pressure changes	Measure blood pressure, identify edemas and proteinuria
Rule out fetal growth abnormalities	Evaluate growth through uterine height, mother's weight gain, and ultrasound.
Early detection of multiple pregnancy to prevent its complications	Diagnose number of fetuses
Screen for abnormal fetal presentations	Fetal presentation examination
Detect potential pelvic dystocias	Evaluation of pelvis

Timetable of the activities for low-risk prenatal visits

The activities for prenatal control must be scheduled in a plan that contemplates as many activities as possible to reduce the number of controls to a useful minimum.

This document proposes a minimum number of consultations to allow compliance with all the activities required to achieve an adequate prenatal control, as long as the pregnancy continue to be low risk.

The choice of the number and timeliness of each consultation was based in the knowledge of the epidemiology of the most frequent maternal and perinatal problems; the possibilities for diagnosing them, solving or controlling them with the appropriate technologies, best practices and with procedures whose efficacy has been shown with the best existing evidence. When the woman seeks pregnancy care late, the health professionals must complete the activities that should have been covered at the visits that were skipped.

Chart 3. Timetable of the activities to be performed at the low-risk prenatal visits

Activities	Weeks of pregnancy at each visit				
	Before Wk 20 (*)	Between 22 and 24	Between 27 and 29	Between 33 and 35	Between 38 and 40
	1st visit	2nd visit	3rd visit	4th visit	5th visit
Pregnancy test	X				
Calculation of amenorrhea	X	X	X	X	X
Perinatal clinical record and risk assessment	X	X	X	X	X
Exhaustive clinical examination	X				
Body weight	X	X	X	X	X
Height	X				
Investigate risky lifestyles	X	X		X	
Detect susceptibility to rubeolla	X				
Antitetanic vaccine (*)		X	X		
Oral examination	X				
Examination of breasts	X				
Gynecological examination, PAP, colposcopy (**)	X				
Blood group and Rh factor	X				
Detection of toxoplasmosis	X		X		
Detection of HIV	X			X	
Hemoglobin assays	X		X		
Iron and Folic Acid Supplementation	X	X	X	X	X
Detection of syphilis	X			X	
Detection of Chagas' Disease	X				
Detection of Malaria	X				
Urine culture	X		X		
Detection of diabetes	X			X	
Detection of B Streptococcus infection				X	
Educational contents for childbirth and breastfeeding	X	X	X	X	X
Blood pressure assessment		X	X	X	X
Fetal growth assessment		X	X	X	X
Diagnosis of fetal livelihood		X	X	X	X
Assessment of pelvic capacity					X
Counseling and provision of contraceptives					X

(*) The activities scheduled for the first visit always need to be completed, regardless of the gestational age at the time of the visit.

(*) If there are doubts as to whether the pregnant woman will come back or not, or if it is indicated in the national standard, the woman may receive vaccination before week 20

(**) As early as possible or according to norm.

Objective *Confirm pregnancy*
Activity *Performance of clinical examinations and laboratory testing to diagnose pregnancy.*

The diagnosis of pregnancy is based on the clinical signs suggesting probability and certainty. Chart 4 outlines the signs and techniques used for the assessment.

Chart 4. Signs indicating probability or certainty and diagnostic techniques

Signs of pregnancy	Diagnostic techniques
Probability Signs	
Amenorrhea	Interview
Changes in the uterus	Gyneco-obstetric examination
Detection of HCG	Blood and urine assessment
Certainty – Positive signs	
Detection of the HCG beta subunit	Blood and urine assessment
Detection of fetal parts	Abdominal palpation
Fetal heart beats	Obstetric stethoscope, Doppler or ultrasound
Visualization of fetus	Ultrasound

Probatility signs

Amenorrhea
Any delay in the occurrence of menses in women at childbearing age should suggest pregnancy.

Changes in uterus
The uterus adopts a more globulous shape; the vaginal fundus gets more convex (Noble-Budin sign) and its consistency is reduced.

Chart 5. Changes in the size of the uterus during the first half of pregnancy

Week of amenorrhea	Size of uterus
<10	It does not reach pubis
12	It reaches the pubic symphisis
16	The fundus is at half distance between symphisis and navel
20	The fundus reaches the navel in height

Human Chorionic Gonadotropin Hormone (HCG)
HCG can be detected as early as 8 days after fecundation (therefore, even before the delay of the menstrual period is perceived).
The greatest peak of HCG occurs 60 to 70 days after the last menses. HCG may give false positives caused by the interference of LH; this effect is usually avoided by dosaging the HCG beta subunit.
There are fast, user-friendly and relatively inexpensive commercial tests available for home use. They are typically very sensitive, with higher sensitivity when the first urine in the morning is used for testing.

Positive signs

HCG Beta Subunit
The beta subunit of HCG is detectable even before nesting, and it is exclusively produced by the syncytiotrophoblast, thus preventing any cross reactions with other hormones. It is the earliest and most sensitive method to diagnose pregnancy. The remaining positive signs of pregnancy are detailed with the activities discussed in **"Diagnosis of fetal life".**
.

Objective *Improve the quality of prenatal control*
Activity *Using some appropriate technologies*

CLAP/WR tries to make proven, effective and low cost technologies available to health care professionals, to contribute to deliver good quality health care.

Gestogram

Measurements of some parameters were added to the obstetric calendar selected on the basis of their reliability and precision, to calculate gestational age from the date of the last menses; it also allows to monitor fetal growth and liveliness and to check normalcy of the mother's weight gain, her blood pressure and uterine contractions.

Thus, the gestogram consists of two discs, one turning on top of the other; gestational age in completed weeks can be found by matching the red arrow with the first day of the last period, and seeking the arrow corresponding to the visit. The values to be compared are located to the left of the week found: percentiles 90 and 10 for uterine height, percentiles 90 and 25 for mother's weight gain and percentiles 95 and 5 for the fetal abdominal girth by the ultrasound.

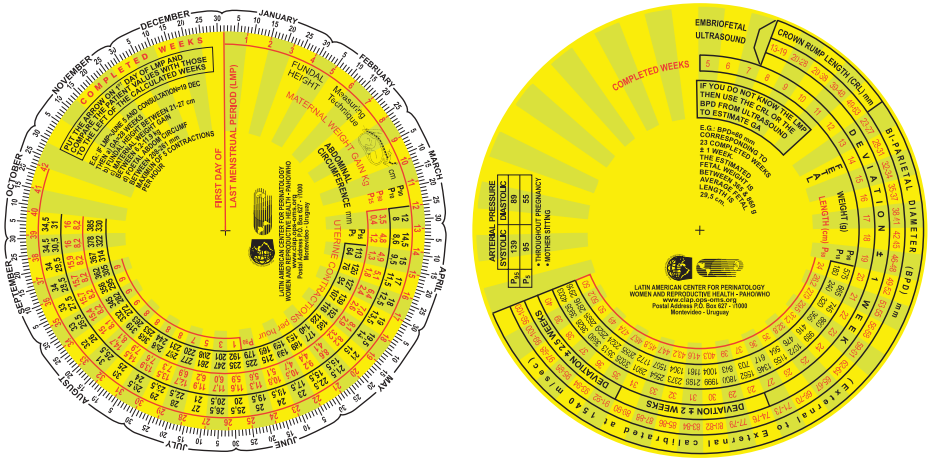


Figure 2. Front and back of gestogram

Apart from calculating gestational age (amenorrhea), this side of the gestogram permits to detect cases:

- with intrauterine growth restriction (measurements under the lowest values for the respective percentiles),
- of macrosomy (measures greater than the highest values of the appropriate percentiles),
- of changes in the duration of pregnancy, either shorter (prematurity) or longer (prolonged in time),
- with contractility greater than appropriate for that age (before Week 37).

If the DLM is not known, the back of the gestogram makes it possible to estimate gestational age with a known error, on the basis of embryo-fetal ultrasound measurements. It shows the percentiles values corresponding to each week starting on week 20: P90 and P10 for fetal weight and P50 for height.

If the DLM is not known and there are no ultrasound measurements of the fetus during pregnancy, the newborn's weight, height and biparietal diameter values measured with a compass may be used as a fast and simple approximation of the duration of pregnancy.

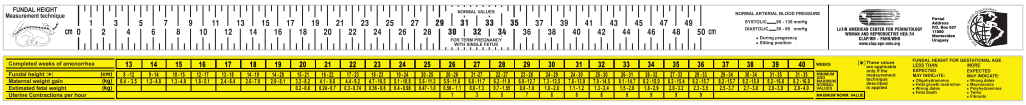
Reminder of percentiles 95 and 5 for the mother's systolic and diastolic blood pressure with the mother is sitting down, valid for all pregnancy.

The data in the gestogram arise from investigations performed by CLAP/WR in healthy Latin American populations in longitudinal follow-ups.

Obstetric tape

Apart from the conventional metric tape, the measurements of several parameters selected because of their reliability and precision help to monitor fetal growth and wellbeing, checking whether maternal weight gain, blood pressure and uterine contractility are normal, while allowing us to know the fetal weight for a specific gestational age.

Figure 3. Front and back of obstetric tape



The obstetric tape has two sides.
The front side (presented in figure 3) is white and it contains:

- The sketch that illustrates the measurement technique corresponding to the normal maximum and minimum values of the uterine height by gestational age
- The metric tape as such, featuring two black, broad bands, the normal values for uterine height for a full-term pregnancy with a single fetus
- The normal values of systolic and diastolic blood pressure

The back yellow side (figure 3) has:

- The normal minimum and maximum values for each gestational age (after week 13 and week 40):
  - Uterine height (in centimeters)
  - Maternal weight gain (in kilograms)
  - Fetal weight (in kilograms)
- The maximum values of the uterine contractions up to week 37
- The clinical pictures that result in a height lower or higher than expected according to gestational age

As in the gestogram, the data in this obstetric tape arise from research conducted by CLAP/WR in healthy Latin American populations followed up longitudinally.

Chart 6. Main data provided by the obstetric tape and gestogram developed by CLAP/WR

	Obstetric tape	Gestogram
Uterine height (p 10 and p 90)	X	X
Maternal weight gain (p 25 and p 90)	X	X
Uterine contractions per hour (p 90 from week 25)	X	X
Maternal blood pressure (p 5 and p 95)	X	X
Fetal weight for each gestational age (p 10 and p 90)	X	X
Fetal height for each gestational age (p 50)		X
Fetal abdominal girth by ultrasound (p 5 and p 95)		X
Calculation of gestational age		X
		X
p = percentile		

Normal values for uterine height, maternal weight gain and weight for height

Uterine Height and Mother Weight

Clinical evaluation of fetal growth and maternal nutrition

The values presented cover from 10th to 90th percentiles for Uterine Height (UH) and mother's weight for height, and 25th and 90th percentiles for the mother's weight gain starting on the 13th week. Normal standards were developed by CLAP*.

Evaluation of Fetal Growth

Intrauterine Growth Retardation (IUGR) must be suspected when the mother's weight increments are below P25 or when UH values are under P10 for their respective curves. If both methods (abnormal values of mother's weight gain or UH) are used in combination to define a potential IUGR, sensitivity (ability to diagnose the true IUGRs) reaches 75%.

Mother's weight gain is calculated by subtracting the mother's current weight from weight before pregnancy. As the latter value is often unavailable, the P10 value on the chart for mother weight for length by gestational age should be used as an alternative.

Clinical suspicions of IUGR must be confirmed with US, ruling out false positives as olygoamnios, errors of onset of amenorrhea, etc.

Macrosomia will be suspected clinically if the UH values exceed P90 of the normal standard; the method sensitivity is around 90%. Having ruled out polyhydramnios, errors of amenorrhea, twin pregnancy, etc, the US will confirm diagnosis.

Evaluation of mother's nutrition

Malnutrition should be suspected when weight gain is lower than P25 or when weight for length is lower than P10 of their respective standards. If any value exceeds the P 90 value in the respective standard, excessive intake or fluid retention should be suspected.

* Fescina R.H. y col. Bol Of. Sanit Panam. 95:156,1983 / 96:377,1984
Acta Obstet Gynecol. Scand 62: 221, 1987

Increase in Mother Weight in kg Percentiles		Weeks	Uterine Height ** in cm Percentiles	
25	90		10	90
0.4	3.5	13	8.0	12.0
1.2	4.8	14	9.0	14.0
1.3	4.9	15	10.0	15.0
1.8	5.1	16	12.0	17.0
2.4	6.4	17	13.0	18.0
2.6	7.0	18	14.0	19.0
2.9	8.1	19	14.0	20.0
3.2	8.2	20	15.0	21.0
4.1	8.6	21	16.0	22.0
4.4	9.2	22	17.0	23.0
4.7	10.5	23	18.0	23.0
5.1	10.8	24	19.0	24.0
5.6	11.3	25	20.0	25.0
5.9	11.6	26	20.0	26.0
6.0	11.7	27	21.0	27.0
6.2	11.9	28	22.0	27.0
6.9	12.7	29	23.0	28.0
7.3	13.5	30	24.0	29.0
7.6	13.9	31	24.0	30.0
7.9	14.5	32	25.0	30.0
8.1	14.7	33	26.0	31.0
8.2	15.0	34	26.0	32.0
8.2	15.4	35	27.0	33.0
8.2	15.7	36	28.0	33.0
8.2	15.7	37	29.0	34.0
8.2	15.9	38	30.0	34.0
8.2	16.0	39	31.0	35.0
8.2	16.0	40	31.0	35.0

** UH measurements obtained from the upper rim of the pubis to the fundus of uterus, sliding the metric tape between the ring and middle fingers.

Weight for Height by Gestational Age

Length in cm

Week	Perc.	140 142	143 145	146 148	149 151	152 154	155 157	158 160	161 163	164 166	167 169
13	10	38.6	40.0	41.3	42.8	42.8	42.2	45.6	47.2	49.0	52.2
	90	51.3	53.1	54.9	57.0	58.8	60.7	62.7	65.1	67.2	69.4
14	10	39.5	40.9	42.3	43.8	45.2	46.7	48.3	50.1	51.8	53.4
	90	52.7	54.5	56.4	58.5	60.3	62.3	64.4	66.8	69.0	71.2
15	10	40.4	41.8	43.3	44.9	46.3	47.8	49.4	51.3	53.0	54.6
	90	53.1	55.0	56.9	59.0	60.8	62.8	64.9	67.4	69.6	71.8
16	10	41.3	42.8	44.2	45.9	47.3	48.9	50.5	52.4	54.1	55.9
	90	53.6	55.5	57.3	59.5	61.4	63.4	65.5	68.0	70.2	72.5
17	10	42.4	43.7	45.2	46.9	48.4	49.9	51.6	53.6	55.3	52.1
	90	54.0	55.9	57.8	60.0	61.9	63.9	66.0	68.5	70.8	73.1
18	10	42.7	44.2	45.7	47.4	48.9	50.5	52.2	54.1	55.9	57.7
	90	54.0	55.9	57.8	60.0	61.9	63.9	66.0	68.5	70.8	73.1
19	10	43.6	45.1	46.1	48.4	49.9	51.6	53.3	55.3	57.1	58.9
	90	54.0	55.9	57.8	60.0	61.6	63.9	66.0	68.5	70.8	73.1
20	10	44.5	46.1	47.6	49.4	51.0	52.6	54.4	56.4	58.3	60.2
	90	51.5	56.4	58.3	60.5	62.4	64.4	66.6	69.1	71.4	73.7
21	10	45.4	47.0	48.6	50.4	52.0	53.7	55.5	57.6	59.5	61.4
	90	54.5	56.4	58.3	60.5	62.4	64.4	66.6	69.1	71.4	73.7
22	10	45.9	47.5	49.1	50.9	52.5	54.2	56.1	58.2	60.1	62.0
	90	54.9	56.9	58.8	61.0	62.9	65.0	67.2	69.2	72.0	74.3
23	10	46.3	47.9	49.6	51.4	53.0	54.8	56.6	58.8	60.7	62.6
	90	54.9	56.9	58.8	61.0	62.9	65.0	67.2	69.7	72.0	74.3
24	10	46.8	43.4	50.1	51.9	53.6	55.3	57.2	59.3	61.3	63.2
	90	55.4	57.3	59.3	61.5	63.4	65.5	67.7	70.3	72.6	74.9
25	10	47.2	48.9	50.5	52.4	54.1	55.8	57.7	59.9	61.9	63.9
	90	55.8	57.8	59.8	62.0	64.0	66.1	68.5	70.8	73.2	75.5
26	10	47.2	48.9	50.5	52.4	54.1	55.8	57.7	59.9	61.9	63.9
	90	56.3	58.3	60.3	62.5	64.5	66.6	68.8	71.4	73.8	76.1
27	10	47.7	49.3	51.0	52.9	54.6	56.4	58.3	60.5	62.5	64.5
	90	56.3	58.3	60.3	62.5	64.5	66.6	68.8	71.4	73.8	76.1
28	10	47.7	49.3	51.0	52.9	54.6	56.4	58.3	60.5	62.5	64.5
	90	56.8	58.8	60.8	63.0	65.0	67.1	69.4	72.0	74.4	76.8
29	10	47.7	49.3	51.0	52.9	54.6	56.4	58.3	60.5	62.5	64.5
	90	56.8	58.8	60.8	63.0	65.0	67.1	69.4	72.0	74.4	76.8
30	10	48.1	49.8	51.5	53.4	55.1	56.9	58.8	61.6	63.1	65.1
	90	57.2	59.2	61.2	63.5	65.5	67.7	69.9	72.6	75.0	77.4
31	10	48.1	49.8	51.5	53.4	55.1	56.9	58.8	61.1	63.1	65.1
	90	57.2	59.2	61.2	63.5	65.5	67.7	69.9	72.6	75.0	77.4
32	10	48.6	50.3	52.0	53.9	55.6	57.5	59.4	61.6	63.7	65.7
	90	57.2	59.2	61.2	63.5	65.5	67.7	69.9	72.6	75.0	77.4
33	10	48.6	50.3	52.0	53.9	55.6	57.5	59.4	61.6	63.7	65.7
	90	57.2	59.2	61.2	63.5	65.5	67.7	69.9	72.6	75.0	77.4
34	10	48.6	50.3	52.0	53.9	55.6	57.5	59.4	61.6	63.7	65.7
	90	59.9	59.7	61.7	64.0	66.0	68.2	70.5	73.2	75.6	78.0
35	10	49.0	50.8	52.5	54.4	56.2	58.0	59.9	62.2	64.3	66.3
	90	58.1	60.2	62.2	64.5	66.6	68.7	71.0	73.7	76.2	78.6
36	10	49.0	50.8	52.5	54.4	56.2	58.0	59.9	62.2	64.3	66.3
	90	58.1	60.2	62.2	64.5	66.6	68.7	71.0	73.7	76.2	78.6
37	10	49.0	50.8	52.5	54.4	56.2	58.0	59.9	62.2	64.3	66.3
	90	58.6	60.6	62.7	65.0	67.1	69.3	71.6	74.3	76.8	79.2
38	10	49.0	50.8	52.5	54.4	56.2	58.0	59.9	62.2	64.3	67.1
	90	59.0	61.1	63.2	65.5	67.6	69.8	72.1	74.9	77.3	80.7
39	10	49.0	50.8	52.5	54.4	56.2	58.0	59.9	62.2	64.3	67.1
	90	59.5	61.1	63.7	66.0	68.1	70.3	72.7	75.5	77.9	81.4

Pan American Health Organization / World Health Organization
Latin American Perinatology - Reproductive and Woman Health - CLAP/WR

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Figure 4. Front and back sides of the uterine height and maternal weight card

In one of the sides there is a brief reference about how to assess fetal growth and its deviations, as well as the mother's nutrition. It also presents the normal standard values from week 13 to week 40 of GA for mother's weight gain and uterine height (figure 4).

The other side presents the normal values (percentiles 10 and 90) for mother's weight for height from week 13 to week 39 of pregnancy. The weight for height was developed based on the index that measures the ratio: pregnant woman's current weight/theoretical weight for height of women not pregnant:

$$\text{Weight for height} = \frac{\text{Pregnant woman's current weight}}{\text{Theoretical weight for height of women not pregnant}}$$

The theoretical weight for height of women not pregnant was taken from Jeliffe DB, Evaluation of the community's nutritional status. Monographic Series Nº 53 WHO – Geneva 1968.

Objective *Obtain data to plan prenatal control, the care of delivery, puerperium and the newborn*

Activity *Usage of the perinatal electronic system*

To ensure the correct implementation of the prenatal control standard, it is absolutely necessary to have a system to record all the information relevant for correct planning of care of the pregnant woman and her child. The registration system is the most appropriate instrument to supervise compliance with the standard and to supply the data indispensable for their subsequent evaluation.

This system includes the clinical record and the perinatal card developed by CLAP/WR

Perinatal clinica record

The perinatal clinical record (PCR) is intended to standardize the contents of the documentation corresponding to pregnancy, childbirth, puerperium and the newborn in the immediate neonatal period. The general design and its filling instructions will streamline the process, so that the important data may be systematically and uniformly filled, and registered timely. The layout of data will permit their quick retrieval and subsequent analysis, either by the person that collected all the data or by people that did not fill the record, but need the information it contains. This is the case for instance, when the child is born away from the institution where the prenatal control was done. The same happens when postpartum and child controls are done outside the institution where the child was born.

Figures 5 and 6 show the model of the PCR developed by CLAP/WR, and recommended by CLAP/WR together with the partogram. These forms are enough and applicable for the low perinatal risk cases, which comprise most of the population. The PCR (figure 5) gathers the minimal data essential for the planning of care of pregnancy, childbirth, puerperium and newborn in a single page. The checklist is a reminder that guides the health care provider as a roadmap; it helps meet the standards of care, while facilitating audit processes. It also has a warning system to alert about the presence of certain factors that may raise perinatal risk or that require greater attention, follow-up or care. The characteristic of this system is that it highlights some boxes in yellow, a color internationally used as an alert code.

The back side of the PCR (figure 6) presents abbreviated lists for coding the most frequent conditions seen in pregnancy, childbirth, puerperium and the newborn. It also includes a coding list for indications of surgical childbirth or induction of delivery, together with a list of medication administered during delivery.

Partogram

To be used together with the PCR, during labor. (described on page163)

Perinatal Card

The perinatal card (PC) is a tool developed by CLAP/WR to permit integration of the actions the health team performs during pregnancy, childbirth and puerperium. It intends to ensure no data is missing at any of the stages of the reproduction process, and it ultimately contributes to the improvement of quality of care. It must always be in the pregnant woman's hands, since she will need it for each medical action required by her pregnancy or puerperium.

The perinatal card ensures that the most relevant data:

- related to prenatal control (systematically recorded at each visit) get to the hands of the professionals that will subsequently be in charge of the pregnant woman's care, either at a different outpatient office or at the center where she is admitted.
- related to an admission during pregnancy, childbirth and postpartum may be

available so the professionals monitoring puerperium may be aware of them.

- for the newborn's follow-up may be known by those in charge of the child's control.

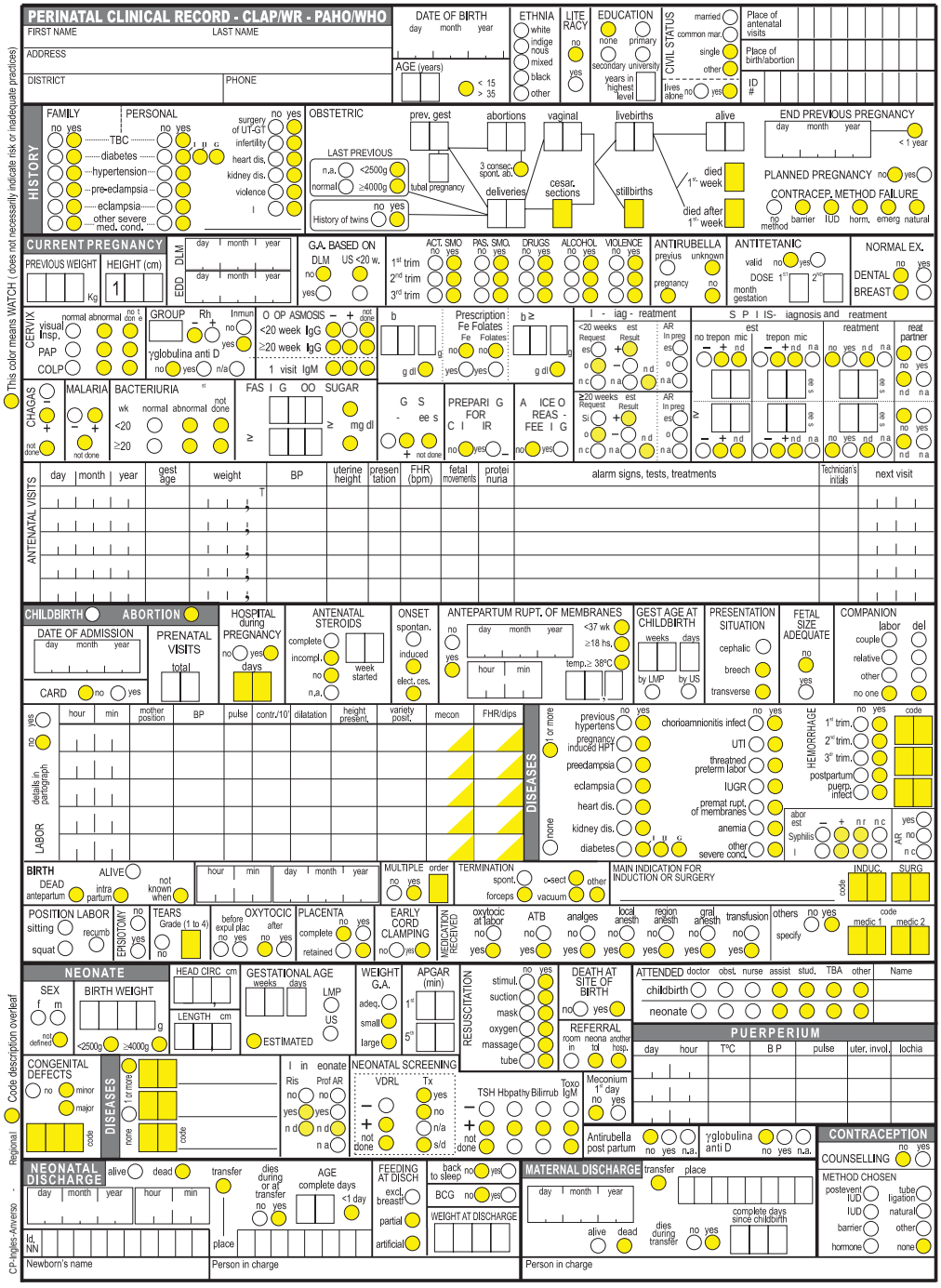

Figure 5 – Regional Perinatal Clinical Record (Front)

CLAP/WR (PAHO/WHO)

CODE LISTSTING

Perinatal Electronic System

Number at left correspond to codes as used in this form. Codes at right are the International Code of Diseases. Rev. 10 (ICD - 10) PAHO/WHO 1992

CONDITIONS OF PREGNANCY, CHILDBIRTH & PUERPERIUM (PCP)

50	**MULTIPLE GESTATION**	O30
51	**PRE-EXISTING HYPERTENSION**	O10
01	Essential pre-existing hypertension complicating pregnancy childbirth and the puerperium	O10.0
02	Secondary pre-existing hypertension complicating pregnancy childbirth and the puerperium	O10.4
52	**PREECLÁMPSIA**	O13 and O14
04	Transient gestational (pregnancy-induced) hypertension	O16
05	Mild pre-eclampsia	O13
06	Severe and moderate pre-eclampsia	O14
53	Pre-existing hypertension with superimposed proteinuria	O11
54	**ECLAMPSÍA**	O15
55	**CARDIOPATHY**	Z86.7
56	**DIABETES**	O24
57	Pre-existing insulin-dependent diabetes mellitus	O24.0
58	Pre-existing non-insulin-dependent diabetes mellitus	O24.1
59	Diabetes mellitus of gestational onset	O24.4
07	Abnormal glucose tolerance test	R73.0
60	**URINARY TRACT INFECTION**	O23.0-23.4
08	Asymptomatic gestational bacteriuria	R82.7
61	**OTHER INFECTIONS**	O98, B50-B54,A60
62	Infections of the genital tract in pregnancy	O23.5
09	Syphillis complicating PDP	O98.1
10	Gonorrhea complicating PDP	O98.2
11	Malaria	B50-B54
12	Ano-genitalHerpes Infection (herpes simplex)	A60
63	Viral hepatitis	O98,4
64	TBC complicating PDP	O98.0
80	Rubella complicating PCP	B06.O, B06.8 y B06.9
65	**PARASITIC INFECTION complicating PDP**	O98,8
77	Chagas	O98,6
78	Toxoplasmosis	O98,6
66	**INTRAUTERINE GROWTH RETARDATION**	P05
67	**PREMATURE CHILDBIRTH THREAT (PREMATURE DELIVERY)**	O60
13	Cervical incompetence	O34,4
68	**CEPHALOPELVIC INCONSISTENCY**	O64, O65, O69
14	Obstructed labour due to malposition and mal presentation of fetus	O64
15	Obstructed labour due to maternal pelvic abnormality	O65
16	Other obstructed labour due to the fetal cause	O66
69	**HEMORRHAGETHE FIRST TRIMESTER**	O20
17	Hydatiform mole	O01
18	Spontaneous abortion and retained	P021.1, O03
19	Ectopic pregnancy	O00
20	Induced or medical abortion	O06,O04
21	Threatened abortion	O20,0
70	**HEMORRHAGE THE 2nd & 3rd TRIMESTER**	
22	Placenta previa with hemorrhage	O44,1
23	Premature separation of placenta (abruptio placentae)	O45
24	Antepartum hemorrhage with coagulation defect	O46
25	Uterine rupture before or during delivery	O71,0, O71,1
26	Obstetric laceration of cervix	O71.3
71	**ANEMIA**	O99,0
27	Iron deficiency anemia	D50
79	Sickle cell anemia	D57,0-D57.2 y D57,8
72	**PREMATURE RUPTURE OF MEMBRANES**	O42
28	Infection of amniotic sac and membranes	O41,1
73	**PUERPERAL INFECTION**	O85, O86
29	Puerperal sepsis	O85
30	Infections of breast associated with childbirth	O91
74	Postpartum hemorrhage	O72
31	Retained placenta	O72,0, O72,2
32	Atonic uterus	O72,1
33	1st & 2nd degree perineal lacerations	O70,0, O70,1
34	3rd & 4th degree perineal lacerations	O70,2, O70,3
75	**OTHER MATERNAL CONDITIONS**	(Min O00-O99)
35	Placenta praevia without hemorrhage	O44,0
36	Pregnancy-related excessive vomoting	O21
37	Unspecified renal disease in pregnancy, without mentioning of hypertension	O26.8, O99.8 (conditions in N00-N39)
38	Drug dependency	F10-F19
39	Fetal distress	Q68
40	Polyhidramnios	O40
41	Oligoahydramnios (without mention of rupture of membranes)	O41,0
42	Labor and delivery complicated with umbilical cord complications	O69
43	Complication of anesthesia during childbirth and puerperium	O74
44	Obstetric embolism	O88
45	Failed closure of cesarian section wound	O90,0
46	Failed of episiotomy closure	O90,1
47	AIDS	B20-B24
76	HIV Positive	R75
48	Malignant neoplasia of cervix	C53
49	Matignant neoplasia of breast	C50

MAIN INDICATION OF SURGICAL DELIVERY OR INDUCTION

01	Previous cesarean section	14	Transverse position
02	Fetal distress	15	Premature rupture of membranes
03	Cephalo pelvic disproportion	16	Eggs infection (suspected or confirmed)
04	Contractility disorders	17	Placenta praevia
05	Prolonged delivery	18	Abruptio placentae
06	Failed of induction	19	Uterine rupture
07	Arrested descent of presentation	20	Preeclampsia and eclampsia
08	Multiple pregnancy	21	Anogenital herpes
09	Retarded intrauterine growth	22	Condylomatosis of the genitalia
10	Preterm childbirth	23	Other maternal conditions
11	Pos term childbirth	24	Fetal death
12	Breech presentation	25	Exhausted mother
13	Posterior position	26	Others

76 HIV

MEDICATION DURING LABOUR

01	Lidocaine or the like	16	Prostaglandin inhibitors		
02	Sympathomimetic amines	17	Calcium antagonists		
03	Anesthetic gases (pentrane-fluorane-nitrous oxide)	18	Magnesium sulphate		
04	Barbiturates	19	Hydralazin		
05	Muscle relaxants	20	Beta blockers		
06	Diazepoxides	21	Other anti hypertensives		
07	Meperidine	22	Blood and derivatives		
08	Spasmolytics	23	Heparine		
09	Oxytocin	24	Corticosteroida		
10	Prostaglandins	25	Cardiotonics		
11	Betalactamics (Penicillins-cephalosporins)	26	Diuretics		
12	Aminoglycosides (gentamicin-amykacin)	27	Aminophyllin		
13	Erithromycin	28	Insulin	31	Antiretrovirals
14	Metronidazole	29	Diphenylhydantoine	32	Sulphadoxin-Pirimetamine
15	Beta mimetics	30	Others	33	Chloroquines

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NEONATAL CONDITIONS

50	**HIALINE MEMBRANE DISEASE**	P22.0
51	**ASPIRATION SYNDROME**	P24
52	**PREMATURITY-INDUCED APNEAS**	P28.3-P28.4
53	**OTHER RDSs**	Q25.0, P29.3, P23, P25, P22, P27
01	Patent ductus arteriosus	Q25.0
02	Persistence of fetal circulation	P29.3
03	Congenital pneumonia	P23
04	Pneumothorax and intestinal emphysema	P25
05	Transient tachypnea	P22.1
06	Chronic respiratory disease originated in the perinatal period	P27
	HEMORRHAGES	
07	Hemorrhagic disease of the newborn	P53
55	Pulmonary hemorrhage originated in the perinatal period	P26
56	Umbilical hemorrhage (not including omphalitis with hemorrhage)	P51
	HYPERBILIRUBINEMIA	
08	Hemolytic disease due to Rh inmunization	P55.0
09	Hemolytic disease due to ABO inmunization	P55.1
10	Preterm-associated neonatal jaundice	P59.0
58	**HEMATOLOGICAL** (Excluding P50-P59)	P60-P61
11	Neonatal polycytemia	P61.1
12	Congenital anemia	P61.3
79	Sickle cell anemia	D57.0-D57.2 y D57.8
13	Other hematological conditions	(rest of P60-P61)
	INFECTIONS	
14	Diarrhea	G00
15	Meningitis	P38
16	Onphalitis	P39.1, A54.3
17	Conjunctivitis	P39.4,L00
59	Newborn's skin infections	P36
18	Septicemia	(rest of P35-P39)
20	Necrotizing enterocolitis	P77
49	Neonatal tetanus	A33
60	Congenital syphilis	A50
61	Viral congenital diseases	P35
68	Congenital rubella syndrome (SRC)	P35.5
69	Cytomegalovirus (CMV)	P35.1
70	Congenital Toxoplasmosis	P37,1
39	HIV positive	R75
19	Other perinatal period infections	(rest of P60-P61)
	NEUROLOGICAL (EXCLUDING MALFORMATIONS)	
33	Acquired hydrocephalus	G91
34	Periventricular and brain leukomalacia	P91.1,P91.2
35	Obstetric trauma with intracranea injury of the CNS and the PNS	P10,P11,P14
36	Intracranial hemorrhage unrelated to trauma	P52
37	Seizures	P90
71	Hypoxic-Ischemic encephalopathy	P21
38	Other conditions of the brain	P91
	METABOLIC-NUTRITIONAL	
43	Child born to diabetic mother	P70.0, P70.1
45	Hypoglycemia	P70.3, P70.4, E16.2
46	Other metabolic and nutritional conditions	P75-PT8
66	**OTHER NEONATAL CONDITIONS**	
40	Prematurity retinopathy	H35
41	Inguinal hernia	K40
65	Cold injuty syndrome	P80.0 (excludes mild hypothermia P80.8)

CONGENITAL ABNORMALITIES

120	Anencephaly	Q00.0
121	Spina bifida/Myelomeningocele	Q05,Q07.0
122	Hydrancephaly	Q04,3
123	Hidrocephalus	Q03
124	Microcephaly	Q02
125	Holoprosencephaly	Q04.2
127	Other congenital malformations of the Central Nervous System	Q04,Q06
128	Troncus arteriosus	Q20.0
129	Transpositions of the large vessels	Q20.3
130	Tetralogy of Fallot	Q21,3
131	Single ventricle	Q20,4
132	Double autlet right ventricle	Q20.1
133	Complete atrio-ventricular canal	Q21.2
134	Pulmonary atresia	Q22.0
135	Tricuspid atresia	Q22.4
136	Left heart hypoplasia syndrome	Q23.4
137	Coarctaction of the aorta	Q25,1
138	Total anomalous pulmonary venous connection	Q26.2
139	Other circulatroy/respiratory abnomralities	Q24,28,34
140	Cleft palate	Q35
141	Tracheo-oesophageal fistula	Q39,1
142	Oesophageal atresia	Q39.0,Q39,1
143	Colon or rectal atresia	Q42.0,Q42.1,Q42.8,42.9
144	Imperforate anus	Q42,3
145	Omphalocele	Q79.2
146	Gastroschisis	Q79.3
147	Duodenal atresia	Q41.0
148	Jejunal atresia	Q41,1
149	Ileal atresia	Q41.2
150	Other GI malformations	Q40,43,45
151	Malformation of the genitalia	Q50-56
152	Bilateral renal agenesia	Q60,1
153	Poly or multicystics or dysplastic kidneys	Q61.1-61.9
154	Congenital hydronephrosis	Q62.0
155	Bladder extrophy	Q54
156	Other nephrourinary abnormalities	Q63,64
157	Trisomy 13	Q91.4, Q91.5,Q91.6
158	Trisomy 18	Q91.0, Q91.1,Q91.2
159	Down syndrome	Q90
160	Other chromosomal abnormalities	Q92,97-99
126	Cleft lip	Q36
161	Polydactily	Q69
162	Syndactily	Q70
163	Skeletal displasia	Q77-78
164	Talipes equinovarus - Talipes calcaneo varus/valgus (club foot)	Q66,8
165	Diaphragmatic hernia	Q79.0
166	Hydrops fetalis	P56,P83.2
167	Severe oligoamnios	P01.2
168	Other musculo skeletal abnormalities	Q68,74,75,79
169	Tegumentary abnormalities	Q82,84

Figure 6 - Regional Perinatal Clinical Record (Back)

Figure 7 - Regional Perinatal Card (Front)

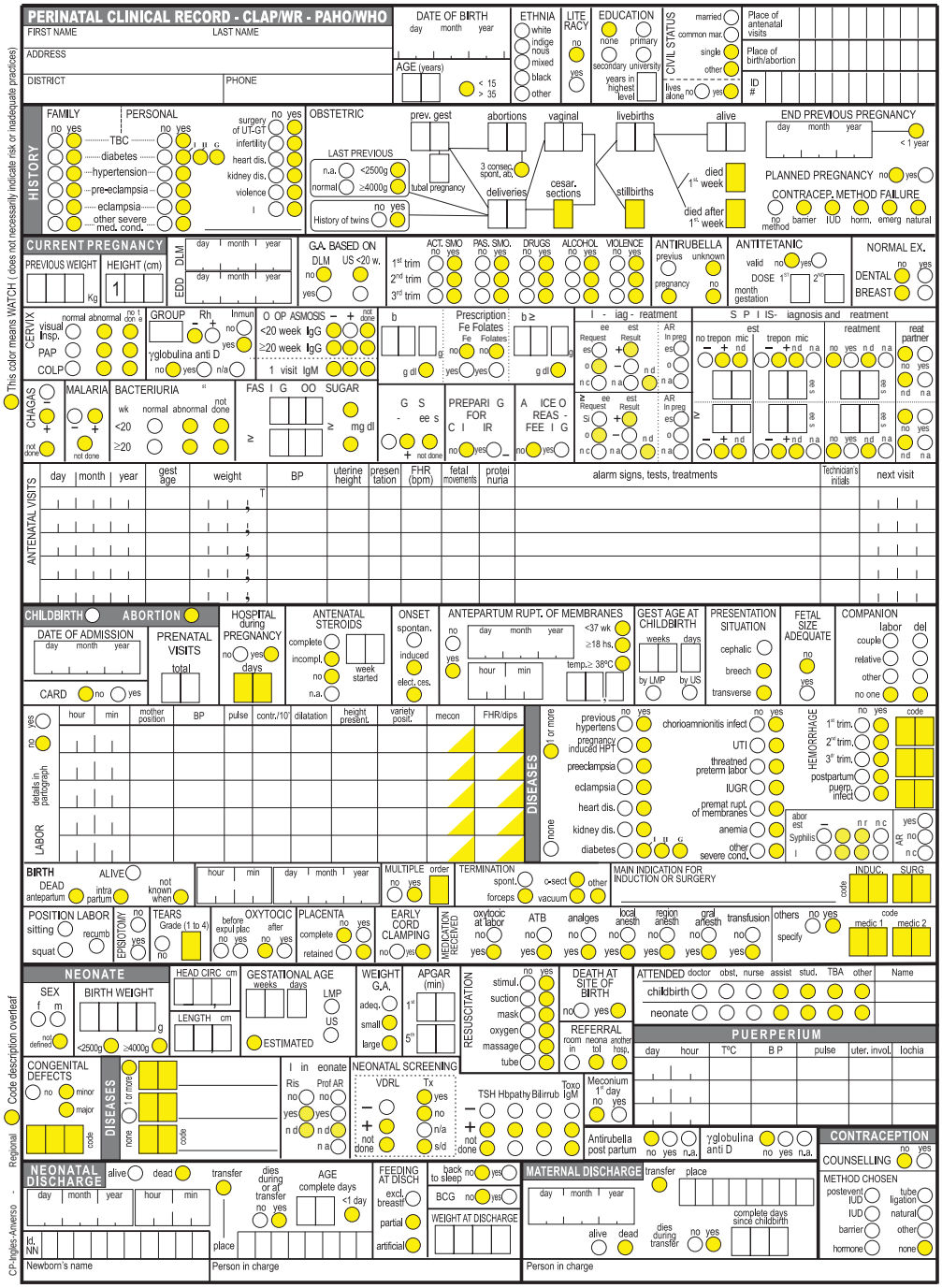

Figure 8 - Regional Perinatal Card (Back)

Processing the PCR data

CLAP/WR has developed software for personal computers that allow users to decentralize data processing, using it where the care is provided. Thus, health professionals have the information available when they require it, streamlining the evaluation of care and decision making.

The software in question was updated recently; it operates in Windows environment, with facsimile filing on the screen. These significant technological changes enhance the program's power and productivity, while preserving all the information generated in earlier versions. As a result of the processing of such data, the institution in question produces a set of documents that provide a summary of its activity in a given period (basic statistics); the data can be also used as a source of more specific research, such as relative risk, description of variables, etc. A number of previously defined indicators readily available provide information relevant to clinicians, managers, epidemiologists or health policies makers.

The clinical records file is available at the maternity's IT network, ensuring confidentiality of the patients' data in the electronic clinical records. The health care center issues periodical reports, using the data computed in the IT network. The central or regional IT centers request the information of the pregnant women and newborns receiving care locally. To that end, the health care center must provide duplicate copies of the data bases with the records after they are entered and corrected. The regional and local IT centers also operate with the PES, making it possible to consolidate all the information.

Even when it may not be the ideal, the data in the PCR may also be processed at a place other than the center where perinatal care was provided. If that were required, it suffices to send the record duplicates to a more complex level, capable of processing the data. This situation may occur when there are no computers available, or when the number of cases seen in one month does not warrant having it at that center.

The most outstanding characteristics of the system developed may be summarized as follows:

- Local data processing with the PES strengthens the perinatal care self evaluation capacity, by allowing the staff to evaluate the data at the center itself.
- It creates awareness of staff on the significance of keeping full documentation of the health actions and observations.
- It provides the perinatal care agencies a quick and user-friendly tool for operational research.

For further information on the Perinatal Electronic System (PES) and the way it is processed, see scientific publication CLAP/WR 1563.

Objective *To develop a road map to guide the staff providing quality prenatal care*

Activity *Usage of the Perinatal Clinical Record developed by CLAP/WR*

The Latin American Center for Perinatology/Women and Reproductive Health (CLAP/WR) published the Perinatal Clinical Record in 1983, seeking to achieve a standardized record and quality of care to pregnant women and newborns in the Region.

This instrument was designed to contribute to decision making related to the pregnant woman's individual clinical management (during prenatal control, childbirth and puerperium) and that of her newborn (from birth to discharge). See Scientific Publication CLAP/WR 1572 and 1575.

Furthermore, the PCR is intended to facilitate the clinician's tasks on the field and to standardize data recording; it seeks to facilitate supervision and assessment of the enforcement of clinical standards as well as to promote an individualized and effective clinical management.

Although the data contained in the PCR may be later entered into a database, the clinician's priority is to have a good clinical record, and that is why CLAP/WR prioritizes completion of the PCR.

Since its inception, the PCR has been changed several times. These changes result from the need to update its contents with the best scientific evidence available, as well as to include the priorities – national and international – as defined by the Ministries of Health in the Region. Notwithstanding, its format and design have suffered few changes, and historically, attempts have been made to keep the same art design. At present, the PCR's design includes the sections below:

- identification
- family, personal and obstetric history
- current pregnancy
- childbirth or abortion
- conditions during pregnancy
- puerperium
- mother's discharge
- newborn
- conditions of the newborn
- newborn's discharge
- contraception

Objective *Detect risks in the population*
Activity *Assessment of perinatal risk*

The implementation of the activities aimed at standardizing prenatal control for low-risk pregnancies requires an instrument to identify those women. This objective is achieved by checking the presence or absence of risk factors.

Risk assessment is not an easy task. The notion of risk is primarily odds-related, and the chain that associates a risk factor with damage is not always well defined. For instance, at times, the "fetal death" damage depends clearly on one factor, but at other times the relation is much more difficult to establish, either because the intervening factor or factors are not known, or because of the difficulties in establishing the individual weight of each of them when the problem depends on multiple factors.

The initial assessment systems were developed on the basis of observation and their authors' experience, and only recently have they been evaluated; some doubts persist over their discriminating ability.

Scoring-based systems still lack accuracy, both in the value assigned to each factor and in the associations between them. There are broad variations according to their application, depending on whether they deal with individuals or populations. To make them more suitable, they should be developed locally, knowing the actual weight of each factor at a local level.

By using methods such as the listing shown below, pregnant women may be divided into two groups. The presence of certain features implies classifying a pregnant woman as high risk, therefore excluding them from low-risk prenatal control.

Of the factors that increase perinatal risk, the chart only mentions those whose control requires activities not contemplated in this proposal and demanding more complex actions (high risk standards) for their control.

Chart 7. Perinatal risk factors

Heart disease	Hydramnios
Hypertension	Oligoamnios
Diabetes	Genital bleeding
Tuberculosis	Threatened preterm delivery
Hemoglobin less than 10 g/l	Premature rupture of membranes
History of perinatal death	Maternal height < 145 cm.
Rh alloimmunization (sensitization)	Mother's weight before pregnancy < 45 Kg.
Fetal macrosomy	Poor or excessive maternal weight gain
Multiple pregnancy	Unfavorable genetic history
Intrauterine growth restriction	

Objective *To gather relevant data on pregnancy*
Activity *Obtain woman's history*

The clinical examination starts by recording the pregnant woman's history. Due to the potential administrative and legal consequences, and because of the association between some factors and perinatal risk, a correct history should include:

Identification of pregnant woman	Data on current pregnancy
Socio-educational status	Family history
Obstetric history	Personal history

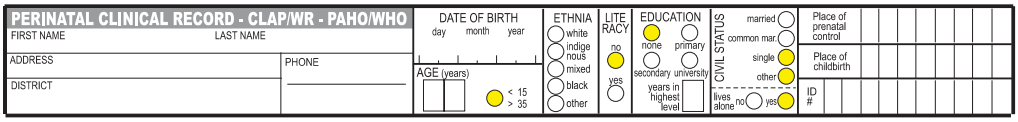

Figure 9. Section on Identification and Socio- Educational status

Pregnant woman's ID	Names and Last names Address District Telephone	Date of birth and age Place of prenatal control Place of birth Identity card number

There is general agreement as to considering women with ages ranging from 15 to 35 years, as the age group with the lowest perinatal risk. Fetal and neonatal mortality and congenital defects are usually more frequent in early adolescence (under 15 years) and after the age of 35 years.

Socio-Educational Status	Ethnic group Level of education Marital status

The strong association between bad perinatal outcomes and low socio-educational level makes it necessary to consider these variables whenever a pregnant woman is evaluated. The socio-educational impairment is associated with a lower number of prenatal visits, more numerous families, crowded homes, a higher percentage of pregnant women that do physical work, continuing to work until more advanced stages of pregnancy, lower educational level and a higher frequency of pregnancies in unstable common-law marriages. The above aspects are then linked to specific ethnic groups.

Indigenous communities and the populations of African descent account for more than 40% of the population in the region.

Some ethnic groups present specific perinatal risks, regardless of their socio-economic-cultural background. Such is the case, for instance, of sickle-cell anemia in African descendants. Apart from their demographic importance and as a result of specific clinical conditions, these groups live in more unfavorable conditions than other groups of people. One of the strategies to improve their situation is to reveal these differences through health indicators broken down by ethnic groups

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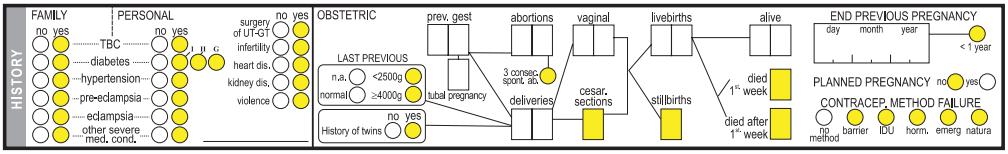


Figure 10. PCR: History Section

Family history	Tuberculosis Diabetes Hypertension	Preeclampsia Eclampsia Other severe medical conditions

It is important to investigate any history in the pregnant woman's close relatives (mother, father, children, siblings, spouse or sexual partner) that may lead to the adoption of special diagnostic or therapeutic measures.

Personal History	Tuberculosis Diabetes Hypertension Preeclampsia	Eclampsia Other severe medical conditions Genito urinary surgery Infertility	Heart disease Kidney disease Violence

At times it is essential to evaluate the degree of impairment that an existing condition or violence may have caused, and its potential deleterious impact on pregnancy.

Obstetric History	Number, course and termination of earlier pregnancies. Live births and stillbirths Outcome of last pregnancy History of macrosomy or low birth weight History of twin pregnancies Aspects referred to pregnancy planning

Data about earlier pregnancies should be considered for the prognosis of the current pregnancy. The risk tends to be repeated.

It is important to highlight any data that might have an impact on the outcomes of pregnancy because of their relevance, e.g. 3 consecutive spontaneous abortions (marked in a yellow circle). This information should be bourne in mind by the health care professional, who must acknowledge this woman's condition as "habitual aborter" and conduct any activities deemed appropriate to prevent the occurrence of a new abortion.

Nulliparas will require special care, since their birth canal has not been tested yet, and they present conditions that tend to be more common in such patients (for instance: preeclampsia).

Grand multiparas will require special care at delivery (during the expulsion of the placenta) and in puerperium, since the overstretching of the uterine fibers entails an increased risk of uterine atonia and hemorrhage.

The outcome of the previous pregnancy is significant when it reveals a short intergenesic interval. The PCR reminds the health professional to query about the interval between pregnancies. Intervals shorter than 1 year shall be recorded in yellow as a sign of alert. A technical group summoned by the World Health Organization (WHO), has recommended at least 24-month spacing after the birth of a live child, and leaving at least 6 months between an abortion and a future pregnancy, in an attempt to reduce any adverse maternal, perinatal and neonatal outcomes. It is important to bear these aspects in mind to counsel women on the most appropriate time for a new pregnancy from a biological point of view. Ultimately, it is up to women and families to decide, and they are the ones who will choose the right time for a new pregnancy with the information available. This decision is a Rights issue included in the Plan of Action agreed upon in El Cairo in 1994.

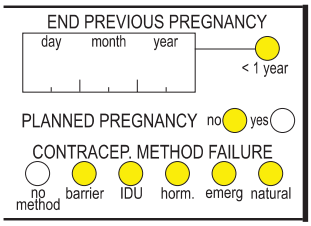


Figure 11.
Fragment of the PCR.
Intergenesic interval

Health care providers must consider the previous history of a newborn weighing less than 2,500 grams, since this increases a woman's chances to deliver another low-birth-weight child in a future pregnancy. Pregnant women with a history of fetal macrosomy have increased risks of presenting another pregnancy with a macrosomic fetus; this would warrant work-up to rule out potential disorders of the carbohydrate metabolism. Fetal macrosomy is associated with an increased number of obstetric interventions, and consequently, to a higher perinatal mortality.

Figure 12.
Fragment of PCR.
History of last newborn and twin pregnancies.

The history of multiple pregnancies requires an extensive work up to rule out a new multiple pregnancy. Multiple pregnancies pose serious risks both to the women and their children. Fetal mortality is 10 times higher than in singleton pregnancies. High prematurity and low weight rates are associated with a high neonatal mortality rate. Anemia, preeclampsia, pregnancy-related hyperemesis, uterine atony and postpartum hemorrhage are more frequent in multiple pregnancies than in single-fetus pregnancies.

It is important to determine whether pregnancy had been planned, since there is frequently an association between unplanned pregnancies and unwanted pregnancies. Unwanted pregnancies have an increased risk of complications such as:

- abortion procedures in hazardous conditions,
- physical symptoms of rejection (pregnancy-related hyperemesis)
- emotional consequences that will impact on the pregnant woman and her child (depression, reduced self-care, hazardous behavior, child neglect)

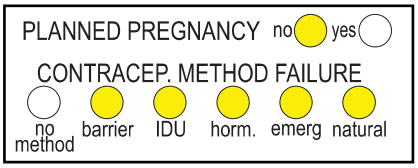


Figure 13.
Fragment of PCR. Pregnancy planning and failure of method

The use of contraceptive methods and failure of the method used, (especially in the case of women who had not planned pregnancy) should be surveyed, since that may turn out to be very valuable information, both from the point of view of populations (since this enables health care managers to establish the accessibility of methods), and from the individual perspective, since when methods fail, that information should be considered to determine the appropriate contraceptive strategy the woman should adopt after the current pregnancy, to prevent future failures.

Objective *Set a timetable to plan the activities required for prenatal control.*
Activity *Determine Gestational Age and Expected Date of Delivery.*

Current Pregnancy
Once pregnancy is confirmed, it is necessary to establish the age of the fetus and the expected date of delivery.
The methods typically used to determine gestational age are:

- Asking about amenorrhea
- Evaluating uterine size, especially in the first trimester
- Ultrasound body measurements (only indicated if any doubts remain after using the clinical methods)

Amenorrhea
The measurement of the time elapsed from the date of the last menses (DLM) is the method of choice to calculate gestational age in women with regular menstrual cycles who have not used hormone contraceptives in the last months.

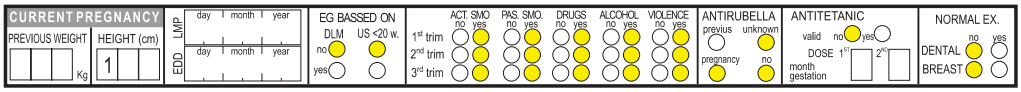


Figure 14. PCR: Current Pregnancy Section

The questions must be asked in a single session, with precision and in a calm atmosphere, asking about the first day and month of the last menses. If these data are reliable, they will be used to calculate the age of pregnancy and the probable date of delivery.

The weeks of pregnancy may be estimated using the Gestogram developed by CLAP/WR (Fig. 1). By matching the red arrow that says “Date of onset of last menses” with the date of DLM and relating it with the day of the visit, the weeks of amenorrhea are obtained. Alternatively, the weeks of amenorrhea may also be estimated by adding the days elapsed since the DLM until the date of the visit and later dividing them by 7.

The expected date of delivery (EDD) can also be easily calculated with the gestogram developed by CLAP/WR. By matching the red arrow (described above) with the first day of the last menses, EDD can be obtained just by looking at the date corresponding to week 40. If there are no gestograms or obstetric calendars available, the expected date of delivery may also be determined by applying one of the following rules:

Wahl:	Adds 10 days to D1 of the DLM and subtracts 3 from the month number
Naegele:	Adds 7 days to the first day of the DLM and subtracts 3 from the month
Pinard:	Adds 10 days to the DLM and subtracts 3 from the month.
280 days:	Starting on D1 of the DLM, count 280 days on the calendar; Day 280 will be the EDD.

Evaluating the size of the uterus
When reliable, the DLM is the gold standard to calculate gestational age. If any doubts remained about the gestational age as defined by DLM, there are less precise measurements available that may give us an approximate idea. Two-handed examination of the uterus before week 16 of pregnancy provides very valuable information to

estimate gestational age. Beyond week 16, measuring the uterine height is of little value to calculate gestational age. The evaluation of the uterine size should be considered merely as an indirect estimate of the age of pregnancy, given that it may be altered by various situations that are detailed in the chart below.

Chart 8: Elements that alter gestational age as estimated by uterus size

Myomas	Oligoamnios
Trophoblastic disease (Mola)	Intrauterine Growth Restriction (IUGR)
Multiple pregnancy	Fetal malformations
Polyhydramnios	Fetal macrosomy

Ultrasound-Based Fetal Anthropometrics

The ultrasound may help when the clinical elements are not enough to calculate gestational age. Its application is based on the existing relationship between amenorrhea, the anatomic development of the fetus and the measurement of certain segments of the fetus. The earlier it is performed, the higher the precision; furthermore, as measurements can be repeated with a certain periodicity, estimation errors can be considerably reduced.

The body measurements below are the ones currently used because of their better correlation with amenorrhea:

Maximum cephalocaudal length: this consists of measuring the distance between the two poles of the fetus. This is the most reliable parameter provided by the ultrasound. It is used between weeks 8 and 13.

The estimation error is ± 7 days (Table 1).

Table 2. Estimation of gestational age by cephalocaudal length

Cephalocaudal length (LCC) (mm)	Amenorrhea (weeks)	Variability (weeks)
13 to 15	8	±1
16 to 19	8,3 - 8,4	±1
20 to 23	9	±1
24 to 28	9,3 - 9,4	±1
29 to 33	10	±1
34 to 38	10,3 - 10,4	±1
39 to 43	11	±1
44 to 48	11,3 - 11,4	±1
49 to 54	12	±1
55 to 63	12,3 - 12,4	±1
64 to 75	13	±1

Biparietal diameter: this diameter is obtained by measuring outside table of the parietal bone proximal to the outer plate of the distal parietal bone (table 4) or the outer table of the parietal bone proximal to the inner plate of the distal parietal bone (table 5). This may be used from week 12 to the end of pregnancy.

Estimation error varies depending on how early or late the measurement is made::

Table 3: Estimation of gestational age based on the biparietal measurement (BPD) Outer-outer cortical plates

Biparietal diameter (mm)	Amenor-rhea (weeks)	90% Confidence Interval (weeks)	Biparietal diameter (mm)	Amenorrhea (weeks)	90% Confidence Interval (weeks)
19 to 22	12	±1	68 to 70	26	±1
23 to 27	13	±1	71 to 73	27	±1
28 to 31	14	±1	74 to 76	28	±2
32 to 34	15	±1	77 to 79	29	±2
35 to 37	16	±1	80 to 82	30	±2
38 to 41	17	±1	83 to 84	31	±2
42 to 45	18	±1	85 to 86	32	±2
46 to 48	19	±1	87 to 88	33	±2
49 to 52	20	±1	89 to 90	34	±2
53 to 55	21	±1	91 to 92	35	±2.5
56 to 58	22	±1	93 to 94	36	±2.5
59 to 61	23	±1	95 to 96	37	±2.5
62 to 64	24	±1	97 to 98	38	±2.5
65 to 67	25	±1	99 to 100	39	±2.5

Table 4: Estimation of gestational age based on the measurement of the biparietal diameter (DBP) measured from the outer edge to the inner edge

Biparietal diameter (mm)	Amenor-rhea (weeks)	90% Confidence Interval (weeks)	Diámetro biparietal (mm)	Amenorrhea (weeks)	90% Confidence Interval (weeks)
18 to 21	12	±1	65 to 67	26	±1
22 to 26	13	±1	68 to 70	27	±1
27 to 30	14	±1	71 to 73	28	±2
31 to 33	15	±1	74 to 76	29	±2
34 to 36	16	±1	77 to 79	30	±2
37 to 39	17	±1	80 to 81	31	±2
40 to 43	18	±1	82 to 83	32	±2
44 to 46	19	±1	84 to 85	33	±2
47 to 50	20	±1	86 to 87	34	±2
51 to 53	21	±1	88 to 89	35	±2.5
54 to 56	22	±1	90 to 91	36	±2.5
57 to 59	23	±1	92 to 93	37	±2.5
60 to 62	24	±1	94 to 95	38	±2.5
63 to 64	25	±1	96 to 97	39	±2.5

Femur length: this length is obtained by measuring the maximum length of the femur starting on week 11 and until the end of pregnancy (Table 6). The ossification nucleus in the femur (Béclard's nucleus) becomes apparent in 35- to 36-week fetuses, and reaches 7 to 8 mm in full-term newborns.

Table 5: Estimation of gestational age based on the measurement of femur length

Femur length (mm)	Amenorrhea (weeks)	90% Confidence Interval (weeks	Femur length (mm)	Amenorrhea (weeks)	90% Confidence Interval (weeks
10 to 12	13	±1	50 to 52	27	±1,5
13 to 15	14	±1	53 to 54	28	±1,5
16 to 19	15	±1	55 v 56	29	±1,5
20 to 22	16	±1	57 to 58	30	±1,5
23 to 25	17	±1	59 to 61	31	±2,5
26 to 28	18	±1	62 to 63	32	±2,5
29 to 31	19	±1,5	64 to 65	33	±2,5
32 to 34	20	±1,5	66 to 67	34	±2,5
35 to 37	21	±1,5	68 to 69	35	±2,5
38 to 39	22	±1,5	70 to 71	36	±2,5
40 to 42	23	±1,5	72 to 73	37	±3
43 to 44	24	±1,5	74 to 75	38	±3
45 to 47	25	±1,5	76 to 77	39	±3
48 to 49	26	±1,5	78 to 79	40	±3

Maturity of the placenta
Even when this is not a gestational age indicator, there is a good correlation between maturity of the placenta (as measured by the ultrasound) and the maturity of fetal lungs. This is especially relevant when the gestational age is not known and a decision must be made to interrupt or proceed with pregnancy.

Objective *Evaluate the mother's nutritional status.*
Activity *Measuring mother's weight and height.*
Calculating weight gain during pregnancy.

The mother's insufficient weight prior to pregnancy, a low height and either an exceedingly low or exceedingly high weight gain during pregnancy have been associated with poor perinatal outcomes.

When the weight before pregnancy is known or the woman seeks care during the first trimester (and the weight at that time is assumed to be the weight before pregnancy) the body mass index (MBI) can be obtained (dividing weight in Kg between height in meters to the square). This allows to estimate the ranges of adequate weight gain based on the BMI prior to pregnancy. As is shown in table 7, adequate gain will depend on the initial MBI.

Table 6. Weight gain recommended by women's pregestational BMI

Weight category	BMI (kg/m2)	Total weight gain (Kg)
Low weight	12.0 – 18.4	12,5 – 18,0
Normal weight	18.5 – 24.9	11,5 – 16,0
Overweight	25.0 – 29.9	7,0 – 11,5
Obesity	30.0 or more	6,0

There is a large weight variation during pregnancy, ranging from 6 to 18 Kg at full term, depending on the mother's nutritional status before pregnancy. (Figure 14). The period with the highest weight gain occurs between weeks 12 and 24.

Measurement Techniques

The weight must be measured at each prenatal control, with the woman in light clothes and barefeet. It is advisable to use scales with regularly calibrated weights.

Height must be measured in the first visit. The technique consists of making the woman stand barefeet, her heels against each other; her back as close to the height rod as possible, straight, her shoulders thrown backwards, and face looking forward.

Weight gain

If the woman knows her usual weight before she became pregnant, the gain will be checked using the values in figure 15 as a reference; these values are also plotted in the perinatal card developed by CLAP/WR. The weight gain is obtained from subtracting the pregravidic weight from the current weight. This weight gain is related to gestational age to ultimately determine the weight gain for that gestational age. That value is transferred to the plot in the card. Its maximum (p 90) and minimum (p 25) limits may also be found in the metric tape, in the Weight-Height card and in the gestogram developed by CLAP/WR.

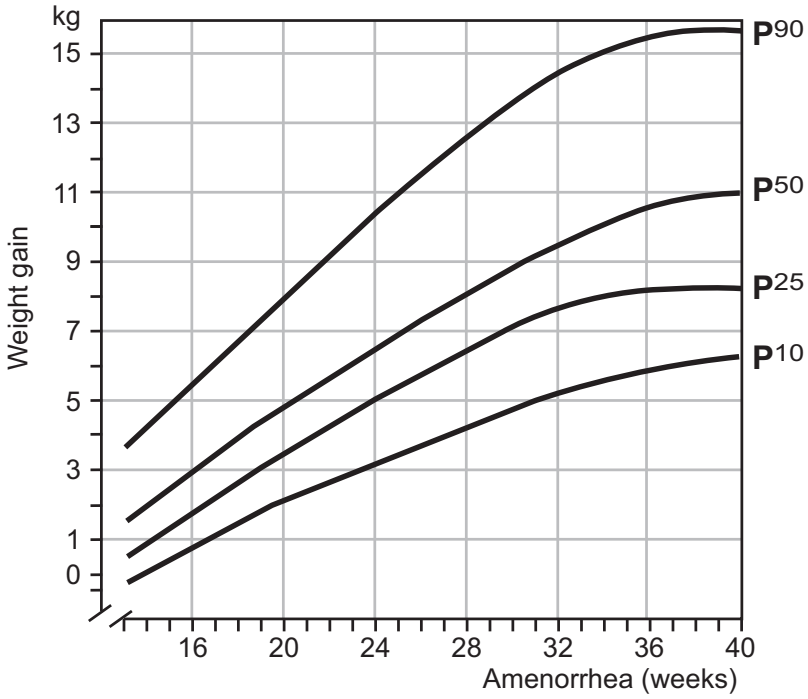
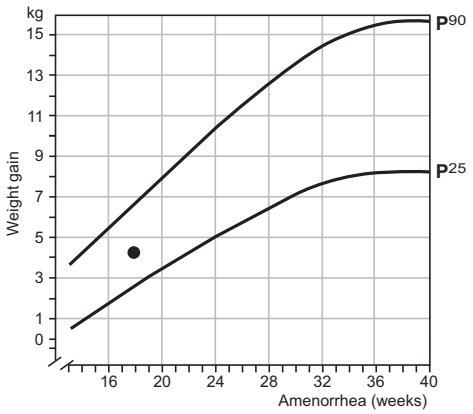


Figure 15. Maternal weight gain versus gestational age

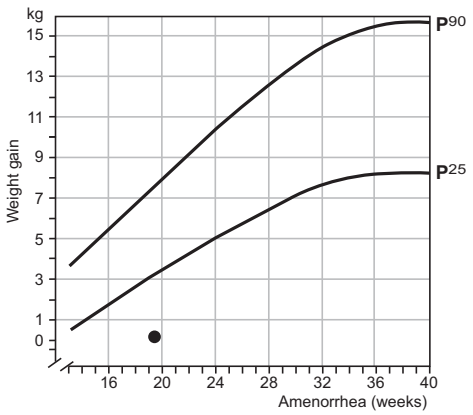
INTERPRETING MEASUREMENT AT FIRST VISIT



The point is between the curves of the 25th and 90th percentiles of the reference weight for gestational age

DIAGNOSIS
Good nutritional status

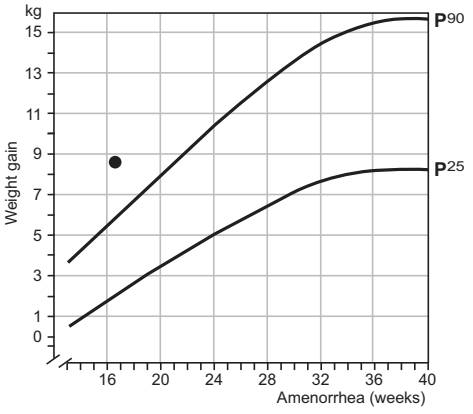
MANAGEMENT
- follow usual visit schedule
- tell the pregnant woman that her weight is adequate for gestational age
- provide nutritional guidance



The point is below the 25th percentile of the reference weight for gestational age

DIAGNOSIS
Pregnant woman at risk; weight lower than normal for that gestational age (malnutrition)

MANAGEMENT
- investigate nutritional history, pregnancy-related hyperemesis, infections, parasitosis, anemia, weakening diseases.
- tell the pregnant woman to come back earlier than indicated in the original schedule

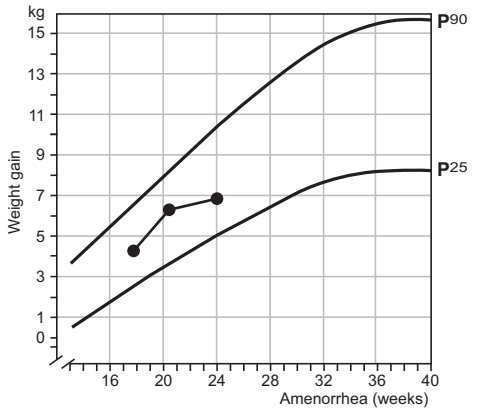


The point is over percentile 90th of the reference curve

DIAGNOSIS
Pregnant woman at risk; weight higher than normal for that gestational weight; ; the higher the overweight, the higher the risk

MANAGEMENT
- determine causes: obesity, oedema, polyhydramnios, macrosomy, multiple pregnancy.
- tell the pregnant woman to come back earlier than indicated in the original schedule
- the weight gained during the entire gestation should not exceed 16 kg (p90)

INTERPRETING MEASUREMENT SEQUENCES AT SUBSEQUENT VISITS



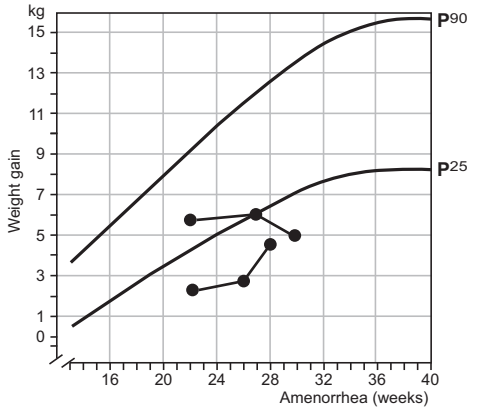
Rising curve between the curves of the 25th and 90th percentiles of the reference weight for gestational age

DIAGNOSIS

Good nutritional status (adequate weight gain):

MANAGEMENT

- follow usual visit schedule
- provide nutritional guidance so that she may stay within the normal ranges



Plotting between percentiles 25th and 90th, with a plateau or a downward slope under the p25 curve, with a plateau or rising slope, not reaching the strip considered normal (p25)

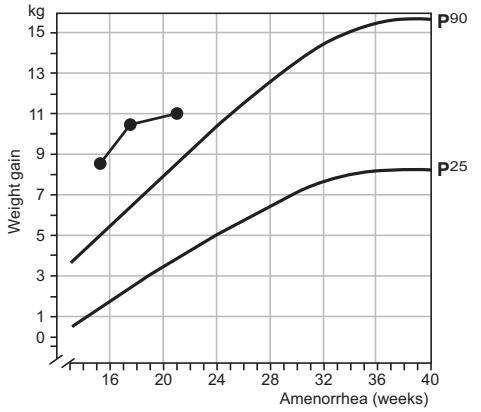
DIAGNOSIS

Pregnant woman at risk because of her weight gain:

MANAGEMENT

- identify causes: nutritional deficit, infections, parasitosis, and anemia, among others. Treat them when present and provide nutritional counseling
- refer the pregnant woman to high risk prenatal control

These measures are aimed at ensuring that the pregnant woman may reach the end of pregnancy with a minimum weight gain of 8 kg.



The curve is over percentile 90 of the reference curve for gestational age.

DIAGNOSIS

Pregnant woman at risk; weight gain is higher than ideal for that gestational weight; the higher the overweight, the higher the risk

MANAGEMENT

- investigate possible causes: obesity, diabetes and oedema,
- if it persists, refer woman to high-risk control
- If there is polyhydramnios, macrosomy, or multiple pregnancy, she should be referred to high-risk control

These measurements are aimed at ensuring that the pregnant woman may reach the end of pregnancy with a weight gain within normal limits (max: 16 kg)

Many pregnant women do not know their usual weight before pregnancy. In these cases, the weight gain may be monitored through the weekly gains, accepting an average gain of 400 g a week in the second trimester and 300 g a week in the third trimester as normal.

Weight for height ratio by gestational age
When the mother does not know her pregravidic weight and she seeks care late, there is another way of knowing if the gain obtained until then is adequate for that gestational age. The table (figure 4) that describes the weights reached at that gestational age by height can be used for that purpose.

The intersection of each week of amenorrhea with maternal height shows percentiles 10 and 90 of the pregnancy weight that could be expected for that gestational age.

Interpretation

Normal: Weight gain will be considered normal if at a certain gestational age, the weight reached by the mother is between percentiles 10 and 90 of the table of reference.

Abnormal: The mother's weight is over percentile 90 and under percentile 10

This last procedure does not provide information about the mother's weight gain, but it is possible to determine if the weight reached by a pregnant woman according to her height is adequate for a specific gestational age or not.
Pregnant women with insufficient weight for height values or with weight gain deficits must receive nutritional advice and food supplementation.

Evaluation of the mother's weight gain

An excessive weight gain predisposes to fetal macrosomy, while poor weight gain is associated with intrauterine growth restriction (IUGR).

Any value exceeding percentile 90 of their respective standard must suggest excessive intake, diabetes mellitus or fluid retention.

Maternal malnutrition will be suspected when the weight gain is under percentile 25, or the weight for height is under percentile 10 of their respective standards. These signs suggest IUGR. The sensitivity (ability to diagnose the true small for gestational age, SGA) of weight gain under p 25 is close to 50%. The sensitivity of isolated uterine height values under p 10 in relation with their reference curve is close to 60%. However, when uterine height is associated with maternal weight gain, the sensitivity of diagnosis goes as high as 75%.

Conduct
In the cases where IUGR is suspected clinically, after excluding the cases of oligoamnios, errors of amenorrhea, etc., the diagnosis should be confirmed by ultrasound, to rule out false positives, and the woman should be referred to the high risk department.

Objective *Investigate risky life styles*
Activity *Ask about smoking (active and passive), drugs, alcohol and violence*

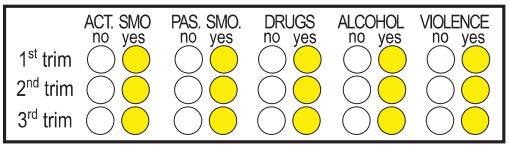


Figure 16. Fragment of the PCR. Life styles

There are lifestyles potentially risky for the woman and her future child. Pregnancy is usually a special moment, in which most women are ready to make "sacrifices" to ensure their future children's health. As a result, many smoking, alcohol and drug cessation programs tend to be more successful during that period. The same happens with aspects related with violence against the woman. Women who suffered from violence for long periods and have accepted it are willing to seek help while they are pregnant. Those are the reasons that led CLAP/WR to incorporate these issues in the PCR.
Even knowing that it is difficult for providers to interrogate about these aspects and it is also complex for women to admit some of these situations and that they may change during pregnancy, these aspects should be touched upon repeatedly. This research, conducted at different instances will enable providers to check whether the interventions implemented were successful or whether they failed.
The health care services should establish the steps required to provide support in the situations in which these diagnoses are established. The lack of response or improvisation may be extremely harmful

Active smoking
Tobacco is one of the most frequently consumed drugs. The WHO estimates that in the developed countries tobacco consumption by women exceeds 20%, while in the developing world the figures of women that smoke range around 9%, with broad variations. Many of these women will continue to smoke during pregnancy.
The harmful effects of tobacco are not limited to the woman, but smoking during pregnancy may be very deleterious for the fetus and newborn, too. There is evidence that smoking during pregnancy, in an isolated or combined manner, increases reproductive risk.
Cigarette smoke has more than 2,500 chemicals, many of which are very harmful, and others for which the true effects have not been determined yet.

Cigarette consumption during pregnancy has been associated with:

- Low birth weight
- Fetal growth restriction
- Preterm delivery
- Complications in pregnancy, delivery and puerperium
- Spontaneous abortions
- Fetal death
- Neonatal deaths
- Reduction of the mother's milk amount and quality

As an average, smokers' children weigh from 200 to 400 g less than the children of non smokers. This difference in weight correlates well with the number of cigarettes smoked. It is estimated that each cigarette/day may result in a 10-gram reduction in birth weight.
The percentage of LBW is higher among smokers' offspring, the LBW increase ranging from 0.6 to 6.7% for the different authors. The risk of delivering a LBW baby is almost duplicated among smokers.
The association between prematurity and smoking has also been confirmed. The percentage of prematurity in smokers is increased from 0.8 and 2.5% versus non smokers.

The main component accounting for LBW in smokers is IUGR, followed by prematurity.

The association between LBW and prematurity enhances the newborn's risk for presenting health problems during the neonatal period, handicaps (brain palsy, mental retardation and learning disorders) and even death.

The children of smoking mothers have three times as many odds of presenting sudden death.

If the mothers succeed in quitting smoking in the first trimester of pregnancy, there are almost no differences between their children and those of non smoking mothers. Even if the pregnant woman does not quit until the third trimester, it is very likely that fetal growth will improve.

Smoking during pregnancy duplicates a woman's chances for presenting placenta-related problems (placenta previa, detachment of the placenta) versus non smoking women. Premature rupture of membranes is also increased in the women that smoke during pregnancy. When these complications occur before week 37, they may associate with prematurity.

The habit of smoking, in particular in groups of women that also show some other risk-increasing condition (age over 35 years, grand multiparity, other severe medical conditions, other addictions, etc.) has been associated with a higher perinatal mortality. This association is patently clear in developing countries, where prevalences are high and where smokers are likely to combine a greater proportion of additional risk factors (socio-cultural, economic, and health care-related, among others).

Passive smoking
Being a passive smoker during pregnancy may also increase the likelihood of presenting IUGR, with the ensuing risk of presenting LBW.
Parents that continue to smoke after the child is born should do so outside their homes. Children exposed to tobacco smoke present a higher number of lower respiratory tract infections and ear infections. Children exposed to tobacco smoke at early ages are more prone to develop asthma. Smoking cessation programs should be implemented for those pregnant women that need them. Women may succeed in their cessation attempts if they have already tried to stop smoking, if the couples do not smoke and/or if they have their family's support to quit smoking.

Alcohol

Alcohol consumption during pregnancy has been associated with physical defects at birth, in a condition called fetal alcohol syndrome (FAS). As there is no evidence of any safety levels for any alcohol intake during pregnancy and breastfeeding, alcohol consumption is not recommended throughout pregnancy.

Alcohol goes through the placenta and is metabolized very sluggishly; consequently, alcohol blood levels in the fetus tend to be much higher and remain much longer than in the mother. This effect may be teratogenic for the fetus. The FAS is one of the most common causes of mental retardation and it is fully preventable. Besides the neurological symptoms, these children tend to be small for gestational age (SGA) and they tend to have typical morphologic changes (small eyes and nose, flat cheeks); at times they may even have some sort of congenital heart disease.

The CDCs report that from 1,300 to 8,000 children are born with FAS in the USA every year. FAS occurs in approximately 6% of the children born to chronic alcoholic mothers, or mothers that have repeated episodes of alcohol abuse during pregnancy. However, the syndrome has also been seen in women with a mild consumption of alcohol during pregnancy. The morphologic changes are usually related with alcohol consumption in the first trimester, while growth problems are related to consumption in the third trimester. However, the effect of alcohol on the fetal brain occurs throughout pregnancy.

There are studies confirming that even women that consume 2 drinks a day (social drinking) as an average may give birth to children with a lower IQ and more severe behavior disorders than the children whose mothers did not drink.

Apart from the aspects related to the FAS, alcohol consumption during pregnancy has been associated with a higher risk for abortion, fetal death and LBW.

As no safe levels of consumption have been determined, health professionals treating women that can get pregnant should remind them that as soon as they learn or suspect that they are pregnant, they should stop drinking alcoholic beverages.

Finally, alcohol consumption during breastfeeding may reduce milk ejection and cause minor neurological disorders in the newborn.

If a pregnant woman needs help to stop consuming alcohol during pregnancy and there are no institutional services available, she may be referred to local organizations such as Alcoholics Anonymous, keeping the connection with the obstetric teams, to prevent the woman from feeling poorly supported. There is recent evidence showing that women at high risk of exposure to alcohol during pregnancy benefit from counseling sessions to reduce consumption.

Drugs

Although the percentage of women that use illegal drugs such as marihuana, cocaine, ecstasy, amphetamines or heroine is difficult to ascertain, the CDCs estimate the incidence to be lower than 3% of pregnancies. These and other illegal drugs may cause a number of risks during pregnancy. Some of them are associated with babies that are born small for gestational age or with a broad spectrum of symptoms such as congenital defects, behavior problems or learning disorders. But as most of the pregnant women that consume illegal drugs also consume alcohol and tobacco, it is difficult to determine the health problems specifically caused by illicit drugs.

Cocaine

Cocaine used during pregnancy may affect the mother and her fetus in many ways. During the first months there may be an increased risk of abortion, later triggering premature delivery, or generating an intrauterine growth restriction (IUGR), also entailing the risk of producing a small-for-gestational-age (SGA) newborn. There is evidence showing that SGA children have a 20-fold increase of the chances of dying within their first month of life versus children with an adequate weight. Likewise, those that survive are at a higher risk of presenting handicaps, including mental retardation and cerebral palsy. The children exposed to cocaine during their intrauterine life typically have smaller heads, which indirectly reflects a poorer brain development. It has also been claimed that children exposed to cocaine are at a higher risk of presenting congenital defects, especially involving the urinary tract, and possibly congenital heart disease.

There are reports suggesting a potential increase in premature detachment of normally inserted placenta in the pregnant women that consume cocaine.
Newborns exposed to cocaine in uterus show impaired attention and worse reflexes than newborns not exposed. Some newborns might present excessive crying and tremors, suggesting similarities with the withdrawal syndrome seen in the adults; others may have trouble to fall asleep, or conversely, they may sleep too much. Children born to cocaine users have been reported to have increased chances of dying due to the Sudden Infant Death Syndrome, and they may have impaired feeding. These disorders tend to be transient and usually resolve in the first months of life.

Marihuana

Some studies suggest that the children born to mothers that consumed marihuana during pregnancy are more likely to present IUGR and premature birth. Both aspects favor the child's chances of having low birth weight.

At birth, some of those children may present with excessive crying and tremors, resembling the withdrawal syndrome seen in the adults.
So far there is no evidence of increased risks for learning disorders or behavior problems in those children.
Women willing to quit drugs during pregnancy should be supported in that endeavor and hopefully referred to organizations specialized in providing care to people with drug dependence

Violence

The WHO defines violence as "The deliberate use of physical force or power, either as a threat or effectively, against oneself, other people or a group or community, that may cause or will very likely cause injuries, death, psychological damage, developmental disorders or deprivations".

PAHO considers interpersonal violence as a public health problem. Women in particular usually suffer from violence, both because of gender-related aspects, and as domestic violence.

Gender violence is defined as "any act of violence resulting from being a female, that causes or may potentially cause harm or physical, sexual or psychological distress to women; it also includes threats of such acts, coactions or the arbitrary deprivation of freedom, either in their public or private life".

Domestic violence is “any direct or indirect action or omission that may by whatever means undermine a person, illegitimately limiting the person’s free exercise or enjoyment of his/her human rights, caused by somebody with whom he/she has had an affective relation based on cohabitation and originating in kinship, engagement, wedlock or common law marriage”.

Despite the relative frequency of this problem (10 to 50% of the women suffer from some sort of violence), which is present in all social groups, regardless of the women’s cultural level, this information is usually hard to obtain. Sometimes the difficulty is due to the providers’ ignorance, prejudice or habits, the characteristics of the medical setting or the providers’ lack of competence to approach the issue. In other cases the difficulties come from women themselves, who may feel stigmatized or fearful to disclose their situations.

The frequency of domestic violence among pregnant women in developing countries ranges from 4 to 29%. Violence may show a broad range of physical and/or psychological effects, even leading to the mother’s death. The children born to mothers that suffer from violence are more likely to have low birth weight, and pregnancies in such cases are more prone to end as preterm delivery, abortion or death of the fetus.

In case of violence, support should be obtained from experts in the field, to provide an effective response for the mothers that suffer from those situations.

Objective *To prevent neonatal and puerperal tetanus*
Activity *Tetanus vaccine*

Tetanus is a frequently lethal condition caused by the exotoxin produced by Chlostridium tetanii; it can be totally prevented through active immunization of the pregnant woman.

The increase in vaccine coverage in the Region of the Americas has contributed to eliminating neonatal tetanus (NNT) as a public health issue. NNT is considered eliminated as a public health problem when the annual rates in all the municipalities of a country are lower than 1 x 1,000 live newborns (ln). In the 1988 - 2003 term the incidence of NNT dropped by 95%. In 2004 the incidence of NNT for all the Americas was 0.5 x 100,000 live births, the rates ranging from zero in most countries to 1 x 100,000 live births in the Andean countries, and peaking in the Latin Caribbean (5.6 x 100,000 live births), where Haiti contributes with 92% of the cases.
The lethality rate of untreated neonatal tetanus is almost 100%, dropping to 50% in high complexity centers equipped with mechanical respiratory assistance.

Adequate immunization of women with tetanic toxoid (TT) prevents neonatal and puerperal tetanus. The newborn acquires passive protection provided by the mother's antitoxin antibodies that go through the placenta to the fetus's blood flow.

Good hygiene practices during childbirth and good care of the umbilical wound until it heals are useful measures to prevent neonatal tetanus and other infections. The adequate immunization of pregnant women with (TT) is effective, providing protection even if the umbilical wound gets infected with Chlostridium tetanii.
The PCR reminds the health professionals to check the pregnant woman's immunity status. The vaccination scheme recommended for the first vaccination of women of childbearing age, pregnant women included, is as follows:

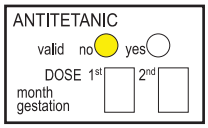


Figure 17.
PCR fragment
Antitetanic vaccine

Chart 9 Vaccination scheme recommended for the women of childbearing age without any previous vaccination

Dosages	Plan The intervals indicated in the chart refer to the minimum time acceptable between vaccinations; there are no maximum intervals
TT1 or Td1	At the first contact or as early as possible during pregnancy
TT2 or Td2	At least 4 weeks after the first dosage
TT3 or Td3	From 6 to 12 months after the second dosage or during a subsequent pregnancy
TT4 or Td4	From one to five years after the third dosage or during a subsequent pregnancy
TT5 or Td5	From one to ten years after the fourth dosage or during a subsequent pregnancy

TT = Tetanic Toxoid Td = Tetanus + diphtheria
Source: Elimination of neonatal tetanus. Practical Guide 2nd edition. PAHO – Scientific & Technical Publication 602. Year 2005

Although there is no evidence suggesting teratogenic effect by the vaccine, booster dosages are not recommended until the fourth month of pregnancy and at least one month before the expected date of delivery.

Shorter intervals may be adopted if there are fewer than 10 weeks left between the first dosage and the expected date of delivery. Newborns will still receive satisfactory (although not optimum) protection when the pregnant woman is administered two dosages of TT adsorbed with a four-week interval. Shorter intervals cannot be considered satisfactory, but they may be used if there are no other alternatives.
In order for a woman to be considered well protected at the time of delivery, she must have received the last dosage at least 2 weeks before delivery.
In areas with moderate to high neonatal tetanus risk, the first dosage or the booster should be administered at the first visit. The interval between the first and the second dosages must always be greater than 4 weeks.

Effectiveness of the vaccine
The efficacy against tetanus obtained after two dosages ranges from 80 to 90%, lasting at least three years in all individuals. Efficacy rises to almost 100% and probably for the lifetime when individuals receive the 5 dosages recommended.

A single dosage of TT administered to women during pregnancy proved to be 80% effective in preventing neonatal tetanus, RR 0.20 (95% CI: 0.10 – 0.40). Conversely, at least two dosages of the vaccine are needed to protect the neonate from death resulting from NNT, RR 0.02 (95% CI: 0.00 – 0.30).

In the case of women vaccinated for the first time during pregnancy, premature childbirth might reduce the newborn's protection, since the mother's antitoxin antibodies would not reach the levels required to protect the fetus.

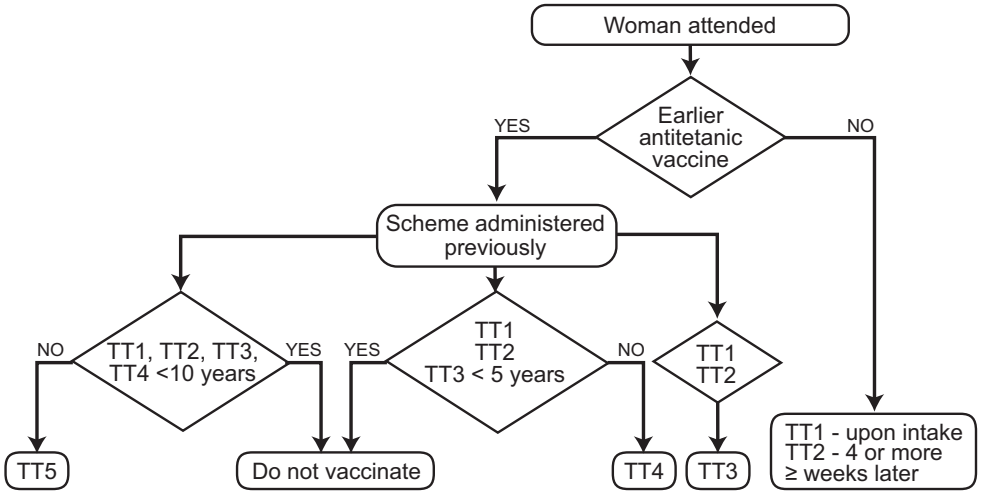


Figure 18. Vaccination scheme for antitetanic immunization.

Objective *To reduce the negative impact of vertically-transmitted infections.*

Activity *Prevention, detection and therapy of vertically-transmitted infections.*

Vertically-transmitted infections are defined as those infections transmitted by the pregnant woman to the fetus or newborn.

Transmission may occur:

- During pregnancy, mainly across the placenta.
- During delivery, through contact with blood or infected secretions in the birth canal.
- After delivery, through breastfeeding, or contact with the mother's secretions.

There is a long list of infections potentially transmitted from mother to child during pregnancy, delivery and puerperium that may be deleterious to the health of the fetus, or newborn, or even life-threatening.

In this chapter we will limit our scope to the infections that have been incorporated in the perinatal clinical record developed by CLAP/WR, as a result of queries to programs dealing with "women health" and "mother and child" implemented by the ministries in the region.

Those infections include, among others:
Rubella, Toxoplasmosis, HIV, Syphilis, Chagas Disease, Paludism, Group B Streptococcus.

Congenital Rubella

Rubella is an exanthematic febrile disease that rarely presents any complications, usually disappearing spontaneously. Despite its apparently benign character, if it is acquired during the first trimester of pregnancy, it may cause the Congenital Rubella Syndrome (CRS), with its typical characteristics: spontaneous abortion, stillbirth, mental retardation, deafness, blindness and congenital heart disease. Fetal infection is extremely likely, reaching almost 90% when the infection occurs before week 11 of pregnancy.

The CRS can be completely prevented by vaccinating all girls and women of childbearing age. Before the vaccine was available, there were about 20,000 cases of CRS reported in the region. In 2004, barely 27 cases of CRS were reported in the region.
Rubella vaccine is 95% effective, and a single dosage provides life-lasting immunity.
Even when many countries in the Region are in the process of eliminating Rubella and the Congenital Rubella Syndrome (CRS), in other countries it continues to be a challenge. Eliminating rubella implies interrupting the endemic transmission of the virus and the disappearance of any CRS cases. Reaching this goal requires a rapid interruption of the endemic dissemination of the rubella virus through programs and mass vaccination campaigns; it requires reaching coverage rates close to 100% in all municipalities and in all age groups, covering both men and women. Failure to achieve that level implies the persistence of reservoirs in the population, entailing the risk of producing new cases.

One of the ways to contribute to these national and regional efforts is to routinely ask about the status of the anti¬rubella immunization during the prenatal control. To that aim, the PCR developed by CLAP/WR has included a reminder on the status of antirubella immunization.

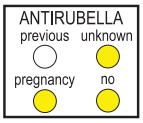


Figure 19.
PCR fragment
Antirubella immunization

The aim is to ensure that all women of child-bearing age receive the vaccine before getting pregnant. Vaccination of pregnant women is not recommended; however, mass vaccination campaigns have provided enough evidence to guarantee that there is no association between the antirubella vaccine received during pregnancy and the occurrence of CRS or fetal death.
Hence, if a pregnant woman happens to get vaccinated without knowing that, a strict monitoring of the fetus and newborn is recommended. Interruption of pregnancy is not justified.

Aiming at the highest coverage of fertile women, and trying not to "miss any opportunities", the recommendation is to vaccinate all women that reach puerperium without such immunization.

The Perinatal Clinical Record developed by CLAP/WR reminds professionals that they should immunize all unvaccinated women before they are discharged from hospital.

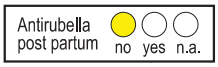


Figure 20. PCR fragment.
Antirubella postdelivery

Congenital Toxoplasmosis

Toxoplasmosis is an endemic zoonosis caused by Toxoplasma gondii, a protozoal infection that involves felines as their definitive host. Human infections tend to be benign, except for two specific situations:

- Immunosuppression: people with immune suppression (HIV/AIDS, TBC, cancer patients).
- Fetuses or children that acquired infection in their mother's womb, transmitted through the placenta. This transmission is only possible when the mother acquires the acute infection during pregnancy.

Congenital toxoplasmosis may cause severe damage, such as fetal death, corioretinitis, brain calcifications, micro or hydrocephalus, which may lead to mental retardation, seizures, blindness, etc. The frequency in developed countries is about 1 case every 1,000 live births; the prevalence among susceptible women varies widely in the various countries, and even in the different cities and districts in the same country. Although the real epidemiological situation in Latin America is not known, there are reports from some countries indicating prevalences similar to those seen in developed countries.

Several studies consistently show that the risk of mother-child transmission is minimal in the first trimester, its peak occurring in the last month. A recent study evaluating the risk for mother-child transmission estimates that it rises from 6% at 13 weeks up to 72% at 36 weeks.

The need to implement universal screening programs for Toxoplasmosis is controversial. However, the general consensus is that educational and hygiene preventive measures should be implemented from the beginning of pregnancy.

Ninety per cent of the primary toxoplasmosis infections in pregnant immunocompetent women are asymptomatic; the infection can be diagnosed in the mother only through IgG or IgM detectable seroconversion.

The Perinatal Clinical Record developed by CLAP/WR includes a general reminder for screening enforceable in the countries that include it in their national standards; however, even when screening is not mandatory, this helps providers remind pregnant women of the preventive educational measures.

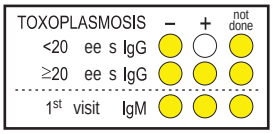


Figure 21. PCR fragment. Toxoplasmosis.

Chart 10. Educational measures recommended to women with negative serology for toxoplasmosis

- Eliminate consumption of raw or poorly cooked meat
- Wear gloves and wash hands thoroughly after manipulating raw meat
- Carefully wash all the silverware that was in contact with raw meat
- Wash profusely any vegetables intended to be eaten raw
- Always wear gloves when you are in contact with the soil, and wash your hands thoroughly after touching it
- Keep all domestic cats inside the house and provide them animal feed
- Wear gloves when cleaning the “pet’s house” and wash your hands after doing so

The chart below summarizes four possible scenarios, ranging from the cases in which screening is performed to those where it is not.

Table 7: analysis of different situations in detecting toxoplasmosis

Possible results		Interpretation	Management
IgG	IgM		
●	●	No infection. There is risk of contraction	Communicate ways of protection Reassessement of Ig G according to national standard
◐	○	past infection	Continue the normal control
◐	◐	Present infection	Evaluar riesgo de infección fetal. Evaluar realización de HO médico
Not done ●	Not done ●	Unknown risk	Communicate means of protection Realize detection according to national standard

Management

Despite the dubious effectiveness of anti-toxoplasmosis therapy during pregnancy, there is a consensus that women with an active toxoplasmosis should be referred to high-risk pregnancy control for their correct work-up and eventual treatment.

Chart 11. Suggested therapy in pregnant women with pregnancy-acquired toxoplasma infection

Clinical situation	Therapy	Dosage	Duration
Acute maternal infection with no confirmation of fetal infection	Spiramycin	Oral 3 g/day t.i.d. (away from meals)	Until the end of pregnancy or until fetal infection is confirmed.
Confirmed fetal infection (from weeks 12 and 18)	Pirimetamine	Loading dose: 100 mg/day per os, b.i.d., for 2 days. Followed by: 50 mg/day per os	Until the end of Pregnancy
	Sulfadiazine	Loading dose: 75 mg/Kg/ day per os, b.i.d., for 2 days. Maximum 4 g/day. Followed by: 100 mg/day per os b.i.d. Maximum 4 g/day.	Until the end of Pregnancy
	Folinic Acid	5 to 20 mg/day	During and up to one week after using Pirimetamine

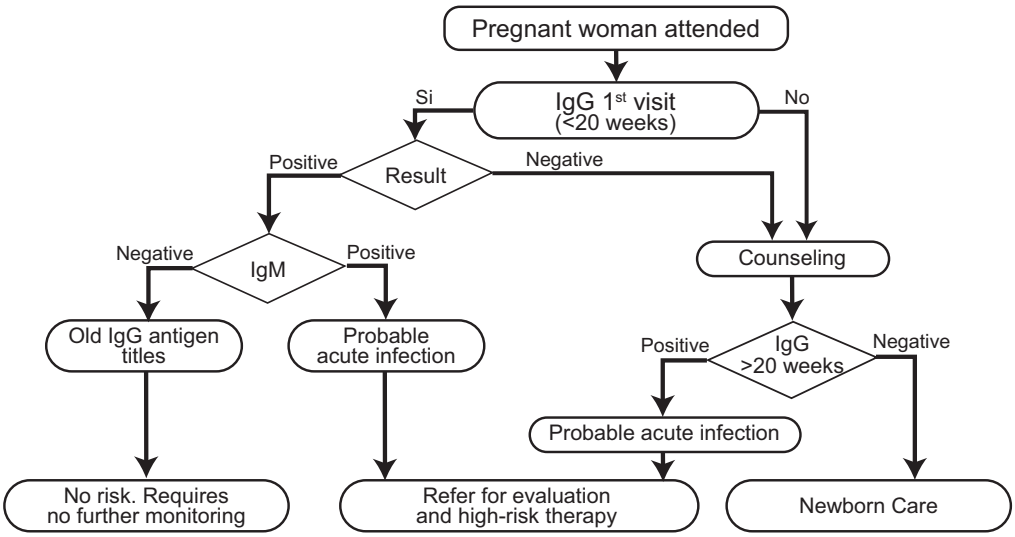


Figure 22. Decision tree for the detection, prevention and treatment of toxoplasmosis in pregnancy

HIV/AIDS

The pandemia caused by the Human Immunodeficiency Virus involves all age groups; although the infection is spread mainly among adolescents and youths (15 to 24 years) it affects an increasing number of women and children. Most infected children acquire the infection from their mothers; this mother-to-child transmission may occur during pregnancy, labor, delivery or breastfeeding.

Even with no further interventions, in populations in which breastfeeding is suppressed, transmission rates range from 15 to 30%. Breastfeeding increases the risk of transmission by 5 to 45%.

At the United Nations Summit held in September 2005, the WHO State Members reaffirmed their commitment to meet the 2001 UNGASS Declaration, which consists of reducing the proportion of HIV-infected infants by 50% by 2010.

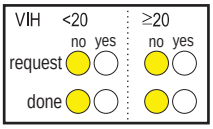


Figure 23.
PCR fragment. HIV

That goal requires knowing the pregnant women's serology, since the risk of vertical transmission may be reduced to below 2% through interventions such as prophylaxis with antiretroviral (ARV) agents, elective cesarean Section (before the onset of labor and rupture of membranes) and the total suppression of breastfeeding. This led the WHO and UNAIDS to recommend making the HIV detection test available to all women presenting to the maternity & child health care services.
The test should be made available ensuring:

- Confidentiality
- Counseling, and
- The test should not be performed until informed consent is obtained.

Properly conducted, counseling, together with confidentiality, enhances the woman's chances to access a voluntary and informed test.
All the health care staff may provide counseling if they are trained.
Health care centers should ensure access to screening tests (rapid blood or saliva tests, or ELISA tests); if positive, they should be confirmed with the Western blot technique or with immunofluorescence. HIV positive people should receive counseling about their rights, conduct, psychosocial aspects and medical implications of the HIV infection; they should be put in contact with specialized centers and receive therapy in keeping with the country's national standards.

HIV-positive pregnant women must receive prophylaxis with antiretrovirals

- Zidovudine (AZT) during pregnancy, starting on Week 28
- AZT and Lamivudine (3TC), plus one single dose of Nevirapine (NVP) during delivery.
- AZT for one week and a single dose of NVP, for the newborn. If the mother received less than 4 weeks of AZT during pregnancy, AZT administration to the child should be extended to 4 weeks.
- Terminate pregnancy through elective cesarean section at 38 weeks (with spared membranes).
- Fully suppress breastfeeding.

This prophylactic scheme applied to HIV-positive women that do not need therapy yet has proven to be most effective in reducing mother-to-child vertical transmission. The management of HIV-positive pregnant women who are already on therapy needs to be reviewed by a specialist. This scheme tends to be less effective than the former.

If the ideal therapy is not available, administer intravenous AZT during labor, starting with 2 mg/Kg/weight, followed by a 1 mg/Kg/weight/hour infusion, while the woman is referred to a higher complexity center.

Hepatitis

Hepatitis B is an infection acquired by susceptible women when they get in contact with an infected person's blood, semen and/or saliva, and which may be transmitted to the newborn through its mother's blood or during breastfeeding.
Pregnancy does not alter the course of the disease, and Hepatitis B would not appear

to cause teratogenesis; however, there is evidence suggesting that a relationship has been observed between hepatitis, prematurity and IUGR.

It is estimated that 1 out of 4 newborns born to mothers infected during the third trimester will be asymptomatic carriers that may suffer from chronic hepatitis. These reasons support the systematic screening of Hepatitis B surface antigens already at the first prenatal visit. That enables us to identify the women that are susceptible, preventing infection through the application of the specific vaccine even during pregnancy. However, vaccination is more common in pregnant women that present with some risk factors for Hepatitis B, such as intravenous drug use, transfusions, and tatoos, among others.

The vaccine is applied in three dosages, and it generates immunity rapidly. Seronegative women (unvaccinated) exposed to Hepatitis B may benefit from the use of anti Hepatitis B hyperimmune gamma globulin (anti-HB HG) the first 48 hours following the infective contact.

Newborns born to seropositive mothers should be protected with anti-HB HG immediately after birth.

As this is an infection that may be transmitted to health workers, the systematic protection with the vaccine should be encouraged among such workers.

Objective *Preventing congenital syphilis*
Activity *Screening and therapy of syphilis in pregnant women*

Syphilis continues to be a serious public health problem; it is estimated that there are more than 12 million new infections by Treponema pallidum each year. Two million of those infections occur in pregnant women. It is to be noted that according to the WHO, between 1997 and 2003 the estimated rates of maternal syphilis reported in the LAC region are higher than in any other region (3.9%). Based on this rate, it is estimated that approximately 459,108 cases of gestational syphilis are to be expected in the Americas Region (except for U.S. and Canada) each year, resulting in 164,222 to 344,331 cases of congenital syphilis (CS). In most of these cases, the infection is transmitted to the fetus, usually between weeks 16 and 28 of pregnancy, and it has a fatal prognosis in 30-50% of the cases.

Pursuing the mandate dictated by its member countries, PAHO has developed the “Plan to Eliminate Congenital Syphilis”, aimed at reducing congenital syphilis to 0.5 cases per 1,000 births (including stillbirths). Along with other organizations, PAHO proposes to promote a regional initiative for the elimination of child transmission of HIV and congenital syphilis in Latin America and the Caribbean.

Syphilis is an STI caused by a spirochete, Treponema pallidum. If left untreated, the disease goes through typical stages. It may be asymptomatic or it may present its earliest sign (chancre) in a hidden place that may go unnoticed. Hence, all women should be screened for syphilis during pregnancy

CLAP/PAHO has incorporated the possibility of recording two controls for syphilis screening in the PCR, as recommended by the best evidence available and in keeping with most guidelines implemented in the Region. The sequence recommended would be:

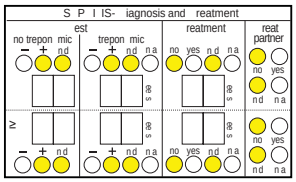


Figure 24.
PCR fragment. Syphilis

- The first control should be done at the first visit (before Week 20)
- and the second screening should be done in the third trimester (after 20 weeks)

A new space was added to record whether it was necessary to treat or not; when it was deemed necessary, there is a box to indicate whether it was completed. The treatment of partners is also included. In pregnancy, treating the pregnant woman is just as important as treating her partner. Failure to treat partners is the main source of reinfection during pregnancy. Counseling must be provided at all visits, to reduce the risk of acquiring syphilis or HIV during pregnancy. Rapid testing is recommended (subject to availability) to provide an immediate diagnosis whenever the treating HCP suspects that there may be no continuity in the antenatal control

Diagnostic testing

The serology diagnosis of syphilis is based on treponemal and non treponemal tests. Non treponemal tests include the VDRL (Venereal Disease Research Laboratory) and the RPR (rapid plasma reagin). A reactive non treponemic test may indicate current infection, a treated or untreated recent infection, or a false positive result. False positives occur in 1 to 3% of the population, and they usually have low titers. They may be negative in early stages of infection, or when titers are very high (prozone phenomenon), and they often turn negative or decrease to very low titers following therapy. In cases of correctly treated syphilis, the VDRL tends to become negative over time, although in exceptional cases it may remain positive for a long time (even for good). False positive reactions may be seen in autoimmune diseases, tuberculosis, mononucleosis, endocarditis and due to pregnancy itself. Treponemal tests are specific, more complex and costly tests, and they include the TPHA (Treponema pallidum haemagglutination assay), the TPPA (Treponema pallidum particle agglutination), the MHATP (micro haemagglutination assay for antibodies to Treponema pallidum) and the FTA Abs (fluorescent treponemal antibody absorption).

They are used to confirm the result of a non treponemal test. The techniques mostly used are MHA-TP and FTA-Abs. These tests remain positive despite the therapy, and there may be false positives (less than 1%) due to other spirochetal diseases (leptospirosis, Lyme's disease, rat bite fever). In these cases there is usually a positive epidemiological history suggesting those agents. Thus, if a treponemal test is positive, and the patient reports having received no therapy, and / or the above conditions are not met, the patient should be treated. The "rapid tests" are simple tests that can be used at the office; the results are available in just a few minutes, enabling the HCP to prescribe treatment immediately. They usually consist of strips impregnated with treponemal antigens that turn positive (giving a color reaction) when in contact with serum, plasma or blood of a patient with syphilis antibodies. They can be read faster (in less than 30 minutes)

and they are included in the treponemal tests. There are more than 20 tests available globally, with varying degrees of sensitivity and specificity, and for some there are comparison and cost effectiveness studies available. They are especially useful when there are no standard treponemal tests. When rapid tests are positive, non treponemal tests allow us to quantify the response to treatment.

All treated women should be evaluated with quantitative serology tests every 1 to 3 months. A four-fold increase of the titles or greater is an indication of the need for new treatment, since it is considered either a treatment failure, reinfection or neurosyphilis; this latter case would also require testing the cerebrospinal fluid (if the test is available). The administration of treatment should be monitored and recorded in the clinical record. If there is no evidence of this administration in the clinical record, the newborn should be considered a case of congenital syphilis.
The Jarisch Herxheimer reaction consists of fever and general malaise due to the release of antigens caused by the death of the treponemes. When the treatment occurs in the second half of pregnancy, this reaction could exceptionally trigger labor.

Management of patients with suspected allergy to penicillin
There are no alternatives to penicillin proven for the treatment of neurosyphilis, congenital syphilis, and syphilis in pregnant women. On the other hand, a new penicillin challenge to a patient with previous allergic reactions can cause severe, immediate reactions.
It is estimated that 10% of the people that report past severe allergic reactions to penicillin remain allergic. Over the time, most of these people stop producing specific immunoglobulin E to penicillin. If there is confirmed evidence that penicillin-specific IgEs are no longer present, these people could be treated safely with penicillin. There are skin tests with major and minor determinants of allergy to penicillin that could effectively identify people at high risk of reaction to penicillin.

Other test for Diagnostic Testing

- Visualization of spirochetes. At very early stages of the infection, when the inoculation chancre can barely be seen and serologic tests tend to be non reactive, the presence of spirochetes in dark-field microscopy or direct immunofluorescence tests of material obtained from the lesion can confirm diagnosis.

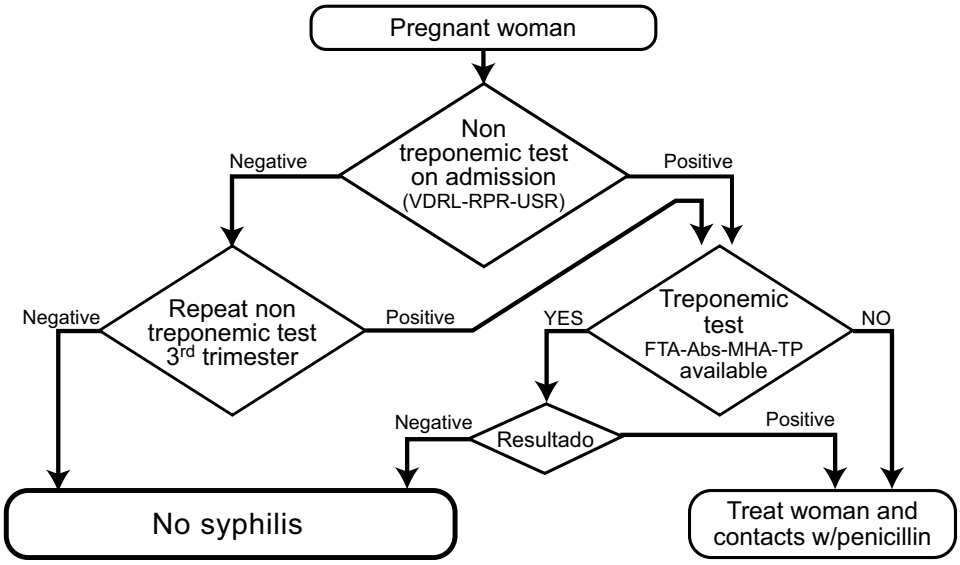


Figure 25. Decision tree for the detection of syphilis in pregnancy

Treating the pregnant woman

Follow the national standard, or else, administer Benzathine Penicillin G 2.400.000 U intra muscular, in a single dose, in case of primary syphilis.

In case of allergy to penicillin, other antibiotics may be effective to cure the mother's syphilis but may fail to protect the fetus. Consequently, in such situations the woman should be referred for desensitization therapy to a more complex level of care, where they can do cardio respiratory monitoring of the pregnant woman, ensuring availability of orotracheal intubation and mechanical ventilatory assistance.

Impact on the fetus - newborn

Fetal infection results from the passage of the spirochete through the placenta. Although transmission usually occurs in the last two trimesters of pregnancy, the spirochete may cross the placenta at any time. Apart from fetal or neonatal death, the children born with congenital syphilis may present with multiple muco-cutaneous manifestations, observed in 70% of the newborns, and may become apparent already in the first weeks of life.

Skin symptoms include

- Palmo-plantar pemphygus (blisters on palms and soles, with turbid and greenish contents, easily ruptured, leaving the dermis unprotected).
- Maculo-papulous syphilides: On limbs and areas surrounding orifices. Initially pink, they get pigmented subsequently (coffee-colored spots).
- Diffuse skin edema: involving palms and soles.
- Anterior alopecia.
- Rhagades around the mouth and the perianal margin.
- Ulceration of the umbilical scar (chancre).

Mucous symptoms include

- Rhinitis or syphilitic coryza. This is the earliest sign of congenital syphilis. (muco-hemorrhagic secretions and naso labial ulcerations).

They may also present with visceral symptoms, including but not limited to

- Hepato and splenomegaly. Other visceromegalies may occur at late stages.

And bone symptoms, such as

- Saddle nose
- Saber shins
- Hutchinson's teeth

The sexual partner and any other potential sexual contacts of the pregnant woman with syphilis must be evaluated and treated.

Objective *To prevent the maternal and perinatal consequences of other sexually transmitted infections (STIs) and other reproductive tract infections (RTIs).*

Activity *Prevention, detection and treatment.*

Syphilis and HIV/AIDS have been described already; what follows is a summary of some aspects of other STI/RTIs that should be considered when monitoring a pregnant woman, since they are frequent reasons that lead women to seek care.
Discharge (leucorrhea): Vaginal microbial flora undergoes qualitative and quantitative changes during pregnancy. While the number of lactobacilli increases, there is a drop of the anaerobes. There is an abundant discharge from the vagina that results from the shedding of the epithelium and bacteria that make secretions highly acidic.
Cervix glands are another source of mucus secretion, triggered as a response to the increased estrogens levels; this has a protective effect against upstream infections.

Leucorrhea may occasionally be abnormal, and it occurs as a result of the presence of organisms such as Candida albicans, Gardnerella vaginalis, Chlamydia trachomatis, Trychomona, Mycoplasm and Neisseria gonorrhoeae, among others.

- Moniliasis of vulva and vagina: the causative agent, Candida albicans, is present in 25% of the pregnant women at the end of pregnancy, although the infection typically stays asymptomatic. The disease presents with itching, a burning sensation and a white, lumpy, sticky, curd-looking discharge. On the microscope, the addition of a few drops of potassium hydroxide (or Gram stain) reveals the presence of micelles and pseudohyphae. The ideal therapy is either Clotrimazole or Miconazole as vaginal cream or vaginal suppositories for 7 days. Asymptomatic sexual partners require no treatment.

- **Bacterial Vaginosis:** caused by Gardnerella or Haemophillus vaginalis, Mycoplasma hominis, Prevotella sp, Mobiluncus sp. It typically presents with a white, grayish fish-smelling discharge, further enhanced by the addition of potassium hydroxide. The pH is usually > 4.5. The microscope shows cells splashed with small comma-looking figures, the "clue cells". The recommended treatment is Metronidazole per os, at 500 mg b.i.d. for 7 days, gel or vaginal suppositories 5 consecutive nights. Asymptomatic sexual partners require no treatment.

- Trychomoniasis: caused by Trychomonas. About 20% of the pregnant women suffer from this parasitic infection, even when it usually remains asymptomatic. Typical signs consist of a foul-smelling, light green, foamy discharge, sometimes presenting with pruritus, reddening and finely mottled hemorrhages on cervix and vagina (strawberry cervix). The microscopic view of the untreated specimen shows the protozoan. Treatment consists of administering Metronidazole per os (2 g in a single dose or 500 mg twice a day for 7 days to the pregnant woman and her sexual contacts, or Tinidazole 2 g per os in a single dose. The woman may also be treated with Metronidazole suppositories or vaginal gel for 5 nights. The use of oral metronidazole was banned in pregnant women for many years, but it has been accepted by the FDA as a safe therapy for some years

- Gonococcia: caused by Neisseria gonorrhoeae. The infection may be asymptomatic, or present with a purulent discharge, potentially producing an inflammatory local reaction with mucopurulent exudate of the endocervical and/or urethral mucosa, possibly dysuria, polachiuria and vesical tenesmus. The microscope shows polymorphonuclear cells containing the Gram-negative diplococcus. It can also be evidenced in cultures using special media, such as agar-chocolate, Tayer-Martin. Serology tests (including modern tests to identify the bacteria's DNA) may turn positive as early as one week after the infection occurs. Gonococcal involvement of the endometrium may cause abortion or miscarriage (this is sometimes the cause of repeated abortion). Even though fetal infection across the placenta is exceptional, it may well contaminate the child's conjunctiva during delivery, causing the "blenorrhagic purulent ophthalmia". For that reason the prophylactic care of the purulent ophthalmia was made compulsory; the procedure involves instilling the newborn's conjunctival sacs with eye drops containing silver salts (Credé's method) or antibiotics, immediately after birth. Pregnancy may have a negative impact, worsening an existing gonorrhea and showing signs in the lower portion of the genital tract, increasing leucorrhea, causing granulose colpitis, bartholinitis, spreading to neighboring areas, and determining the occurrence of urinary and rectal symptoms. After delivery, these infections may go upstream and cause endometritis, salpingitis and/or pelviperitonitis. Both the pregnant woman and her sexual partner must be treated with a single intramuscular dose of Penicillin G 5.000.000 U or a single dose of Ceftriaxone 125 mg, or Cefixime 400 mg, both per os

- Chlamydiasis: caused by Chlamydia trachomatis. It is usually asymptomatic. Discharge, if present, is typically yellowish and tends to involve the endocervix. It may present with dyspareunia, bleeding and urethritis. The diagnosis can be made when cytoplasmic inclusions are observed in the Pap smear or if it is revealed with Giemsa stainings. There are also special media available for growing Chlamydia, fluorescent mononuclear antibodies, etc. Both the pregnant woman and her sexual partner must be treated with a single oral dose of Azitromycin 1 g or Amoxicillin 500 mg per os t.i.d. for 7 days

- Herpes simplex: There are two types of Herpes hominis, i.e., Type I, which prefers the ectodermic skin tissue and rhinopharingeal mucosa, and Type II herpes, or vulvar herpes, that affects the genitalia and is transmitted as a venereal disease. It presents as multiple itchy or painful vesicles that turn yellowish white and subsequently develop ulcers. Passage across the placenta, albeit rare, may lead to fetal lesions such as intrauterine growth restriction, microcephalus and/or intracranial calcifications that may not manifest until later in childhood, when the child is assessed because of psychomotor retardation. The newborn's infection

occurs through direct contact across the birth canal. It is usually severe, and often lethal (50 to 70%); it causes jaundice, hepatosplenomegaly, hemorrhages and septicemia. Necrotic foci may occur in the liver, lung, adrenal glands and brain. Consequently, the presence of active genital herpes at delivery shall be an indication of elective cesarean section. The presence of viruses at delivery entails a 40% risk of neonatal infection, a risk that is considerably reduced if the cesarean section is performed before the membranes rupture, or no later than 4 hours after their rupture. Diagnosis is typically clinical. Blisters are usually associated with dysuria, pain and occasionally fever. Treatment includes Acyclovir 400 mg per os t.i.d. for 7 days. Alternatively, topical 5% Acyclovir cream may be associated for 5 days, or Valacyclovir 1 g per os b.i.d for 7 days. Symptomatic sexual partners must receive the same therapy

Objective *Prevent vertical transmission of Chagas disease*
Activity *Prevention, detection and treatment*

The causative agent of Chagas disease is called Trypanosoma cruzii. Its presence is not limited to our continent, but it is considered endemic in 21 countries in the region, and it is estimated that it affects more than 15 million people.

Prevalence of infection by T. cruzii in pregnant women ranges from 5 and 40%, depending on the geographical area. Increased migration has led to an increase in the frequency of congenital infections by T. cruzii in urban areas and in non endemic countries. In those countries that have eliminated vector transmission, implementing a good control of their blood banks, the only route for new cases is through vertical mother-child transmission during pregnancy.

The number of newborns with congenital Chagas ranges from 4 to 12%, and may reach as high as 20%; this broad variation is related with the geographical region and the socio economic conditions of the groups under study. From 60 to 90% of the cases of congenital infection are symptom-free. Symptomatic cases often present with premature birth, low birth weight and hepatosplenomegaly. Some patients may present with anasarca and acute respiratory syndrome. Meningo encephalitis and myocarditis are more frequent when there is HIV co-infection.

There are no specific clinical markers of congenital infection of Chagas Disease.

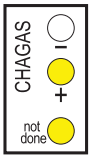


Figure 26.
PCR fragment.
Chagas

In the countries where the infection is endemic, serology testing is recommended in the pregnant woman. The detection of specific antibodies against Trypanosoma cruzii to confirm diagnosis requires the use of at least two standardized serologic reactions that yield sensitivities as high as 98 to 99.5%, i.e., HAI-IFI, HAI-ELISA and ELISA-IFI.
IHA: Indirect Hemagglutination.
IFI: Indirect immunofluorescence.
ELISA: Immune enzymatic assay.

Specific chemotherapy is contraindicated during pregnancy, but the infected mother may be tested to rule out heart impairment and to guarantee a safe and good quality obstetric care. If the test is positive the family must be informed about the procedures and therapies applicable to the newborn. The recommendations below apply to the children whose mothers have positive Chagas serology:

- Direct parasitology screening of the newborn: micro hematocrite (MH) is the technique of choice because of its simplicity, because it requires a small blood volume (0.3 ml) and because of its high sensitivity (50 to 93%). The indirect parasitology methods (Xenodiagnosis, Mice Inoculation and blood culture) are highly sensitive but they require a complex infrastructure and the results are not available until 15 to 60 days later

- Subsequent conventional serology screening – at the age of 9 to 12 months. The search of specific antibodies does not contribute to diagnosis early in life, since the usual serology tests detect IgG antibodies, which may have been transmitted passively by the mother. Although the detection of the specific IgM fraction (produced by the fetus) does allow an early diagnosis, the test has a low sensitivity

Criteria suggesting congenital Chagas

- newborn born to a mother with positive T cruzi serology,
- Parasites identified at birth or parasites or non maternal specific antibodies detected after birth, unless there is a history of blood transfusions or vector contamination in the past.

The antenatal diagnosis enables the neonatologist to prescribe the specific treatment, ensuring the newborn's cure.

A cord blood sample can be used at birth to screen for blood-borne parasitic infections. Specific therapy consists of Nifurtimox 10 mg/kg/day, followed by Benzidazole at 5 mg/kg/day for 30 days. These drugs are highly effective when they are administered before the age of 3 years, and their side effects are few.

Objective *Reduce maternal morbimortality and prevent vertical transmission of Malaria*

Activity *Prevention, detection and treatment*

Malaria is an infection caused by a protozoan of the Plasmodium gender. The causative agent is inoculated into the human being through the bite of the female Anopheles mosquito. It is endemic in 21 of the 37 countries of the Region. Over 80% of the cases reported originate in the 9 countries that share the Amazon jungle, being pregnant women and children particularly susceptible.

The clinical aspects depend to a great extent on the patterns and intensity of the transmission of Malaria in the area where the patient lives, since that determines their degree of acquired immunity.

- In stable areas where transmission is high people are continuously exposed to inoculation with Malaria, they tend to acquire partial immunity to the clinical disease and the most severe manifestations usually occur in childhood. Adolescents and adults are partially immune and they rarely present the clinical disease. Immunity is reduced during pregnancy and it may be lost when the women move away from the transmission areas

- In unstable areas where the transmission of Malaria is low, (the most frequent situation in Latin American countries where the disease remains endemic) the low inoculation rates delay the acquisition of immunity; this causes the acute infection of subjects in all age groups (children, youths and adults), and if the subject is not treated, the risk of progressing to severe forms of the disease is high

In the high-transmission areas, children are at high risk of dying to malaria, while in the low-transmission areas that risk is shared by all age groups.

Diagnosis of Malaria
Diagnosis is based on clinical criteria (suspicion diagnosis) or on the identification of the parasites (confirmatory diagnosis).

Clinical Diagnosis
Isolated clinical diagnosis is not specific at all, and it is based on the occurrence of fever within the 3 days prior to consultation, in the absence of any severe conditions.

The first symptoms of malaria (in an uncomplicated case) are often nonspecific and may mimic a typical viral impregnation. The patient may show headaches, asthenia, fatigue, abdominal discomfort, muscle and joint pain, followed by fever, chills, sweating, anorexia, etc.

At stages where there is no evidence of organ dysfunction, mortality rates are low (close to 0.1% for P. falciparum infections), if effective treatment is provided early. Delaying treatment or using drugs ineffectively may lead to an increased severity and worsening of the patient's status in a few hours. Worsening may manifest through one or more of the following symptoms: coma (brain malaria), metabolic acidosis, severe anemia and hypoglycaemia. In adults it may manifest as acute renal failure or pulmonary edema. At this stage, even in people who receive proper treatment, mortality rises to 20%. If left untreated, severe malaria is often fatal.

Malaria and pregnancy

- Given that our region has a low transmission profile, women of childbearing age have little acquired immunity to malaria. In such settings it is common to see severe cases of maternal illness, i.e., severe malaria with central nervous system complications, hypoglycemia, hyperpyrexia, severe hemolytic anemia, pulmonary edema and death. Severe cases may obviously be accompanied with poor reproductive outcomes, such as: IUGR, LBW, prematurity, abortion, stillbirth and child death.

Parasitology Diagnosis

The two methods suggested for the parasitological diagnosis are Light Microscopy and the Rapid Diagnostic Tests (RDTs). The advantages of light microscopy are low cost, high sensitivity and specificity. It includes the "thick stain test", (considered the "gold standard" of diagnosis) where a drop of peripheral blood is analyzed with Giemsa stain, looking for the parasite. Three negative smears, 48 hours apart are required to declare the subject free from infection.

Rapid tests (RDTs) that detect parasitic antigens are more expensive, and their vulnerability to high temperatures and humidity are a significant constraint to their effectiveness.
The polymerase chain reaction (PCR)-based techniques used to detect parasitic DNA are highly sensitive and they are frequently used to detect mixed infections, especially when the parasite counts are low.

Pregnant women in endemic areas must undergo parasitology work-up to diagnose the cause of their fever. This will reduce any unnecessary use of antimalarial antibiotics in pregnancy. In areas where there are more than two species of parasites responsible for malaria, it is necessary to identify the causative parasite; that diagnosis can only be provided by parasitology methods.

Prevention of malaria during pregnancy

Control the effects of malaria infection in pregnant women and their fetuses with the interventions below:

- Treatment of the woman with malaria, her anemia and the other consequences of infection
- Use of insecticide-treated insect nets (this could reduce the number of malaria-related deaths by one fourth)
- Intermittent preventive therapy (IPT), to be applied in high-transmission areas

Treating the pregnant women

The pregnant women presenting with acute symptomatic malaria during the second trimester of pregnancy are more prone to develop a more severe form than other adults, often complicated with pulmonary edema and hypoglycemia. Mortality can get close to 50% which is much higher than the rate observed in non pregnant women. Fetal death and premature childbirth are also frequent. All the above reinforce the need for treatment, primarily aimed at saving the mother's life.

Anti-malarial agents considered safe in the first trimester include Quinine, Chloroquine, Proguanil, Pyrimethamine and Sulfadoxine–Pyrimethamine. Quinine is not only the most effective, but it is also safe throughout pregnancy. While quinine is the drug of choice for the first trimester, the Combined Therapies based on Artemisine (ACT) (Artesunate or Artemeter) are preferred for the second and third trimesters.
Notice that as anti-malarial drugs have an antifolinic effect, they always require the concomitant use of folinic acid.

Drugs contraindicated during pregnancy

Mefloquine, Primaquine and Tetracyclines, Amodiaquine, Chlorproguanil-Dapsone, Halofantrine, Lumefantrine and Piperaquine.

Treatment of uncomplicated Malaria falciparum during pregnancy
First trimester: Quinine + Clindamycin for 7 days.
Avoid the use of ACT unless it is the only effective therapy available.

Second and third trimesters: ACT + Clindamycin for 7 days.
or, Quinine + Clindamycin for 7 days.

The unnoticed exposure to antimalarials is not a cause for interrupting pregnancy.

Women breastfeeding
The amount of antimalarials transmitted through the mother's milk is low, being dapsones the only exception to that rule (14% of the dosage administered to an adult is excreted through urine). Tetracyclines are also contraindicated because of their effects on the children's bones and teeth.

Chart 12. Intervention strategies against malaria during pregnancy - low - transmission scenario

Case Management	Preventive Intermittent Therapy (PIT)	Insecticide-treated nets
High risk of active malaria Seek and treat anemia with the antimalarial agents recommended and supplement with iron and Folic Acid. Rapid recognition of all the cases of active malaria and treatment with drugs of known effectiveness	Provide PTI (after perceiving fetal movements) during the prenatal controls, close to weeks 26 and 32.	Start using them in pregnancy and extend their usage after delivery.

IPT consist of the supervised administration of antimalarials during pregnancy at therapeutic dosages and at intervals previously defined. They are started on the second trimester, once the woman has perceived the first fetal movements. The recommendation is to administer from 2 to 3 dosages separated by at least a one-month-interval. The drug of choice is Sulfadoxine-pyrimethamine (SP), since it has proven to be safe when it is used between the second and third trimester.

The plan recommended is as follows:
1st dosage close to week 26.
2nd dosage close to week 32.
3rd dosage (in countries with a high prevalence of HIV) close to week 36.
There is no evidence showing that the administration of more than three dosages of IPT with SP during pregnancy may offer any additional benefits.

Objective *Reduce the Group B Streptococcus morbimortality in newborns.*
Activity *Prevention, detection and treatment.*

Group B Streptococcus (Streptococcus agalactiae) is an encapsulated Gram-positive bacterium capable of causing invasive disease in newborns and pregnant women, especially in groups with special medical conditions (e.g. diabetics).

In the pregnant women GBS can cause urinary tract infections, egg infection, endometritis or sepsis. Severe forms are rare in pregnancy. However, certain cases of premature delivery or fetal death may be attributed to GBS infection.

In newborns it usually presents with bacteriemia, pneumonia or meningitis. Other syndromes (cellulitis and osteomyelitis) have also been reported. About 25% of the cases of GBS-related neonatal infection occur in preterm children

In developed countries, before the widespread use of prophylactic antibiotics, the incidence of invasive GBS-related disease was 2 to 3 per thousand live births. The implementation of screening tests followed by the proper therapy reduced that incidence to less than 0.5 per thousand and invasive disease in pregnant women dropped by 21% in 5 years.

In some countries of the Region the incorporation of such screening tests in the national standards would be warranted to further reduce neonatal mortality, although costs and logistics may be a constraint. The use of routine antibiotics based on a risk factor screening has not proven to be effective.

GBS Colonization

The gastrointestinal tract is the natural reservoir of Group B streptococcus; the organism colonizes the vagina secondarily. The frequency of GBS-related vaginal infection in developed countries is not well studied, and it shows a broad variation. In some countries of the region the incidences range from 8 to 30% of the pregnant women attending pregnancy control centers. Maternal colonization is the main risk factor for vertical transmission of neonatal streptococcus, especially when there is rupture of the membranes.

Although an early colonization in pregnancy does not predict neonatal sepsis, screening cultivating rectal and vaginal samples to rule out GBS in the last weeks of pregnancy may indicate which are the women colonized at the time of delivery, and consequently, which have increased chances of transmitting infection to their newborns.

Diagnosis of GBS

One first sample is taken from the vaginal introitus with a swab, and a second sample is obtained from the anal sphincter with that same swab or a new one. The specimens must be sent to the laboratory in appropriate culture media. Samples should be drawn between 35 and 37 weeks of gestation, to improve the sensitivity and specificity of detection in women that are still colonized at the time of childbirth.

GBS colonization in earlier pregnancies should not be considered as an indication for prophylactic therapy in a later pregnancy.

As colonization may be transient, the predictive value of cultures is very low, and cultures should be conducted no later than 5 weeks prior to delivery.

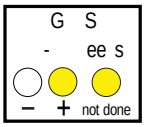


Figure 27. PCR fragment. Streptococcus

Additional risk factors for perinatal GBS-related disease

Other factors that increase the risk of perinatal infection are:

- Gestational age <37 weeks
- Rupture of membranes >18 hours
- Fever >38ºC suggesting egg infection

Those issues are included in the "Rupture of Membranes" box, to remind the health team to adopt the appropriate measures. In those cases it is advisable to prescribe intrapartum antibiotic therapy, as will be described later on.

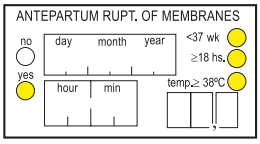


Figure 28. PCR fragment.
Ante Delivery Rupture of Membranes

Chart 13. Recommended plans for prophylactic intradelivery treatment

Recommended	
Penicillin G	**5 million units i/v (starting dose), 2.5 million units i/v every/ hours up to delivery**
Alternative	
Ampicillin	**2 g i/v (starting dose) 1 g i/v every/ hours up to delivery**
Allergy to penicillin	
Cephazoline	**2 g i/v (starting dose) 1 g i/v every/ hours up to delivery**

Planned Cesarean Section
EAs GBS can cross the intact membranes, cesarean sections fail to prevent vertical mother-to-child transmission. Nevertheless, fetal colonization is exceptional when elective cesarean section is performed in the absence of labor and with preserved membranes. Hence, prophylactic therapy is not recommended as a routine in these cases.

Objective *Detect potential oral and/or dental septic processes.*
Activity *Examination of mouth and teeth.*

A comprehensive oral and dental examination should be incorporated in the clinical assessment of all pregnant women. Examination is intended not just to confirm or rule out the presence of dental caries, but also to detect the existence of periodontal disease (PD) and lesions in mouth and tongue. Note that early stages of syphilis may manifest only as an ulcerated lesion (syphilitic chancre) that may be seen on the oral mu¬cosa. Periodontal disease is one of the most frequent chronic infectious processes, its prevalence ranging from 10% to 60%, depending on the population's socio-sanitary conditions.

PD includes gingivitis (an inflammatory condition of the soft tissues surrounding the teeth and gums) and periodontitis (which in¬volves the destruction of the teeth support structures, such as the periodontal ligament, the bone, cement and the soft tissues). PD originates as a result of an overgrowth of certain bacteria, mainly Gram ¬negatives.

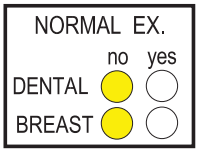


Figure 29.
PCR fragment.
Teeth and breasts.

Periodontal disease would associate with poor perinatal outcomes, primarily low birth weight and preterm delivery, abortion, fetal death and preeclampsia. If PD is confirmed to be an independent and modifiable risk factor, its prevention and treatment would enable us not just to improve women's health, but also to improve perinatal outcomes. Recent studies challenge the earlier results and suggest there are other determinants associated to the bad perinatal outcomes and that the association found earlier would be due to the poor control of confounding variables.

Finally, it is good to remember that pregnancy is rarely a contraindication to treat any oral and/or dental conditions. Moreover, if any radiology assessments were required, they should be performed in full compliance with radioprotection measures. The use of local anesthetics entails a low risk, as long as they are free from vasoconstric¬tors.

Objective *Detect potential changes of the nipple, inflammatory and/or tumor disease of the breast.*

Activity *Examination of the breasts.*

The examination of the breasts is part of the gynecological examination and it must be done in an atmosphere of privacy and respect. It should be performed from the first visit if the rapport with the user makes it possible. The PCR incorporates a reminder to prevent that control from being missed.

The physiological changes of the breast occur early, and they are the last changes to disappear, depending on the duration of breastfeeding.

Breast examination is intended to identify any disorder that may interfere with breast-feeding, such as disorders of the nipples, mastitis and benign and malignant tumors.

The finding of a breast lump suggesting a malignant tumor during pregnancy does not preclude diagnostic work-up to confirm or rule out the diagnosis.

The treatment of flat or umbilicated nipples is still controversial. The most modern tendency suggests that exercises of the nipple are unnecessary, since as it is soft tissue, an adequate breastfeeding technique would suffice to correct this situation. On the other hand, some authors recommend exercises from the time of diagnosis. Some of the most common include the so-called Hoffman's exercises, which consist of stretching the periareolar tissue to gradually evert the nipple, or stretching and rolling the nipple between the index finger and the thumb several times a day. These drills must be discontinued when there is a threatened premature delivery.
Care of breasts and nipples during pregnancy should include:

- Washing with nothing but water.
- Avoid the use of creams and lotions.
- If the nipples are sore they may be exposed to sunlight for 5 to 10 minutes a day.
- Wear firm bras (capable of holding the breasts without pressing them).

Objective *Rule out cervical cancer and cancer precursor lesions; evaluate cervical competence.*

Activity *Examination of genitalia, oncologic colpocytology, colposcopy.*

Cervical cancer

Cervical cancer is the second malignancy in frequency among women, and it accounted for more than 250,000 deaths globally in 2005; approximately 80% of those deaths occur in developing countries, being Latin America and the Caribbean no exception. The prevention of those deaths by means of an adequate screening and treatment will partially contribute to reaching the Millennium Development Goals.
Most deaths in developing countries occur in young women.

Risk Factors

Multiple issues have been identified as risk factors, including multiparity, sexually transmitted infections (STIs), especially those related to strains 16 and 18 Human Papilloma Virus (HPV), active and/or passive smoking, having multiple sexual partners, male sexual partner with many female sexual partners, starting sexual intercourse early in life, precursor lesions of cervix cancer (dysplasias or intraepithelial squamous lesions).

Examination of the pregnant woman

A correct gynecological examination includes a thorough inspection of the vulva, the walls of the vagina and the cervix with a speculum and the vaginal digital examination. The recommendation is to perform an assessment at the first visit; however, it may happen that psycho-emotional factors surrounding the gynecological examination or lack of familiarity between the pregnant woman and the health team may lead to postponing the examination until it is considered more appropriate.

Visual inspection

Inspection may be done with a speculum. Although the application of acetic acid or lugol is accepted, staining with those substances is not recommended as a routine, since they do not improve the sensitivity to detect cervical cancer and premalignant lesions.

- Inspection with acetic acid (vinegar): when applied to the cervix, acetic acid can change its normal pink color, turning it whitish (aceto-white epithelium); this indicates abnormality
- Inspection with lugol's iodine (iodine-iodurate solution): when it is applied on the normal cervix, it turns it dark brown. Suspicious lesions will not get stained

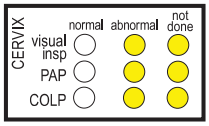


Figure 30.
PCR fragment.
Cervix assessment

Control of cervical cancer

- Primary prevention is intended to generate safe sexual behaviors through education, or to try to alter hazardous sexual behaviors, to reduce HPV exposure or other co-factors that favor cervical cancer. Vaccines against the HPV strains 16 and 18 are likely to be incorporated as part of primary prevention in a relatively short time. The primary prevention strategy also aims to encourage healthy life styles and reduce other factors related to cervical cancer (especially tobacco)

- Secondary prevention is based on an early diagnosis using screening techniques, especially oncologic colpocytology (PAP) and referring the woman to the appropriate level of care when a lesion is detected. User also should be warned about the most frequent signs and symptoms suggesting cervical cancer

- Tertiary prevention: once cancer or precancerous conditions are diagnosed, it is necessary to ensure therapy, which will be frequently curative; sometimes it will even allow to preserve the organ and its function. Other times it will be curative but mutilating, and at times it will only be palliative and the aim will be to achieve the best quality of life

Cervical cancer screening

There are two different strategies recommended for screening women populations, i.e., organized screening and opportunity screening.

- Opportunity screening: in this type of intervention the health teams offer a PAP smear to every woman that seeks care at the center. This approach is applied mainly to young women with a lower risk that attend prenatal control, the family planning visits or the child health departments. Some of its drawbacks are that more women may be lost from follow-up and they have a high cost-effectiveness ratio compared to the organized screening

- Organized screening: this is designed to reach as many women at risk of developing cervical cancer as possible. It involves planning care by levels and making the most rational use of resources. The age groups and the frequency of testing recommended are summarized in the table below:

Chart 14. Ages and frequencies recommended for performing the oncologic colpocytology (PAP)

Start after the age of 30 years, but exceptionally after the age of 25 years
Annual screenings are not recommended at any age
Between the age of 25 and 49 years, a cytology test every 3 years may be enough
Between the age of 50 and 64 years, cytology every 5 years may be enough
After the age of 65 years, if the woman has had two previous tests showing normal cytology, do not repeat cytology

Screening of the pregnant woman

If the pregnant woman has a normal PAP performed as described in Chart 14, there is no need to repeat the test unless recommended by the national standards.

Pregnancy is not the ideal time to carry out cytology testing because the physiological changes observed in this period may yield misleading results. Nevertheless, screening is recommended in all pregnant women that have skipped cervical cytology testing in due time, in women that were never tested, whenever there is evidence of cervical changes, or when there are elements to suggest that the woman is not likely to return to the health care center. All the above indications seek to reduce the number of chances missed.

Obtaining the PAP specimen
The PAP specimen must be taken at the first level of care, and it requires a minimum training and material.

Below is a list of the minimum material required:

- Disposable gloves
- speculum
- light sources
- gynecology table
- material to obtain specimens (Wooden spatula, endocervical brush),
- glass slide for the microscope
- pencil to identify the slide and
- fixating spray or 95% alcohol

Procedure using the wooden spatula
Once the cervix is visible through the speculum, the longest part of the spatula is inserted into the cervical opening and it is rotated in a circle (360 degrees).
Both sides of the spatula must be thoroughly spread on the slide.

Figure 31. Instruments used for PAP sampling.
a) Wooden spatula
b) Endocervix brush
c) Brush

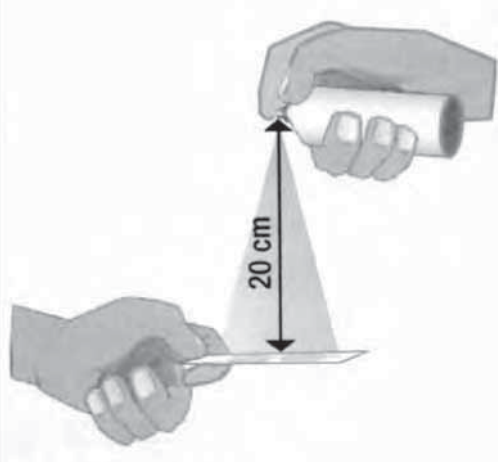


Figure 32. Spray fixation of the PAP smear.

Immediately after extending the specimen on the slide, it should be fixated with spray at a 20-cm distance, in a right angle, or it should be fixated by soaking it in a bottle containing 95% alcohol.
Do not forget to identify the slide properly with the woman's data.

Sampling is not recommended if the woman is bleeding profusely or if there are any elements suggesting a low genital tract infection.

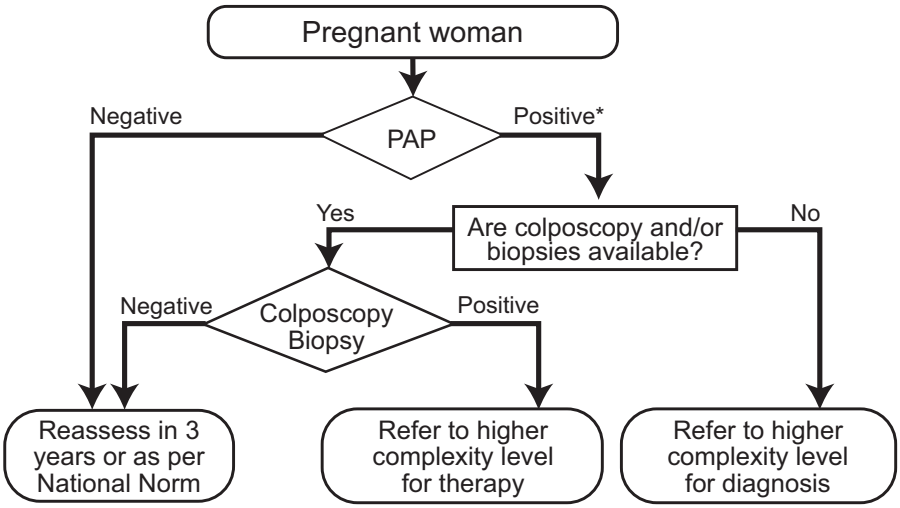
Other diagnostic alternatives include the following.

Colposcopy
Colposcopy involves the examination of cervix, vagina and vulva (colposcope) an instrument that provides light and magnification.
It must be performed by a qualified provider with adequate training.

Used as a diagnostic tool for the detection of cancer and cancer precursor lesions in women with positive (abnormal) cytology, it has a high sensitivity (85%) and specificity (70%).

Biopsy

Biopsy consists of removing a fragment of suspicious tissue for histology; except for the case of macroscopic lesions, it should be done under colposcopic vision.



* When PAPs is reported as ASC-US or low-grade SIL (LSIL), all persisting lesions (reported in 2 PAPs in a 6-month to 1-year period) should be investigated

Figure 33. Management decision tree based on PAP results

Interpretation of the results

Currently there are numerous systems for classifying cervical lesions; two types are predominantly cytological (Papanicolao`s classification or the Bethesda system), while the other two are histological (the CIN - cervical intraepithelial neoplasia - classifications; that confuses the provider and / or the user. Hence, Table 24 compares and relates the above-mentioned systems to facilitate understanding.

Table 8: Terminology used for the screening and cytological and histological diagnosis of cervical lesions

Cytological classification (Screening)		Cytological classification (Screening)	
PAP	Bethesda	CIN	WHO (descriptive classifications)
Class I	Normal	Normal	Normal
Class II	ASC-H ASC-US	Atypia	Atypia
Class III	LSIL	CIN 1 includes flat condyloma	Koilocytosis
Class III	HSIL	CIN 2	Moderate dysplasia
Class III	HSIL	CIN 3	Severe dysplasia
Class IV	HSIL	CIN 3	Carcinoma in situ
Class IV	Invasive cancer	Invasive cancer	Invasive cancer

ASC-US: English acronym that stands for “atypical squamous cells of undetermined significance.”
ASC-H: English acronym that stands for “atypical squamous cells that do not rule out high-grade squamous intraepithelial lesion.”
LSIL: English acronym that stands for Low-Grade Squamous Intraepithelial Lesion.
HSIL: English acronym that stands for High-Grade Squamous Intraepithelial Lesion
CIN: Cervical intraepithelial neoplasia.

Treatment of cervical cancer during pregnancy
Typically, women with a diagnosis of cervical cancer or cancer precursor lesions must receive care at a higher level of complexity, where correct treatment can be ensured.
Treatment will be determined by gestational age, the pregnant woman’s wishes and staging.

Cervical incompetence (CI)
Sometimes the inner aperture of the cervix is passively dilated and it is incapable of maintaining an on-going pregnancy. This is a rare event, seen in not more than 3 cases in one thousand deliveries.

CI may be congenital (due to uterine malformations) or acquired, usually secondary to dilation and curettage, surgical childbirth and/or tears.

Diagnosis
The most suggestive element is the history of late abortions or immature deliveries, usually painless, with the expulsion of a live fetus that may be expelled wrapped in its membranes.

During pregnancy the diagnosis is made on the basis of history and/or the finding of a cervix with a dilatation greater than expected for gestational age, in the absence of contractions. At times the membranes can protrude through the outer opening of the cervix (hour-glass membranes).
Transvaginal ultrasound has recently been used to assess the status of the inner opening of the cervix and thus contribute to the diagnosis of cervix incompetence at earlier stages.

Therapy
The treatment of cervical incompetence is surgical and it consists of closing the cervix with a special tape under anesthesia between week 14 and week 26. This procedure is called cerviCAL stitching or “cerclage”. The woman must be referred to a higher level of complexity for its performance.

Objective *Rule out a potential maternal-fetal-neonatal blood incompatibility.*
Activity *Determine blood group, Rh factor and irregular antibodies.*

Rh negative women with an ongoing pregnancy with an Rh-positive fetus have 13% odds of becoming isoimmunized as a result of that pregnancy. Most of them will become immunized during delivery, while a small fraction of them will do so during pregnancy. When there is ABO blood mismatch, the odds of presenting Rh alloimmunization drops to 2%.

Rh isoimmunization is a process that can be prevented with the use of anti-D hyper immune gamma globulin in puerperium or in post-abortion. Even when prophylaxis fails, the perinatal outcome may benefit from monitoring the degree of isoimmunization and from the confirmation of fetal involvement.

Immunization can be reduced in pregnant women by administering anti-D the first 72 hours following:

- abortion (every Rh-negative woman) or
- delivery of all Rh-negative puerperal women with Rh-positive children, not immunized previously

The percentage of alloimmunized women is drastically reduced with this intervention.

In the countries where anti-D gamma globulin is administered postpartum, the frequency of isoimmunization drops from 13% to less than 2%. If there is an added prophylaxis during pregnancy (between weeks 28 and 32) or after a hemorrhage or invasive procedures (such as amniotic tap or cordocenthesis), the frequency of alloimmunization is reduced to 0.1%. It would only be restricted to the cases of abortion or failures in immunoprophylaxis.

The low cost-effectiveness of anti-D gamma globulin limits the benefits of administering it routinely during pregnancy. As not all the cases of maternal alloimmunization and risk of presenting perinatal hemolytic disease are related to the Rh-negative factor, assays to detect the existence of irregular antibodies (indirect Coombs Test) are warranted both in the Rh-negative and Rh-positive pregnant women.

Clinical assessment - pregnant women should be thoroughly interrogated to find about the following:
History of abortion, perinatal deaths, neonatal jaundice of an earlier child (need for exchange transfusion, phototherapy), administration of anti-D gamma globulin, transfusions, invasive procedures during pregnancy (amniocenthesis, cordocenthesis), transplants or grafts and intravenous drug addiction (needle sharing).

Laboratory Assessment, at their first visit, pregnant women should be tested for blood group and Rh factor assessment, as well as for the detection of irregular antibodies (indirect Coombs test).

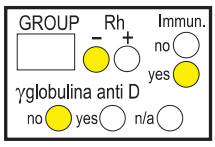


Figure 34.
PCR fragment.
Blood group and Rh

Management

Rh-negative pregnant woman with negative irregular antibodies- the follow-up is done as recommended in the guidelines, including new assessments of irregular antibodies and eventually anti-D gamma globulin prophylaxis.

Rh-negative pregnant woman with positive irregular antibodies- this confirms the diagnosis of maternal alloimmunization. In this case the patient must be referred to a higher level of complexity to rule out or confirm a potential perinatal hemolytic condition (fetal involvement).

Rh-positive pregnant woman with negative irregular antibodies- the follow-up is done as recommended in the usual schedule; no further assays will be required to determine blood group, Rh factor, or irregular antibodies.

Rh-positive pregnant woman with positive irregular antibodies- this confirms the diagnosis of maternal alloimmunization. In this case the patient must be referred to a higher level of complexity to identify the causative antibody and to rule out or to confirm a potential perinatal hemolytic condition (fetal involvement).

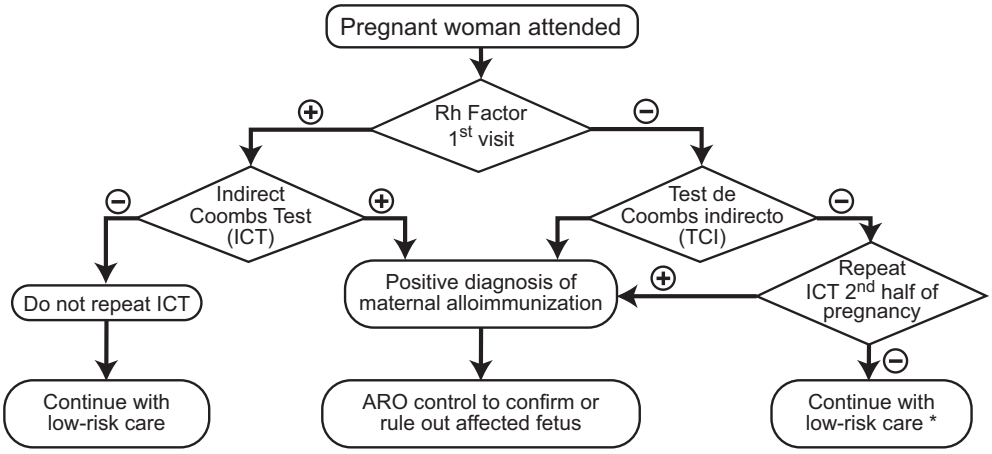
Prophylaxis plan

Immunoprophylaxis will depend on the pregnant woman's immune status, gestational age, the course of pregnancy (invasive procedures, genital bleeding) and the availability of the resources required. If immunoprophylaxis resources were available, and the situation warrants it, the plans below are recommended:

Genital hemorrhage or invasive procedures in the first trimester.
50 to 120 mcg anti-D gamma globulin, administered I/M or I/V.

Genital hemorrhage or invasive procedures after the first trimester.
100 to 120 mcg of anti-D gamma globulin, I/V, or;
240 to 300 mcg of anti-D gamma globulin, I/M.

Post-delivery
100 to 120 mcg of anti-D gamma globulin, I/V, or;
240 to 300 mcg of anti-D gamma globulin, I/M.



* Anti-D immunoprophylaxis as recommended in the national guidelines

Figure 35. Decision tree for the management of perinatal hemolytic conditions

Objective *Prevent, detect and treat maternal anemia.*
Activity *Determine hemoglobin levels.*
Supply iron and folic acid.

Anemia is a public health problem because of the impact it has on human health, especially during pregnancy, where it is associated with an increased risk of maternal and perinatal mortality (especially in cases of severe anemia), prematurity, low birth weight and IUGR.

Definition
A pregnant woman is considered to have anemia when the hemoglobin level is lower than 11.0 g/dL (during the first or third trimester) or lower than 10.5 g/dL in the course of the second trimester. Anemia is considered moderate when hemoglobin levels range from 7.0 to 9.0 g/dL; when levels are under 7.0 g/dL, the anemia is considered severe.

Screening for anemia during pregnancy
At the first visit, the overall work-up of the pregnant woman should include the inspection of skin and mucosa and a cardiovascular examination, trying to rule out or to confirm anemia.

Hemoglobin tests should be done in accordance with each country's national standards. CLAP/WR suggests conducting the first test when the woman seeks care for the first time (intake visit) and a second test during the second half of pregnancy. These data can be recorded in the PCR, which also serves as a reminder of the main preventive measures that should be suggested to the pregnant woman (iron and folate supplementation).

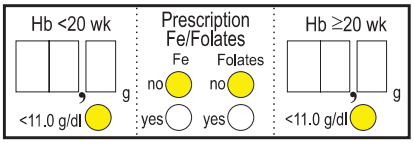


Figure 36. PCR fragment. Anemia

Iron Deficiency
The most common form of anemia is the type related with low iron levels. Iron-deficiency-related anemia is preceded by the exhaustion of iron deposits. It is estimated to be the most common nutritional deficiency among pregnant women, its prevalence ranging from 35 to 75% of the pregnant women in developing countries. Notice that anemia may have more than one cause, as occurs in the case of vitamin A, B12 and pyridoxine deficiency, or in chronic inflammatory processes (HIV, malaria and parasitic infections).

Diagnosis
Added to the deficit of hemoglobin, patients with ferropenic anemia present with hypochromic and microcytic red blood cells. The clinical expression of this deficit has an impact on the pregnant woman, causing tiredness, fatigue, pallor of skin and mucosa and increased heart rate. In other cases, the finding of a fetus with intrauterine growth restriction may suggest the presence of anemia.

Folate Deficiency
The second cause of nutritional anemia during pregnancy is folate deficiency. This deficit is very common during pregnancy because requirements are increased by 50% and the intake is usually minimal.

Diagnosis

Folate-deficiency anemia shares the same clinical signs as ferropenic anemia; however, the difference becomes apparent in the slide, which shows the megaloblastic and macrocytic red blood cells. These characteristics of the RBCs are also observed in the anemias caused by the deficit of vitamin B12, the third most frequent form of nutritional anemia.

Prevention of anemia

Iron and folic acid requirements are increased during pregnancy and it is difficult for a pregnant woman to meet this increased demand merely through her diet; consequently the prevention strategies for iron deficiency anemia should include:

- Diet changes aimed to increase the intake of iron and agents that facilitate its absorption, while trying to reduce the intake of its inhibitors
- Iron and folic acid fortification of commonly consumed food
- Supplementation with drugs containing iron and folic acid
- Treatment of infections that may disrupt the absorption of iron and other nutrients (e.g. parasitism)

Iron supplements have been suggested as a strategy to improve the mother's iron levels, consequently improving her health and survival, the size of the fetus, and the child's development during the neonatal and post-neonatal periods.

Hence, all pregnant women should be administered 60 mg of elementary iron a day from the moment pregnancy is suspected, continuing it throughout the post delivery period. The overall supplementation time should not be less than 6 months, and in places where the prevalence of anemia during pregnancy is > 40%, iron supplementation is recommended as far as 3 months after delivery.

Several countries in the Region fortify specific popular foodstuff with iron (and/or other nutrients) in an attempt to improve the status of the population in general.

Prevention of neural tube defects

In the chapter on pre-conceptional care we have highlighted the importance of folic acid for the prevention of neural tube defects; the woman should receive folic acid at 0.4 mg/day, starting as early as three months prior to pregnancy (at least 4 weeks earlier); it should not be discontinued until the third month of pregnancy.

Food fortification strategies are becoming increasingly common in some countries in the region, since under the current conditions it is unlikely that 100% of the women that get pregnant will receive folic acid before conception.

Treatment

Therapy requires addressing the cause of anemia; e.g., if it is due to a parasite, the pregnant woman should receive the specific anti-parasitic treatment. Obviously, it also requires non specific therapy: 120 mg of elementary iron/day and 0.4 mg of folic acid.

A severe anemia may require institutional care and packed blood cells transfusions.

Objective *Rule out proteinuria, glucosuria and bacteriuria.*
Activity *Urinalysis and urine culture.*

During pregnancy, the woman's urine undergoes changes considered to be physiological, such as a progressive reduction of the urinary output and density; glucosuria is a relatively frequent finding, and a 0.5 g/L proteinuria can also be evidenced in the 24-hour urinary output. The urinary sediment, however, is not substantially altered.

Urinalysis

Urine tests can be of use to detect conditions that jeopardize the woman's and/or the child's lives. The most frequent urinary elements suggesting abnormal conditions in pregnancy are:

- Proteins
- Bacteria
- Glucose

Although the presence of some glucose in urine may be normal during pregnancy, levels > 250 mg/dL may reflect GD. Proteins could indicate urinary infection, kidney disease or pregnancy-related hypertensive disorders.

Although urinalysis is part of the antenatal care guidelines in almost all the countries in the Region, its use as part of the antenatal routine remains controversial.
The PCR permits to record the presence of proteins in urine at each visit; however, three tests would suffice.

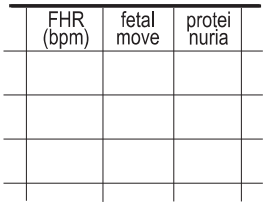


Figure 37. PCR fragment
Prenatal control

- One urinalysis at the first visit, to rule out the existence of renal damage (hematuria, proteinuria, cillindruria, etc.) and diabetes (glucosuria)
- The second test around week 28, specifically aimed at detecting proteins (to rule out preeclampsia)
- The third urinalysis between weeks 33 and 35 may suggest any of the conditions above, although its main aim is to rule out preeclampsia. It is also of use to detect the presence of urinary tract infections

Proteinuria is usually the last sign to appear in the clinical course of preeclampsia and it correlates directly with the level of hypertension. Proteinuria tends to appear when diastolic pressure reaches 90 mm Hg and it increases together with hypertension.

Although there are multiple-reaction dipsticks available to detect bacteriuria and proteinuria, recent studies suggest that their sensitivity to identify both proteins and infection is low. Hence, many authors claim that their use should be discontinued.
Albumin levels in random tests should trigger an alarm when they exceed 0.30 g/L.

Urinary infection and asymptomatic bacteriuria

The term “urinary tract infection” (UTI) refers to the presence of a critical number of bacterial colonies in urine (usually over 100,000/ml).

It may be asymptomatic (asymptomatic bacteriuria) or be accompanied by a range of symptoms such as cystitis, urethral syndrome and pyelonephritis.

Low UTIs affect the bladder, while high urinary infections may involve the kidneys (pyelonephritis). Bacterial cystitis may present signs and symptoms such as dysuria (painful voiding), pollachiuria, cloudy urine, occasionally hematuria and frequently pyuria (white blood cell count in urine over 10,000/ml). Signs and symptoms suggestive of pyelonephritis include lumbar pain, fever, shaking chills and poor general status in a patient presenting with low UTI symptoms. Acute pyelonephritis must be considered a serious condition in the context of pregnancy.

From 2 to 10% of the pregnant women may have a symptom-free bacterial colonization. Given its potential impact on their health and that of their future children, every case of asymptomatic bacteriuria diagnosed in pregnancy must be treated.

Urine culture screening is recommended in all pregnant women at their first prenatal visit, to detect asymptomatic bacteriuria. Cultures obtained between GA weeks 12 and 14 succeed in identifying 80% of the pregnant women with asymptomatic bacteriuria. The perinatal clinical record developed by CLAP/WR reminds providers to request a bacteriuria during the first half of pregnancy.

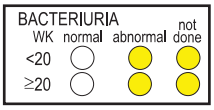


Figure 38.
PCR fragment.
Bacteriuria

It is estimated that by repeating the urine culture monthly, an additional 1 to 2% of the asymptomatic bacteriurias would be diagnosed every month. So far there is no consensus with regard the optimum frequency of urine cultures. The presence of asymptomatic bacteriuria in the pregnant woman is considered a risk factor because it is known to cause complications such as pyelonephritis, preterm delivery and low birth weight. In an attempt to reduce the risk of prematurity related to asymptomatic bacteriuria, CLAP/WR suggests performing a second bacteriuria control around week 28 of gestation.

Diagnosis

Bacteriuria testing will be considered positive when the number of colonies found in the urine specimen is > 100,000 bacteria/mL. The mid-stream sample must be taken from the first urine in the morning, with the genitalia in special aseptic conditions. Proper sterility of the specimen containers must be ensured.

Treatment

Controlled clinical studies, cohort studies and meta-analyses have shown that treatment of asymptomatic bacteriuria reduces the incidence of the above-mentioned complications.

No antibiotics can be considered ideal, so the antimicrobial agent will be selected on the basis of the susceptibility of the organism found and the drug’s safety for the fetus. Likewise, there is no consensus on the duration of therapy to keep urine sterile. Three-day schedules are apparently the ones that get closest to the ideal for the treatment of asymptomatic bacteriurias, since they provide a better risk/benefit ratio. The 7- to 10-

day schedules eradicate bacteriuria in 70 to 80% of the cases and they are considered of choice for the treatment of symptomatic urinary infections. Single-dose schedules are still not recommended because of their lower efficacy.

Below are the therapy schedules suggested for asymptomatic bacteriuria caused by an unknown organism:
Three-day schedule:

- Amoxicillin 500 mg per os every 8 hours or
- Ampicillin 250 mg per os every 6 hours or
- Cephalexine 250 mg per os every 6 hours

If the 3-day schedule fails, the schemes below are recommended:

- Nitrofurantoine 100 mg per os every 6 hours for 21 days.
  In women with recurrent bacteriuria, a suppressive therapy may be started:
  - One oral dosage of 100 mg Nitrofurantoine at bedtime, or
  - Cephalexine 250 mg per os.

The 7- to 10-day scheme:

- Nitrofurantoine 50 mg per os every 12 hours, or
- Amoxicillin 500 mg per os every 8 hours or
- Ampicillin 250 mg per os every 6 hours, or
- Cephalexine 250 mg per os every 6 hours

Postcoital prophylaxis may be beneficial in the case of recurrent infections:

- Single dose of Cephalexine 250 mg per os, or
- Nitrofurantoine 100 mg per os

Follow-up
A new urine culture should be performed as a control 2 to 4 weeks after therapy is completed. Negative tests may be repeated about 4 weeks later.
There is no consensus about the adequacy of a new urine culture in women that had a positive bacteriuria 6 weeks after delivery.

Objective *Rule out clinical and gestational diabetes mellitus.*
Activity *Blood glucose test and oral glucose tolerance test.*

It is estimated that one in 200 pregnant women suffer from diabetes mellitus (DM) (0.5%) and from 2 to 17 pregnant women in 100 will present gestational diabetes (GD).

The frequency of the problem is poorly known at Latin American institutions because of the lack of epidemiological studies in those populations; underdiagnosis is thought to account for that false “low prevalence”.

Typically, the women with diabetes mellitus that seek antenatal care tend to be clearly identifiable because they usually have a family history of the disease, clinical symptomatology, poor outcomes in their obstetric history or obstetric findings that make the diagnosis quite straightforward. However, diagnosing gestational diabetes in the general population is not so simple, because its detection requires the use of certain procedures.

Gestational Diabetes

Gestational diabetes is the condition presenting with carbohydrate intolerance of variable severity and course, with onset or first recognition during the current pregnancy. This definition applies regardless of whether or not the patient requires insulin therapy or whether the condition persists after pregnancy. Nor does it exclude the possibility that diabetes may have been present before pregnancy.

Clinical screening

The assessment of the risk of presenting gestational diabetes must be made at the first visit. That requires a correct history and physical examination, primarily to confirm or rule out the existence of any of the risk factors below:

History

- Presence of diabetes in first-degree relatives (parents, children, siblings)
- Gestational diabetes in earlier pregnancies
- Perinatal deaths of unknown cause
- Repeated spontaneous abortions of unknown cause
- Repeated polyhydramnios
- Macrosomia (Newborn weighing > 4000 grams
- Fetal malformations

Current

- Mother's age > 30 years
- Obesity in the early pregnancy with a body mass index (BMI) greater than 26
- Excessive weight gain during pregnancy
- Preeclampsia (pregnancy-induced hypertension)
- Polyhydramnios in the current pregnancy

Laboratory screening

Although there is no full agreement in medical literature about the usefulness of universal screening for gestational diabetes in pregnancy, there are several facts supporting the implementation of programs for the universal detection of gestational diabetes:

- GD has a high perinatal morbi-mortality when it is not diagnosed timely
- More than half the cases of GD will progress to develop clinical diabetes mellitus
- The potential occurrence of postnatal problems due to pregnancy-related hyperglycemias, such as obesity and diabetes
- There are relatively simple and inexpensive diagnostic procedures available with an acceptable efficacy
- Outcomes can be remarkably improved by an early diagnosis and an adequate and timely therapy

Recent studies have shown that the treatment of gestational diabetes will significantly reduce perinatal morbidity, improving the quality of life of women three months after birth. Other epidemiological studies have shown that the prevalence of gestational diabetes is higher in indigenous and Hispanic women versus Anglo-Saxon women. These would be two additional reasons justifying screening tests for gestational diabetes in our Region.

Fasting Blood Glucose

Despite the lack of agreement on the usefulness of fasting blood sugar in the diagnosis of gestational diabetes, there is evidence suggesting that isolated blood glucose samples might be as sensitive as the Oral Glucose Tolerance Test (OGTT) to diagnose gestational diabetes. The general recommendation is that until there is firm evidence to the contrary, a fasting blood glucose test should be performed at the first ante-natal visit.

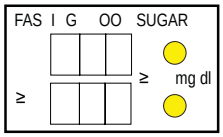


Figure 39. PCR fragment. Blood glucose

If fasting blood glucose is > 105 mg/dL, the test should be repeated; the repetition of the blood glucose > 105 mg/dL would confirm gestational diabetes. If the new test is lower than 105 mg/dL, then a glucose tolerance test will be required.

Where an OGTT is not available, a fasting blood sugar test between 24 and 28 weeks may be the best alternative to rule out the existence of gestational diabetes. Hence the PCR reminds providers to order a new blood glucose test early in the course of the third trimester.

Oral glucose tolerance test

There is general agreement that an OGTT should be performed between 24 and 28 weeks of pregnancy to screen for gestational diabetes.

- A free diet with no restrictions will be allowed the three days before the test
- The woman will attend the laboratory in the morning, having fasted for at least 8 hours
- The subject must be at rest, sitting and not smoking
- Intercurrent infections must have been ruled out earlier
- A blood sample is drawn to check fasting blood sugar (normal value < 105 mg/dL)
- The woman should take 75 g of glucose diluted in 250 to 300 ml of water containing 5 to 10 ml of lemon juice in not more than 5 minutes
- A new blood glucose sample is drawn two hours later (normal value < 140 mg/dL)

Diagnostic Confirmation Criteria

- Two fasting blood glucose levels > 105 mg/dL
- Blood glucose > 140 mg/dL two hours later, in an OGTT with 75 g of glucose

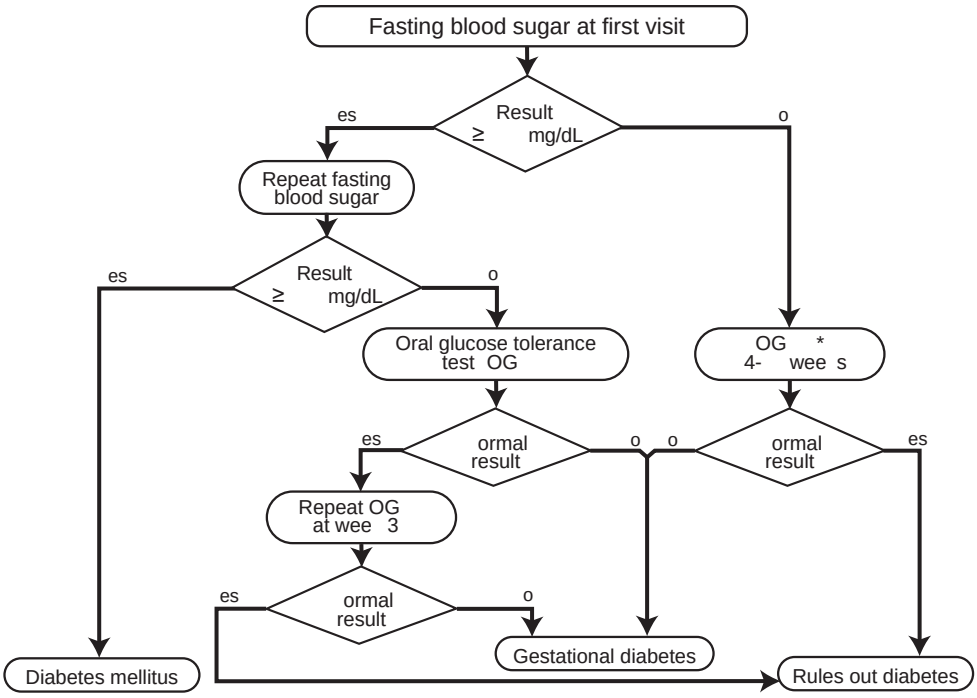
Procedures like dipsticks, assessment of glycosilated hemoglobin, fructosamine and postprandial glycemias are not acceptable to confirm diagnosis.

Classification of the diabetic status during pregnancy

1. Pregestational Diabetes
   - Type I (insulin dependent or juvenile)
   - Type II (non insulin dependent or adult's)

2. Gestational Diabetes.
   - A1: Fasting glucose lower than 105 mg/dL with an abnormal OGTT
   - A2: Fasting glycemia > 105 mg/dl up to 129 mg/dL
   - A3: B1: fasting glycemia > 129 mg/dL

When the diagnosis is confirmed, the pregnant woman should be referred to a high-risk monitoring program. The assessment of high-risk patients will be aimed, among other things, to determine the daily glycemic profile, with which it is possible to define the baseline and postprandial glucose levels along the day. Glycosilated hemoglobin or fructosamine tests will also be performed to determine the metabolic control status in the previous months.



* In women with no ris factors for diabetes this can replace glycemia between wee s 4-

Figure 40. Decision tree for the detection of gestational diabetes

Follow-up of gestation-related diabetes after delivery

As the metabolic conditions tend to change, a new Oral Glucose Tolerance Test (OGTT) will be repeated after the 42nd day of puerperium. This test will be used to reclassify the type of diabetes; diabetes is confirmed when fasting blood glucose levels remain > 105 mg/dL or > 140 mg/dL two hours after the subject is challenged with 75 g of glucose.

Objective *Provide information and educational contents applicable to childbirth and child-rearing.*

Activity *Preparing for childbirth and counseling to promote breastfeeding.*

There are certain changes in the pregnant woman's behavior that may determine special needs for being accompanied and receiving psycho-emotional support. These needs have typically been addressed by the health staff through the special care provided at the prenatal visits, psycho-prophylactic preparedness classes, continuing care during labor and delivery, and the dedication of family and staff to meet the needs of mother and child the first days and weeks following delivery.

Institutionalization of childbirth (deliveries at hospitals or bed-equipped health care centers or other facilities that depend on the formal system of care) was intended to reduce the high maternal mortality rates seen in home childbirth. The woman is admitted at the onset of labor, and childbirth is managed following those centers' general guidelines for the care of patients with a variety of conditions.

As institutionalization of childbirth was gradually implemented in the countries, it primarily succeeded in reducing the high maternal mortality rate. Despite this progress, the social aspects and the psycho-emotional support related with the reproductive process were usually not addressed, ignored or scarcely prioritized.

At present, the concept of "institutional childbirth" is not limited strictly to the professional surveillance of the woman at delivery; psycho-emotional, cultural and social aspects related with maternity are attributed the same relevance.

The main activities included in medical care imply:

- Engaging the partner and the rest of the family members that the pregnant woman wishes to involve in prenatal care, and the care of labor and delivery
- Providing the woman education and preparing her psychologically and physically for delivery and breastfeeding
- Promoting an early contact between mother, father and child immediately after the latter's birth
- Implementing mother-and-child rooming in during institutional puerperium; hands-on education showing the mother how to take care of her child and herself during puerperium and breastfeeding

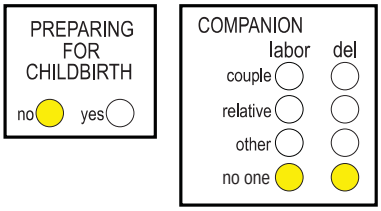


Figure 41. PCR fragment. Preparation and company

Antenatal care

Social support home visits to primiparas, adolescents or those women facing pregnancy on their own or in extreme poverty. The home visit by the health staff has proven to be effective at increasing the efficacy of prenatal care. The components of this intervention include education, social support, helping them quit smoking, tapping on other community resources available and improving the pregnant woman's self-esteem.

Health-Oriented Education consists of engaging the pregnant woman (especially the primigesta) in activities that may teach her about her own pregnancy, delivery and the care of the child she is expecting. The participative games developed by CLAP/WR, "The pregnancy track", "Pregnancy clover" and "Our first month", address this theme comprehensively, using health-promoting and disease prevention elements, and highlighting the warning signs that warrant immediate care.

Figure 42. Educational games

Promotion of natural breastfeeding during prenatal care. There is evidence showing

that special education aimed at promoting breastfeeding during pregnancy is effective in reducing the frequency of weaning the first two months following delivery. Educational contents will be aimed at showing the advantages of natural breastfeeding over feeding with cow milk or commercial formulas, as well as at enhancing the woman's self-esteem, pointing at her ability to overcome any initial difficulties. Chart 17 summarizes the ten steps of the strategy developed by UNICEF and WHO to achieve successful breastfeeding. These ten steps are a set of recommendations

Chart 15. Strategy: Ten Steps to Successful Breastfeeding (UNICEF-WHO)

1	Have a written breastfeeding policy that is routinely communicated to all health care staff
2	Train all health care staff in skills necessary to implement this policy
3	Inform all pregnant women about the benefits and management of breastfeeding
4	Help mothers initiate breastfeeding within half an hour of birth
5	Show mothers how to breastfeed, and how to maintain lactation even if they should be separated from their infants
6	Give newborn infants no food or drink other than breast milk, unless medically indicated
7	Practise rooming-in - that is, allow mothers and infants to remain together - 24 hours a day
8	Encourage breastfeeding on demand
9	Give no artificial teats or pacifiers (also called dummies or soothers) to breastfeeding infants *
10	Foster the establishment of breastfeeding support groups and refer mothers to them on discharge from the hospital or clinic

***** This step was included before knowing of the potential effect pacifiers could have protecting the child against sudden infant death

The PCR reminds the health care provider to include counseling to promote breastfeeding during prenatal control

Figure 43. PCR fragment Breastfeeding

Objective *Confirm fetal vitality*
Activity *Check fetal movements and heart rate*

The clinical parameters most frequently used to confirm the existence of fetal life are fetal movements and fetal heart beats. Unfortunately, they are not usually perceived by the mother until quite advanced stages of pregnancy and they are detected later still by the clinician.

Fetal movements

Apart from being an element indicating fetal life, fetal movements are associated with embryo-fetal health. Movements may be observed very early by ultrasound; later on (second trimester) they are perceived by the mother, and finally they can be palpated or recorded by an outside observer.

The presence of movements indicates the integrity of the anatomic subtract and reflects the fetus's capacity to perform complex functions. A marked reduction or interruption of such movements should suggest health problems or even fetal death.
As shown in Chart 18, movements can be perceived thorugh various means.

Chart 16. Detection of embryo-fetal movements

Gestational age (weeks)	Method
From weeks 7-9	Real-time ultrasound (transvaginal-transabdominal)
From week 12	Doppler Detector
From week 20	Perceived by abdominal palpation (the mother can perceive them starting on weeks 16-18, although in this case they are not considered a certainty sign because of the subjective nature of the data)

Fetal movements can be checked through:

- Perception by the mother
- Abdominal palpation by an observer
- Ultrasound

Perception by the mother: pregnant women perceive fetal movements at an age that varies depending on the mother's ability and her individual threshold to appreciate them. The primipara does it between 18 and 20 weeks and the multipara some weeks earlier. Initially identified as a slight tingling, they become increasingly intense. The location of the placenta in the anterior aspect of the uterus may delay the mother's perception of the fetus's movements.

As a routine, the provider should start asking the mother whether she has perceived any fetal movements within the last 24 hours at week 20, asking whether their frequency is normal.

The average time of fetal movements as perceived by the mother varies greatly from one individual to another. Fetuses go through alternate periods of activity (average 40 minutes) and rest (average 20 minutes) that determine the amount of movement perceived. Other factors that can alter the duration of these periods include tobacco smoking, certain drugs, physical activity, time of the day and gestational age, among others.

The lower normal limit is estimated to be 10 movements in 12 hours or 4 movements per hour.

If there are any elements of concern, suggesting fetal health impairment, the mother can be instructed to keep track of the baby's movements and to record them in a spreadsheet. This task (as well as others in which the mother's cooperation may be useful for pregnancy monitoring) must be requested only in special cases, since daily self-monitoring may raise the mother's anxiety and stress.

The simplest technique to count fetal movements consists of:

a) Counting the fetal movements, starting at a specific time
b) If 4 movements are recorded in the first hour, it is considered normal
c) If fewer than 4 movements are noticed within the first hour, counting should be continued until reaching 10 movements within the first 12 hours

If fewer than 10 fetal movements are recorded within the first 12 hours, the pregnant woman is referred to a health center.
Although the technique in which the mother keeps the daily record of fetal movements is widespread, there is not enough evidence to either recommend it or not to recommend it for the purpose of assessing fetal well being.

Abdominal palpation by an observer- under normal conditions, movements are usually perceived after week 20. The pregnant woman should lie on her left lateral recumbent position while the observer keeps his/her hand on the woman's abdomen for a few minutes. If no movements are perceived after a few minutes, the fetus can be stimulated, causing it to move and palpating it through the mother's abdominal wall. If the mother is examined in dorsal recumbent position, caution must be taken not to mistake fetal movements with the aortic beat that is transmitted.

Ultrasound- fetal movements may be noticed after week 7 or even earlier through transvaginal examination, and after week 9 or earlier in transabdominal explorations.

Fetal Heart Activity

Auscultation of fetal beats is probably the most reliable sign of fetal vitality. The ideal gestational age to detect beats varies, depending primarily on the method used. The chart below outlines the weeks at which fetal heart beats are detected according to the technique used.

Chart 17. Detection of embryo-fetal heart beats

Gestational age (weeks)	Método
From 6-8 weeks on	Real time ultrasound (vaginal-abdominal)
From 12 weeks on	Doppler detector
From 20 weeks on	Obstetric stethoscope

The fetal heart rate normally ranges from 120 to 160 beats per minute during contraction-free intervals (baseline heart rate).
As described in the previous chart, fetal beats can be detected through the following:

- Obstetric ultrasound
- Doppler detector
- Ultrasound

Obstetric Stethoscope, this is a stethoscope specially designed for obstetrics thatt permits the auscultation of beats starting on week 24 of gestational age; sometimes, under special conditions, and in slender patients, beats can already be heard as early as week 20. CLAP/WR experts have designed a fetal stethoscope made of resistant plastic, with an excellent conduction of sound. It also brings illustrations and instructions describing the auscultation method and the relation between fetal heart rate and contractions, based on research conducted at CLAP/WR.

Figure 44. Pinard's Stethoscope as modified by CLAP/WR

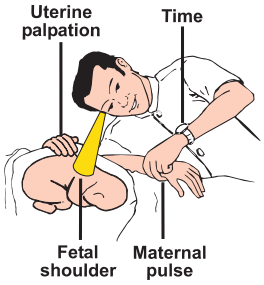


Figure 45.
Auscultation technique

The auscultation technique consists of applying the stethoscope perpendicularly on the auscultation focus that corresponds to the fetus's anterior shoulder, which had been previously detected through palpation; the pregnant woman must be asked to lie down in dorsal recumbent position. Transmission to the stethoscope occurs as sound is propagated following solid layers.

The examiner's head exerts a mild but uninterrupted pressure on the stethoscope. His/her free hand takes the mother's pulse to tell her beats apart from those of the fetus. The hand that was holding the stethoscope is released to prevent it from interfering with outside noises, and it is then placed on the uterus to detect the presence of contractions.

This is especially important during labor, since auscultation during and outside of the contraction will allow the health professional to notice the existence of DIPS. The examiner will count the beats (while looking at the watch) and report the result in "beats per minute" (bpm).

Doppler Effect, the sensitivity of the doppler-based devices currently available is significantly higher than that of the obstetric stethoscope. It permits to detect heart beats earlier (12 weeks) at the supra-pubic level.

Sometimes beats can be clearly identified, while at other times funicular sounds interfere; in practical terms, however, their diagnostic value to ascertain fetal vitality is the same.

It is usually very useful when auscultation with the obstetric stethoscope is impaired.

Ultrasound- heart beats may be seen with the dynamic ultrasound starting on weeks 5 or 6 transvaginally and after the 6th to 8th weeks transabdominally.

Objective *Anticipate the diagnosis and prevent premature delivery*

Activity *Evaluate the uterine contractility pattern (rate, length and intensity)*
Delay preterm delivery
Induce fetal lung maturation

Preterm or premature childbirth continues to be one of the leading causes of neonatal morbididity and mortality worldwide. Congenital malformations excluded, it accounts for 3 of 4 perinatal deaths and half the neurological disorders seen in childhood. According to the definition of the 10th International Classification of Diseases (ICD 10), every birth occurring after Week 22 and before Week 37 is considered premature.

Premature delivery may be spontaneous, including preterm births of known or unknown cause, spontaneous rupture of membranes and cervical incompetence. Planned premature childbirth is indicated when there is a medical need to advance birth because of maternal and/or fetal risk.

Frequency varies greatly from one country to another; in some developed countries frequency is lower than 5%, while in some developing countries those figures exceed 20%. Although developed countries have typically succeeded in gradually reducing prematurity, in recent years some of them have experienced an increase as a result of the need to interrupt pregnancies before term on medical grounds.

Several factors are known to increase the risk of premature childbirth; they can be broken down into three main categories:

- Demographic and genetic characteristics
- Habits, behaviours and environmental factors
- Medical and obstetric factors

As it is difficult to find a single cause that may account for all the premature childbirths, the entity is currently considered as a syndrome. Hence, premature childbirth would be a condition triggered by multiple (usually co-existing) causes, which are finally expressed with uterine contractions and cervical changes.

History of premature delivery in an earlier pregnancy is the most clearly defined risk factor; evidence shows that if a woman has had a premature childbirth in the past, her chances of having another premature child is 6 times greater than women without that history. Some reports show that this risk correlates with the number of premature deliveries in the past and the chances also tend to increase proportionally the earlier the age of the past premature delivery. Other factors linked with premature childbirth are current multiple pregnancy, cervical incompetence and uterine malformations.

Other potential risk factors include:

- Extreme age
- tobacco, alcohol and drugs
- genito-urinary infections
- diabetes mellitus
- hypertension
- absence of or late prenatal control

Some of these risk factors can be eliminated during pregnancy, while others cannot be eliminated; consequently, efforts should focus on trying to control or eliminate the factors that can be eliminated.

Diagnosis of threatened premature labor

It is based on three aspects:

- Gestational age
- Uterine contractions
- Status of uterine cervix

Gestational age, as preterm delivery is defined on the grounds of time, the gestational age needs to be determined.

Uterine contractions- in the second half of pregnancy, palpation of the abdomen provides information on the size and consistency of the uterus (tone or tension) as well as on the existence of spontaneous contractions. This palpation must be performed with the pregnant woman in lateral recumbent position, preferably her left side. Normal contractions can be perceived by palpation or by means of an external tocographer.

Chart 18 shows the normal maximum value (p 90) of the frequency of contractions per hour according to gestational age. These values correspond to a series of low-risk pregnant women, monitored on a weekly basis until the end of pregnancy. Contractions were recorded in lateral recumbent position.

Chart 18. Frequency of Uterine contractions according to gestational age

Gestational age (weeks)	26	27	28	29	30	31	32	33	34	35	36	37	38
Number of contractions per hour (percentile 90)	1	3	5	7	8	8	8	8	9	9	9	9	9

The values in chart 18 correspond to percentile 90 and they show a progressive increase of the frequency of contractions in the hour between weeks 26 and 30, followed by stabilization. Hence, in week 32, 90% of the normal pregnant women will have up to eight contractions per hour. It is interesting to highlight that in all the deliveries that ended prematurely and in which the contractions patterns were investigated, the rate was increased (over percentile 90), before triggering delivery.

When the frequency of contractions measured with the pregnant woman lying down is slightly higher than that established as percentile 90 of the normal pattern, it should suggest the diagnosis of a potentially impaired contraction pattern and the woman should be asked to wait for an hour before repeating the measurement. If the frequency continues to be increased, she should be referred to the appropriate level of care.

These values are printed on several technologies developed by CLAP/WR, such as the gestogram (figure 2) and the obstetric tape (figure 3).

Status of the uterine cervix: the main signs to consider are effacement, dilation and the position of the cervix. A 50% or greater shortening, thinning or effacement of the cervix, dilation of one or more centimeters and a centric position of the cervix should suggest a threatened premature labor. However, isolated cervical changes by themselves may not suffice to confirm the diagnosis of threatened premature labor.

Treatment

Whenever a cause for the threatened premature labor is identifiable, an etiological treatment must be started, (for example; antibiotics in urinary tract infections, cerclage in cervix incompetence, etc.). However, as we are dealing with a syndrome, an etiological therapy is very often not possible; in such cases symptomatic therapy is the only choice. One of the pillars for symptomatic treatment is to reduce or stop the abnormal uterine contractions, and the other is to stimulate fetal lung maturation with steroids.
Treatment will be indicated as long as there is no:

- Cervical dilation exceeding 3 cm,
- amnionitis,
- severe preeclampsia,
- active hemorrhage,
- fetal distress.

Bed Rest

Bed rest has always been indicated as one of the first steps in the treatment of threatened preterm delivery. To date there is not enough evidence to either indicate it systematically or to proscribe it. Anyway, given the insufficient research in that respect, this indication should be adapted to the woman's actual possibilities.

Tocolytic agents

The drugs below are among the most effective tocolytic agents:

- Betamimetics
- Anti-prostaglandins
- Calcium channel blockers
- Ocytocin antagonists

Betamimetics- used intravenously, their rapid onset can already be seen within 5 to 20 minutes. Those effects usually disappear quite quickly, too (30 to 90 minutes).

They have proven to be effective for:

- Prolonging pregnancy by at least 24 hours in 70% of the cases
- Prolonging pregnancy by 48 hours and longer in 50% of the cases
- Reducing the chances of low birth weight (LBW) by 20%

Their drawback is that they have unwanted side effects such as:

- Tachycardia
- Vasodilation

- Hypotension (except for ethylephrine)
- Hyperglycemia
- Nausea, vomiting
- Shaking chills.

The most commonly used betamimetic in the region is Fenoterol; the starting dosage is 1 microgram per minute, increasing to 2 and up to 4 micrograms/minute if the initial dosage has not been effective. The table below shows the uterus-inhibiting and cardiovascular effects of the main betamimetics.

Table 9. Utero-inhibiting and cardiovascular effects of some betamimetic drugs (according to Schwarcz, Díaz and Fescina)

Drug	I/V infusion mg/min	Uterus inhibiting effect Contractions		Maternal cardiovascular effects		
		Amplitude	Frequency	Heart rate	Blood pressure	
					Systolic	Diastolic
Isoxuprine	500-1000	++	++	↑↑	↓↓	↑↑↑
Ethylephrine (ethyladrianol)	250-500	++	++	↑	↑↑	-
Orciprenaline	10 20	++ +++	- +++	↑ ↑↑	- ↓	↓ ↓↓
Salbutamol	14-43	+++	++	↑	-	↓
Terbutaline	5-20	+++	+++	↑↑	↓	↓
Ritodrine	200-300	+++	+++	↑↑↑	-	↓
Fenoterol	2 6	+++ +++	++ +++	↑ ↑↑	- -	↓ ↓

** Moderate effect
*** Intense effect
(↑) Increase
(↓) Reduction
(↓) Reduction (minimal variation)

Antiprostaglandins, among antiprostaglandins, indometacin has proven to be extremely powerful, sometimes even more than betamimetics. Below are some of the effects achieved:

- Prolong delivery by 48 hours and longer in 90% of the cases
- Prolong delivery up to one week and longer in 60% of the cases
- Reduce LBW by 60%
- Reduce perinatal mortality by 50%

The main undesired effect is the risk of an early closure of the ductus arteriosus. This complication would occur after week 32 of pregnancy and only if the dosage exceeds 300 mg.

The recommended dosage is 100 mg administered by the rectal route. Contraindications for usage include: drug allergy, coagulation disorders or thrombocytopenia.

Calcium channel blockers- the best known is Nifedipine.
Calcium antagonists are better than any other drugs when uterine inhibitor therapy is meant to stop a threatened premature labor. They have proven to be more effective than betamimetics to treat women with threatened premature labor, since they:

- Prolong delivery for 48 hours in a larger number of cases.
- Prolong delivery for one week in a larger number of cases.
- Cause a greater reduction of RDS.
- Have no side effects that may lead to discontinuation of therapy.

One of their advantages is that they can be administered sublingually, so they are ideal for places where resources are limited. The dosage is 10 mg sublingual. The same dosage can be repeated every 15 minutes, not exceeding 40 mg in an hour.
They are contraindicated in some cases of heart disease and they should not be used together with magnesium sulphate.

Ocytocin Antagonists, the best known is Atosiban. To date there is no evidence to support they are more beneficial than betamimetics in terms of their tocolytic efficacy or child-related outcomes. They only compare well versus betamimetics in terms of causing fewer undesired effects in pregnant women. The increased number of fetal deaths found in a study that used placebo in controls raises the need to be cautious about their use.

Contraindications for uterine inhibition
Uterine inhibition must be discontinued or avoided whenever there is:

- Severe preeclampsia
- Detachment of the placenta
- Egg infection
- Advanced dilation of the cervix
- Fetal death

Therapies that have not proven to be effective in threatened premature labor
Magnesium sulphate- recommended at times when the treatment against threatened premature labor is ineffective and increases neonatal mortality; therefore, its usage should be discouraged.
Hydration- little evidence is available in that respect. However, evidence obtained so far suggests that it would have no benefits. Nitrous Oxide- there is no evidence so far justifying its use instead of the conventional therapies.

Betamimethics: no evidence of their effectiveness

Fetal lung maturation inductors
Not all steroids have proven to be effective in the induction of fetal lung maturation; the best results have been obtained with the use of:

- Betamethasone two 12-mg IM doses 24 hours apart
- Dexamethasone in four 6-mg IM doses 12 hours apart
- Hydrocortisone in four 500-mg IV doses 12 hours apart

Most studies have shown their effectiveness when they are administered between weeks 28 and 34 weeks, although recent evidence suggest that their usage is justified after week 24, especially in cases of preeclampsia, rupture of membranes, multiple pregnancy and whenever there are suspicions that delivery might occur within 24 hours.
Its main effects are reducing:

- Perinatal mortality by 41%
- RDS by 44%
- Intracrania hemorrhage Stroke by 46%
- Necrotizing enterocolitis by 64%
- Admissions to NICU by 20%

The beneficial effects of steroids have no sex-related differences, as was claimed in the past, and they do not significantly increase the risk of maternal sepsis.
The diagram below shows the starting therapy of threatened delivery and premature delivery, while the pregnant woman is referred to a higher level of complexity, seeking specialized care for the neonate.

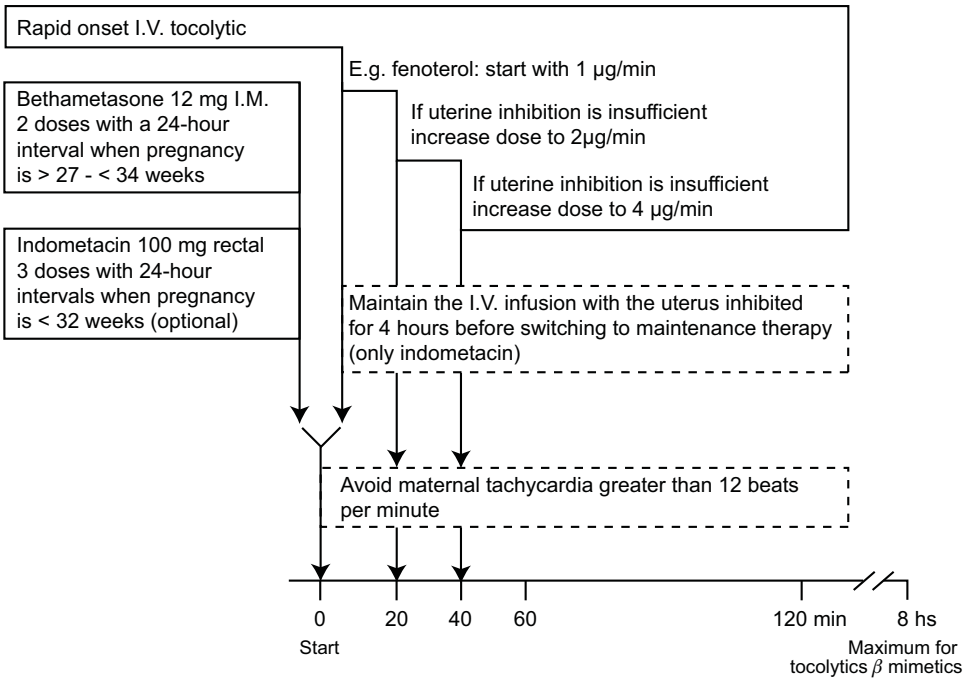


Figure 46. Treatment plan for threatened premature labor

Objective *Screen for blood pressure changes*
Existing hypertension
Pregnancy-induced hypertension syndrome (preeclampsia).
Hypotension

Activity *Measure blood pressure, check existence of edema and proteinuria*

Hypertension is a common complication of pregnancy, and it is potentially dangerous for the mother, fetus and newborn. In many countries it is the leading cause of maternal death. It may occur alone or in conjunction with edema and proteinuria. The presence of edema is common in pregnant women. However, it is always present in the cases of severe preeclampsia and eclampsia. Proteinuria is an indicator of severity that occurs late; it has a directly proportional correlation with pressure.

In the other end, maternal hypertension can also associate with increased fetal or neonatal mortality and increased frequency of small-for-gestational-age (SGA) fetuses.
The chart below summarizes the main damages associated with abnormal values of maternal blood pressure during pregnancy.

Chart 19. Blood pressure and perinatal complications

Complications:	Maternal	Fetal-ovular	Neonatal
Hypertension Diastolic > 90 mm Hg. Systolic > 140 mm Hg.	Coagulation disorders. Hemolysis Cerebral hemorrhage Liver failure Renal failure Increased mortality	Abortion Detachment of normally inserted placenta. Intrauterine Growth Restriction (IUGR). Intradelivery acute fetal distress. Olygoamnios	Small for gestational age (SGA). Preterm. Respiratory distress syndrome. Neonatal depression. Increased mortality
Hypotension Diastolic < 55 mm Hg. Systolic < 95 mm Hg.	Lipothymias and fainting.	Intrauterine Growth Restriction (IUGR). Increased mortality	Small for gestational age (SGA) Increased mortality

Factors that may alter blood pressure values

The values obtained differ depending on the pregnant woman's position, whether she is sitting, in supine recumbent, or lateral recumbent position. There are also operator- or instrument-related aspects that can be controlled with a proper methodology. The sphygmomanometer must be checked periodically, examining its different pieces: cuff, tubes and gauges. In the case of aneroid manometers, the control must include calibration, comparing the values obtained with those obtained with a mercury manometer in parallel. Aneroid manometers with a stop in the bottom end of the scale are not recommended.

Measurement Technique

- The subject must be rested (20 minutes) before measurement
- Woman sitting, her dexterous forearm leaning on a surface and stretched at heart height.
- Place the uninflated cuff around the middle of the arm; the inflatable bladder must cover the inner aspect of the arm. The lower end of the cuff must remain 5 cm away from the elbow crease
- Palpate to find the arterial pulse on the medial side of the crease; apply the capsule of the stethoscope against it
- Insufflate the cuff to 20 mm, exceeding the value at which beats were no longer heard
- Slowly open the sphygmomanometer valve and reduce the cuff pressure at 3 mm per second
- The value at which beats are first perceived when releasing pressure should be recorded as maximum or systolic blood pressure
- The value at which beats are attenuated, dulled or disappear will be recorded as minimum or diastolic blood pressure

Physiological changes during delivery

Pressure figures get to their lowest values between weeks 16 and 20 and they increase toward the end of pregnancy; such increase is more remarkable in the case of diastolic pressure.

On the other hand, the abnormal values of diastolic pressure have a greater prognostic value than those of the systolic pressure.

The woman is considered to be hypertensive when

- Diastolic pressure values are ≥ 90 mm Hg.
- Systolic pressure values are ≥ 140 mm Hg.
- There is a 30-mm Hg increase in systolic pressure or ≥ 15 mm Hg in the diastolic pressure versus that woman's normal values before pregnancy

Abnormal values should be checked by repeating measurements with the woman sitting upright after an hour's rest in lateral recumbent position. If the values of the second measurement are within normal limits, the woman is not diagnosed as hypertensive. Schedule her next follow-up appointment as established in the usual plan.

Grading of pregnancy-related hypertension

- Gestational hypertension (Transient hypertension or pregnancy-induced hypertension) this term refers to the hypertension diagnosed for the first time after the 20th week of pregnancy, with no proteinuria. Pressure goes back to normal within 12 weeks of childbirth.
- Preeclampsia- refers to the hypertensive condition diagnosed after the 20th week of pregnancy; it presents with proteinuria and resolves within days after childbirth.
- Eclampsia, the woman presents preeclampsia worsened by seizures and/or comma. Eclampsia is an extremely serious obstetric complication with a high maternal and fetal mortality.
- Preeclampsia occurring in a patient with chronic hypertension, a pregnant woman with a history of chronic hypertension has further increases of pressure and proteinuria, the latter of which resolves after childbirth.
- Chronic hypertension, hypertension is confirmed when the woman is not pregnant or within the first 20 weeks of pregnancy.

The woman is considered to be hypotensive when

- Diastolic pressure values are < 55 mm. Hg.
- Systolic pressure values are < 95 mm. Hg.

Blood pressure must be measured at every visit to screen for maternal hyper- or hypotension. Blood pressure should be checked systematically before week 20 of pregnancy to diagnose existing hypertension.

Risk factors for gestational hypertension and preeclampsia

- Nulliparity
- Adolescence
- Age > 35 years
- Multiple pregnancy
- Obesity
- Family history of preeclampsia – eclampsia
- Preeclampsia in earlier pregnancies
- Pregestational diabetes mellitus
- History of thrombophilia
- Chronic renal disease
- Autoimmune conditions

Prevention

The main preventive measure is to encourage seeking prenatal care early; visits should be periodical and comprehensive, and intended to remove the risk factors associated with hypertension. Other public health measures have limited effectiveness, i.e., using diets rich in sea-fatty acids, or promoting calcium supplements in the diet of populations with calcium poor diets.

The daily administration of aspirin at low doses (50 to 150 mg/day) during the third trimester of pregnancy reduces the incidence of preeclampsia in patients at righ risk of presenting it. This preventive effect has not been corroborated in the general population at a low risk of presenting preeclampsia.

Prediction
To date there are no reliable screening tests to anticipate the occurrence of preeclampsia.

Management
Pregnant women with hypertension must receive care in accordance with the national guidelines developed for for high-risk pregnancies.

Recommended management
Pregnancy-induced hypertension
The woman may receive outpatient care as long as periodical pressure controls are ensured; a weekly urinalysis will be required to detect the presence of proteinuria and to evaluate fetal health.
Worsening of hypertension, the presence of albumin in urine, or a severe IUGR require the patient's admission; she should then receive therapy as if it were pre¬eclampsia.
The woman must be advised to extend her rest periods. She and her family must also be warned about the risks and warning signs and symptoms.

Mild Preeclampsia
Added to the precautions detailed for women with pregnancy-induced hypertension, the precautions below should also be taken.
If the diastolic pressure does not reach 110 mm Hg, the blood pressure control, urinalysis and fetal status monitoring can be done twice a week; there is no need to start her on anti-hypertensive drugs or sedatives or a diet low in sodium. If this is not possible, the pregnant woman should be hospitalized. Term pregnancies should be terminated, while preterm pregnancies require the use of corticosteroids to induce lung maturation, followed by controls every two weeks. If symptoms worsened, the pregnant woman should be admitted to hospital and treated as a severe pre¬eclampsia. Although it may not be definitive, rest at hospital reduces prematurity and severe hypertensive episodes.

Severe preeclampsia and eclampsia
To date, the ideal therapy of severe preeclampsia and eclampsia consists of terminating pregnancy. In addition, the precautions detailed below should be implemented:

In all cases
Make sure the resources required for treatment are available; if they are not, the woman should be referred to a center that can provide the cares she needs. The resources required include staff trained in the management of critically ill patients, oxygen, laryngoscope, endotracheal tubes, mask, bag, hydralazine or nifedipine, magnesium sulphate and 1% calcium gluconate.

- The pregnant woman must be closely monitored by the staff at all times
- Place a catheter in a large vein (16 French or larger)
- Infuse fluids,
  Saline solution or Ringer lactate, 200cc/hour (unless there is evidence of pulmonary edema)
- Place the bladder tube with a collector (to measure urinary output)
- Administer anti hypertensive drugs if the diastolic pressure is > 110 mm Hg; try to stabilize it between 90 and 100 mm Hg, as in the flow chart "Therapy options with anti-hypertensive drugs"
  Administer magnesium sulphate as in the flow chart "Therapy options with magnesium sulphate"
- Draw blood and urine samples for testing

Drug	Loading dose
Hydralazinel	Slow i/v injection of a 5 - mg dose; repeat dose every 20 minutes until desired effect; not to exceed 5 doses.
Labetolole	Slow i/v injection of a 20 - mg dose; dose may be duplicated (40 mg, 80 mg, etc.) every 20 minutes until the desired effects is reached: not to exceed 5 doses.
Nifedipine	5 mg s/l; the dose may be repeated every 10 minutes

If the woman presents with comma or seizures
Apart from all the precautions above, the following must be addressed:
- Ensure patency of the airway (aspirate pharynx, intubate)
- Protect the tongue from bites
- Administer oxygen

Treatment with Magnesium Sulphate
Magnesium sulphate can be used at primary care if the elements below are ensured:
- All the above resources are available
- Urinary output greater than 30 ml per hour
- Respiratory rate > 16 breaths per minute
- Preserved patellar reflex

Chart 20. Therapeutic options with magnesium sulphate

Plan	Starting Plan	While there are seizures	Maintenance
Exclusively intravenous	4 g IV (20% solution) to be passed in 5 to 10 minutes	20% IV 2 g every 5 minutes until seizures are stopped	20% IV 1 g per hour in continuous infusion
Mixed, intravenous, intramuscular	4 g IV (20% solution) to be passed in 5 to 10 minutes. Followed by 10 g IM (50% solution) 5 g on each buttock	20% IV 2 g every 5 minutes until seizures are stopped	50% IM 5 g every 4 hours

Magnesium Sulphate Poisoning

Respiratory Depression:

If poisoning occurs in a ventilated patient, no antidotes will be required and the therapy may be maintained.

If poisoning occurs in an unventilated patient:
- Ventilate manually or mechanically
- Discontinue the magnesium sulphate infusion immediately and slowly administer a 1g of a 10% calcium gluconate solution IV

Severe hypotension
Bear in mind that magnesium sulphate is a hypotensive agent that may potentiate the effect of other anti-hypertensive agents used concomitantly.

Other anticonvulsants
Scientific evidence is undeniable; magnesium sulphate is the anticonvulsant therapy of choice for eclampsia; it provides protection from the seizures occurring in severe

preeclampsia. The use of other anticonvulsants should be limited to cases when magnesium sulphate is not available. Diazepam is the most popular benzodiazepine; its major risk is that it causes respiratory depression, so it should be used with the same caveats as magnesium sulphate.

Starting Plan:

- 10 mg IV slowly, in 10 minutes
- If seizures persist 10 minutes after the first dosage, a new dose should be passed in 10 minutes, until a total 30-gram dose is completed in the first hour

Maintenance Plan:

- 50 mg diazepam in 100 ml saline solution in 5 hours

Diazepam Poisoning

Respiratory Depression
If poisoning occurs in a ventilated patient, no antidotes will be required and therapy may be maintained.

If poisoning occurs in an unventilated patient:

- Ventilate manually or mechanically
- Discontinue the diazepam infusion immediately
- Administer flumazenil (benzodiazepine antidote) 1 mg IV slowly; the effect tends to have both a rapid onset and a brief duration (successive dosages may be required)

Severe Hypotension
Bear in mind that diazepam is a hypotensive agent that may potentiate the effect of other anti-hypertensive agents.

Once the woman is stabilized, termination of pregnancy should be planned using the fastest and safest route possible.

Objective *Detect fetal growth anomalies.*
Activity *Evaluate fetal growth by fundal height, weight gain and ultrasound.*

Fetal growth disruptions may be due to a deficit (Intra Uterine Growth Restriction: IUGR) or excess (fetal macrosomia) in growth.

Intrauterine growth restriction
A fetus is considered to have an intrauterine growth restriction when its growth is lesser than expected for gestational age. If it were born then, its weight would be estimated as lower than percentile 10 of the normal standards of neonatal weight by gestational age.

In a strict sense not all the children born with weight values lower than percentile 10 are actually IUGR (they may be normal children with a low growth potential).

In our countries the prevalence of IUGR ranges from 12 to 17% of all live births.

IUGR newborns have an eight-fold perinatal mortality rate and their risk of asphyxia is seven times as high as that of newborns born with a weight adequate for gestational age. The situation is even more serious when IUGR associates with prematurity.

Neonates with IUGR frequently suffer from hypoglycemia, hypocalcemia, polycytemia and cold stress. In the course of their lives they may develop learning disorders and physiological and metabolic disruptions that may not become evident until adulthood, i.e., diabetes, obesity, hypertension and coronary artery disease.

Factors most frequently associated with IUGR

- IUGR in an earlier pregnancy
- Smoking habit
- Alcohol consumption
- Drug consumption
- Insufficient maternal weight at the start of pregnancy
- Insufficient weight gain during pregnancy
- Existing hypertension or pregnancy-induced hypertension
- Thrombophylic syndromes
- Multiple pregnancy
- Maternal anemia
- Intrauterine infections
- Placenta previa
- Diabetes with vascular disease
- Congenital defects

Fetal macrosomia

A newborn is macrosomic (large for gestational age), when its birth weight exceeds percentile 90 of the neonatal weight by gestational age as plotted in the standards.

After week 35, the presence of fetal macrosomia increases the risk for perinatal death, which may be as high as four-fold that of babies born with an adequate weight. There is also a higher frequency of instrumental childbirth, shoulder dystocia, acute intradelivery fetal distress, neonatal depression and neurological sequel. These children have impaired coping skills adapting to extrauterine life (hyaline membrane disease, transient respiratory distress, hypoglycemia).

Factors more frequently associated with fetal macrosomia

- Macrosomia at an earlier pregnancy
- Non vascular maternal diabetes
- Rh isoimmunization
- Obese mother with an excessive weight gain during pregnancy

Technologies for measuring fetal growth

The most frequently used technologies are:

- Assessment of fundal height increase
- Assessment of maternal weight gain
- Ultrasound fetal anthropometry

It should be noted that the obstetric history of a small-for-gestational-age (SGA) baby or the presence of fetal macrosomia in an earlier pregnancy may quadruple such a risk by four in the current pregnancy.

Assessment of the increase in fundal height

The uterus grows in size together with gestational age; this growth is evaluated by measuring the uterus with a flexible and inextensible tape measure, from the pubis to the fundus as determined by palpation (figure 48). CLAP/WR has developed curves for fundal height as a function of gestational age, with percentiles 10 and 90 marking the limits of normalcy (figure 47).

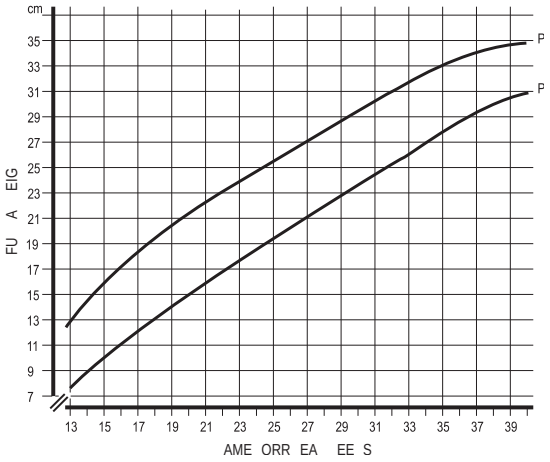


Figure 47. Fundal Height in relation to GA

Normal fundal height standards by gestational age.

These curves were designed with normal Latin American populations using the measurement technique below:

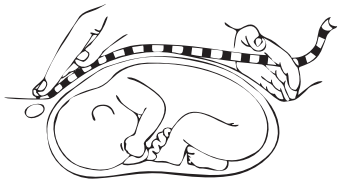


Figure 48. Measurement technique, with tape between index and middle fingers

When the data on the amenorrhea is reliable, and stillbirth and/or oligoamnios have been ruled out, the insufficient increase of uterine height permits to diagnose IUGR with 56% sensitivity and 91% specificity.

After excluding twin pregnancy, polyhydramnios and uterine myomatosis, the sensitivity of fundal height for the diagnosis of fetal macrosomia is 92% and specificity is 72%.

Measurement values differ depending on the method, so it is essential to standardize the measurement techniques and to implement the use of normal standards of reference developed using the same technique.

The zero on the tape measure is placed on the upper rim of the pubis with one hand, then sliding the tape between the index and middle finger of the other hand, until they reach the uterus fundus with the ulnar edge of that hand.

Another way of measuring height is by placing the zero on the upper rim of the pubis; the tape is then placed under the ulnar brim of the hand; as a result, the hand describes a wider curvature, so the value observed is 1.5 ± 0.6 cm. higher, in the third trimester of pregnancy, when compared with the measurement technique described above. The values obtained with this technique are not compatible with the charts developed by CLAP/WR.

Figure 49. Measurement technique, with tape measure under the ulnar edge

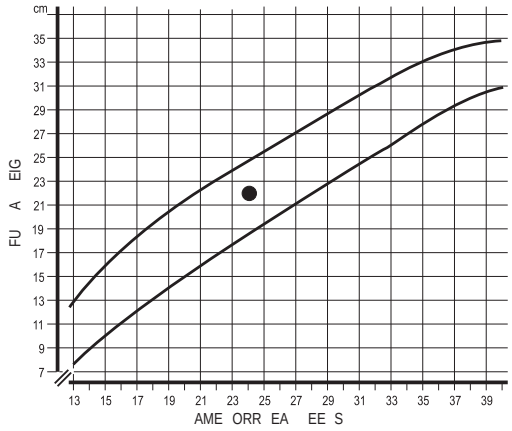
The values found are then transferred to the height-for-gestational-age curve in the perinatal card.

Interpretation

Normal value: Values within percentiles 10 and 90 of the fundal height for gestational age reference curve.

Abnormal value: Values over percentile 90 or under percentile 10 of the reference curve: all pregnant women with an abnormal value should be referred to a high-risk follow-up.

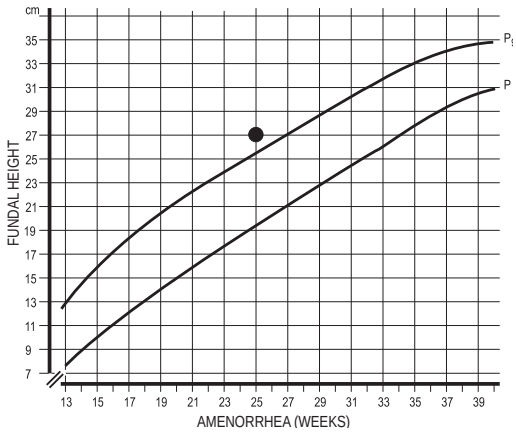
Examples of evaluation of the Fundal Height (FH) / Gestational Age (GA) Ratio at first visit



Situation
The line plots between percentiles 10 and 90 of the reference curves

Interpretation
Normal value

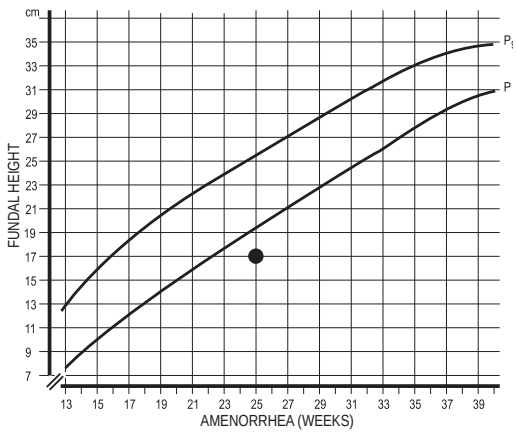
Management
- Follow usual visits schedule
- Reassure the pregnant woman that her FH is adequate for gestational age



Situation
The line plots above the 90th percentile

Interpretation
Fundal height exceeds amenorrhea

Management
- Rule out errors in the calculation of the GA
- Determine other causes: polyhydramnios, fetal macrosomia, multiple pregnancy, mole, uterine myomatosis, obesity
- Schedule an appointment with high-risk team within 15 days for assessment

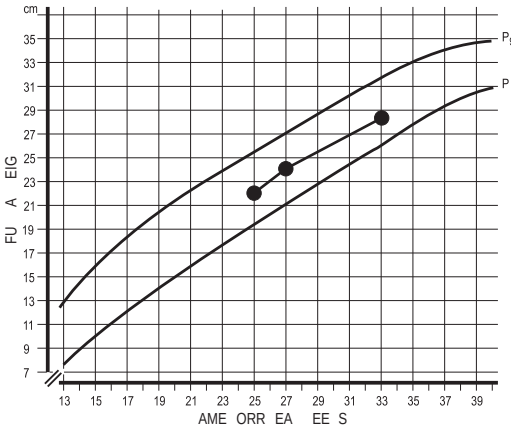


Situation
The dot is under the 10th percentile line.

Interpretation
Fundal height less than amenorrhea

Management
- Rule out errors in the calculation of the GA
- Determine other causes: IUGR, demised fetus, oligoamnios
- Schedule a follow-up appointment with high-risk team within 15 days

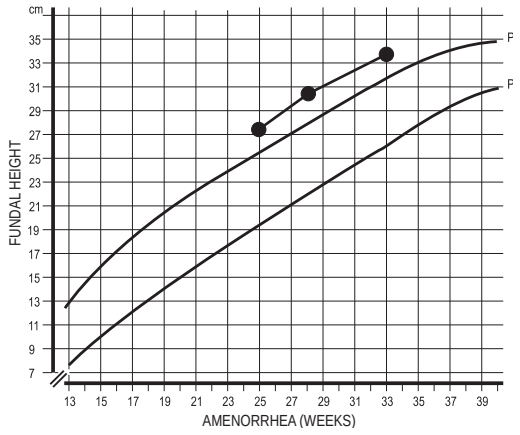
Examples of trend evaluation
Fundal Height (FH) / Gestational Age (GA) Ratio
at subsequent visits



Situation
The line plots between percentiles 10 and 90 curves

Interpretation
Normal growth

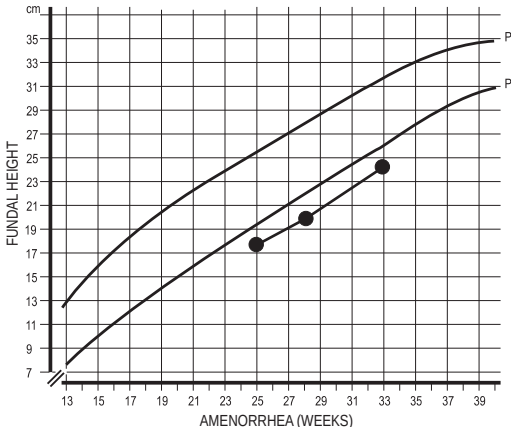
Management
- Follow usual visit calendar.
- Reassure the pregnant woman that growth is normal



Situation
The line plots above the 90th percentile

Interpretation
Potential error in the estimation of GA, with normal growth

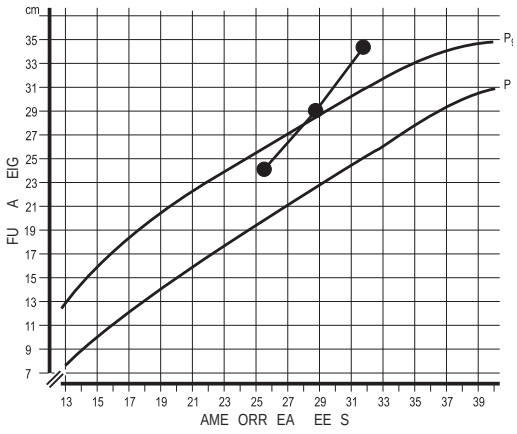
Management
- Rule out errors in the calculation of GA
- Should be evaluated by high-risk team within 15 days to rule out macrosomia, polyhydramnios, etc.



Situation
The line plots below the 90th percentile line

Interpretation
Potential error in the estimation of GA, with normal growth

Management
- Rule out error in the calculation of GA
- Schedule an appointment with high-risk team within 15 days to rule out oligoamnios or IUGR



Situation

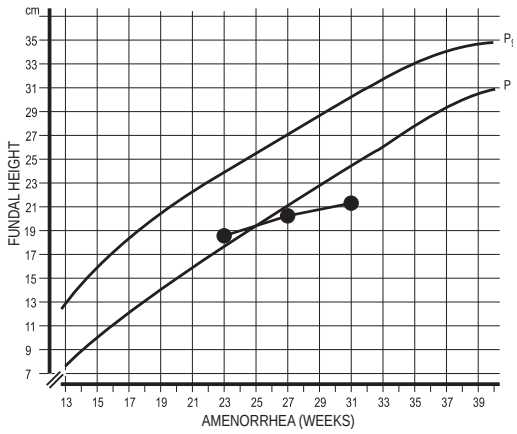
The line exceeds the normal stripe (p10 - p90)

Interpretation

Growth greater than normal values.

Management

- Refer to high-risk follow-up within 15 days to rule out polyhydramnios, macrosomia, multiple pregnancy, etc.



Situation

The line drops from the normal stripe (p10 - p90)

Interpretation

Growth under normal values. Potential IUGR.

Management

- Refer to high-risk follow-up within 15 days

Evaluation of the mother's weight gain

The suspicion of IUGR is reinforced if together with a fundal height lower than p10 the mother's weight gain is under p25 or the mother's weight gain for her height is lower than p10.

By combining the two methods, when both abnormal values of maternal weight gain and fundal height are defined as suggestive of IUGR, sensitivity (the capacity to diagnose the true IUGRs) reaches 75%.

Management

The cases with a clinical suspicion of IUGR, excluding oligoamnios, amenorrhea error, etc., must be assessed with the ultrasound to rule out false positives, and once the diagnosis is confirmed, those women should be referred to high-risk follow-up.

- 2-D Ultrasound fetal anthropometry
  This test is safer to diagnose any disorders of fetal growth.

There are charts and curves describing the course of several fetal parameters that have been developed to provide information about the fetal growth in relation with gestational age. Ultrasound allows differentiating symmetric and asymmetric intrauterine growth

restrictions; moreover, it detects intrauterine growth impairment earlier than any clinical measurement. However, the cost of the equipment and the training requirements may be significant drawbacks. In the symmetric intrauterine growth restriction, all the fetal measures are reduced (head girth, length and weight) while in asymmetric growth restriction there is only a reduction of weight (abdominal girth), while length and head girth remain normal.

The most broadly used measurements are:

a) Fetal abdominal circumference, which may be measured directly with the sonographer following the outer perimeter of the fetal abdomen at the level of the Ductus Venosus or by determining the greater diameter (D) and the lesser diameter (d) perpendicular to the former, both measured from one outer edge to the other outer edge and the circumference is obtained by applying the formula of the ellipse

$$\text{Abd. Cir} = \frac{(D + d)}{2} \times 3.14$$

This is the best measurement available to evaluate fetal growth, with 94% sensitivity and 100% specificity for the diagnosis of intrauterine growth restriction and 95 and 90% sensitivity and specificity, respectively for the diagnosis of fetal macrosomia.

b) Fetal biparietal diameter, for the diagnosis of IUGR has a sensitivity of 67% and a specificity of 93%.

The values of macrosomic fetuses are similar to those of fetuses with normal growth.

c) Fetal head circumference, behaves like the biparietal diameter (BPD). It is not altered in macrosomic fetuses, it changes a little in the asymmetric IUGR and it is considerably altered in symmetric IUGRs, thus permitting the differential diagnosis of the type of IUGR.

The fronto-occipital diameter (FOD) is measured on the same plane as the BPD (at the level of the septum pellucidum cavum), from the outer edge of the frontal bone to the outer edge of the occipital bone. The Head Circumference is obtained with those two diameters, by applying the formula of the ellipse.

$$\text{Head Circ.} = \frac{(BPD + DFO)}{2} \times 3.14$$

Chart 21. Values expected according to the growth disorder

Disorder	Expected values	
	Fetal abdominal circumference	Head circumference or BPD
Macrosomia	> p 95	between p 5 and p 95
Symmetric IUGR	< p 5	< p 5
Asymmetric IUGR	< p 5	between p 5 and p 95

d) Fetal abdominal circumference/Femur length ratio and growth rate of the abdominal circumference according to the previous value, are GA-independent growth indicators. This is most appropriate in the cases of pregnant women with unknown gestational age who seek care late in the course of their pregnancy.

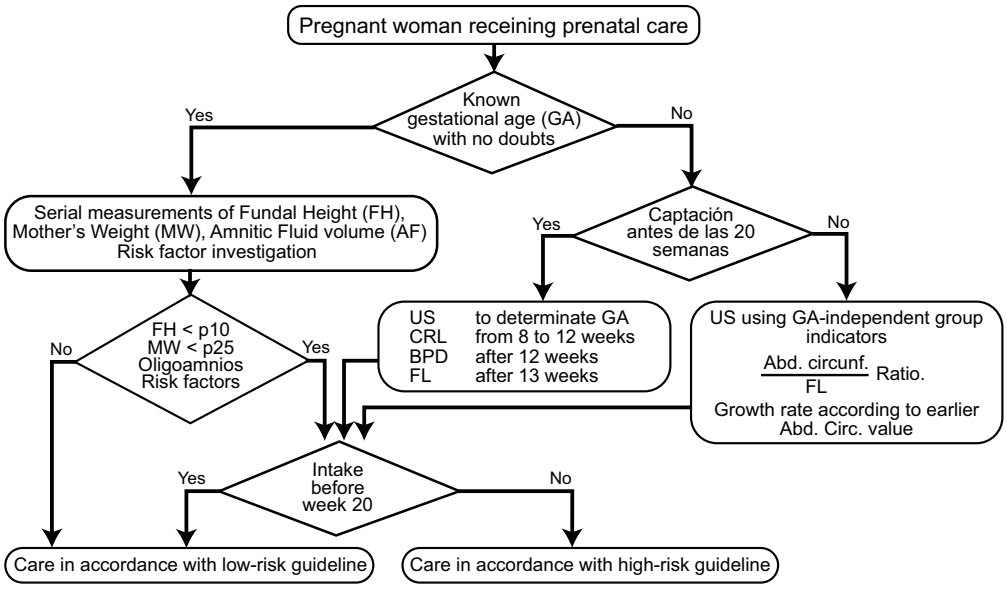


Figure 50. Evaluation of fetal growth

Therapy

Cases diagnosed as IUGR must be referred to the high-risk level of care.

While the pregnant woman continues to receive care at the first level, she must be prescribed:

- General precautions
  Stop tobacco, alcohol and drugs. Calm anxiety and improve nutrition

- Increase uterus-placenta flow
  Bed rest (preferably left lateral recumbent position), low doses (80 mg/day) of acetyl-salicylic acid

- Treat any existing conditions in the mother
  The treatment of hypertension, anemia (hemorrhage, anemia or other diseases) and the control of diabetes may generate recuperation growth.
  In term pregnancies the ideal treatment will consist of its termination through the most adequate route

Obstetric management in preterm pregnancy will pose to the teams the dilemma of giving birth an immature infant at a risk of neonatal death or sequelae or keeping it in the mother's womb until it matures but putting its life at risk. Likewise, the birth route will be defined on the basis of gestational age and fetal health and tolerance to uterine contractions. In preterm cases, corticosteroid therapy to induce fetal lung maturation is an essential resource.

Objective *Detect multiple pregnancies early to prevent its complications.*
Activity *Diagnose the number of fetuses.*

Multiple pregnancies

The frequency of twin pregnancy (the most common of multiple pregnancies) ranges around 80 to 120 singleton births. The introduction of the ovulation stimulation techniques and In Vitro Fertilization in sterile women has increased the number of multiple gestations. Despite this fact, the frequency of multiple pregnancies in the overall number of births ranges from 1.5 to 2%.

One third of twin pregnancies are monozygotic or identical twins and two thirds are dizygotic or fraternal twins. The influence of maternal age, parity, inheritance, race and drugs is expressed only in dizygotic multiple pregnancies, as described in the chart.

Chart 22. Impact of some factors on the frequency of multiple dizygotic pregnancies

Parity	1.27% at the first delivery 2.7% at the fourth delivery
Inheritance	Maternal history multiply odds 2 to 4 fold
Contraceptive drugs	Oral post-anovulatory drugs the month following their discontinuation
Ovulation induction drugs	Human Chorionic Gonadotropin Clomiphene
Race	black - 1 in 79 white - 1 in 150 yellow - 11 in 160

The duration of pregnancy and the newborn's weight show lower values than those seen in single pregnancies. Mean gestational age at delivery is about 3 weeks shorter and the mean birth weight value is 1000 g lower in multiple pregnancies.

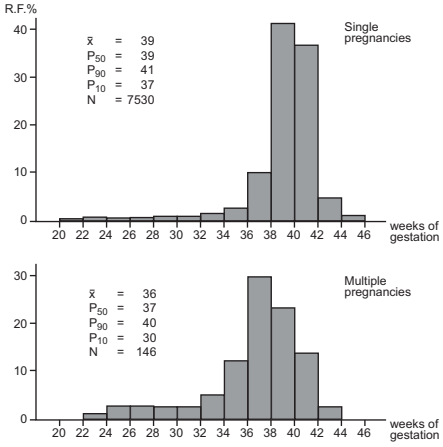


Figure 51. Distribution of gestational age at childbirth in single and multiple pregnancies without any special interventions during the prenatal period

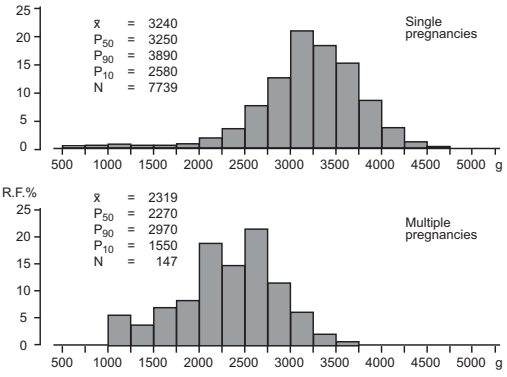


Figure 52. Distribution of birth weight in single and multiple pregnancies without any special interventions during the prenatal period

In public maternities that cater for low socio economic populations, approximately half the multiple pregnancies end up as preterm childbirths (less than 37 weeks). More than half

the pregnancies that reach full suffer from IUGR. Severe asphyxia the first and fifth minute of life is respectively three and four times higher than in singleton deliveries..

Chart 23. Conditions associated with multiple pregnancy

Maternal	Fetal	Neonatal
Anemia	Malformations	Preterm
Preeclampsia	IUGR	SGA
Placental accidents	Intradelivery Acute Fetal Distress	Neonatal depression at minutes 1 and 5
Polihidramnios	Presentaciones anormales	
Hemorrhage due to uterine atonia		

Neonatal mortality is four times higher in multiple pregnancies than in singleton pregnancies. Morbidity is also higher than in singleton pregnancies, and the incidence of physical growth retardation, mental delay and cerebral palsy are increased in these children.

Diagnosis of multiple pregnancy

Suspicion

- Family, maternal or personal history of multiple pregnancy
- Toxemia early in pregnancy
- Hyperemesis
- Ovulation stimulation therapy before the current pregnancy

Presumptive diagnosis

- Uterus larger than expected for gestational age
- Fundal height greater than p 90 of the fundal height for gestational age curve
- Palpation of several fetal parts
- Palpation of more than two fetal poles
- Palpation of two equal fetal poles (two crowns or two rumps)
- Palpation of two different fetal poles, too close to or too far from each other, suggesting they do not belong to the same fetus
- Auscultation of more than one source of fetal beats with different frequencies

Certainty Diagnosis

- Visualization of two fetuses in the ultrasound
- Detection of two asynchronic heart rate recordings simultaneously

Differential diagnosis

Having ruled out multiple pregnancy, at times a discrepancy in excess between fundal height and amenorrhea can be explained by fetal macrosomia, polyhydramnios, or uterine myomata. Both polyhydramnios and fetal macrosomia may be the consequence of a diabetes concomitantly with pregnancy (gestational or not).

Management

With a confirmed diagnosis of multiple pregnancy the pregnant woman must be referred for their further control at high-risk care and childbirth should be planned at a more complex level.

Objective *Detect abnormal fetal presentations*
Activity *Diagnosis of fetal presentation.*

The presentation is defined as the part of the fetus in contact with the mother's pelvis, which is capable of playing a role in the mechanism of delivery. It may be the fetal head, (head presentation) or the lower limbs or breech (pelvic or breech presentation). In the transverse lie, the part offered to the pelvis is the fetus's shoulder, which is incapable of spontaneously ending in vaginal delivery.

Pelvic or breech presentation
The frequency of pelvic presentation in term pregnant women with a single fetus weighing ≥ 2500 g. ranges from 2.5 to 3% of all childbirths.
Breech delivery associates with a higher perinatal morbimortality.

Circumstances that increase the frequency of the breech presentation:

- Preterm childbirth
- Multiple pregnancy
- Polyhydramnios
- Placenta previa
- Fetal malformations (anencephalia, hydrocephalia, etc.)
- Uterine malformations

Transversal Lie
Its frequency is lower than 1 in 200 childbirths. It is linked to the same circumstances that favor breech presentation. If left to proceed spontaneously, it will end up in rupture of the uterus, and even maternal and fetal death.

Diagnosis of breech presentation or transverse lie
Clinical
Diagnosing the fetus's position in uterus requires familiarity with Leopold's maneuvers.

First maneuver: palpating the fundus permits to identify the fetal pole that occupies it. If the pole is hard, round and regular, if it bounces and it presents the neck crease and both palpation and bouncing hurt, one can assume that the fundus of the uterus is occupied by the head. If the head is confirmed to be in the fundus the case is diagnosed as a breech presentation.

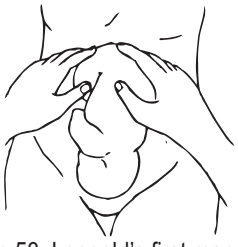


Figure 53. Leopold's first maneuver

Second maneuver: palpation of the flanks helps to determine the situation and location of the fetal back. Normally, when the fetus is in longitudinal position, the fetus's spine is palpated on one side and the belly on the other. Conversely, in the transverse lie, both fetal poles are located at both sides of the mother's womb.

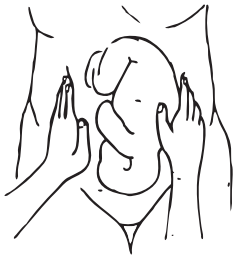


Figure 54. Leopold's second maneuver

Third maneuver: this maneuver permits to palpate the pole offered to the pelvis. In breech presentations it is possible to find a pole that may be large (full or complete breech) or small (incomplete breech), but whatever the modality, the pole is irregular, soft, not very resistant and it is difficult to make it bounce. The fetal forehead and neck crease are not recognizable. In the transverse lie the pelvis is empty.

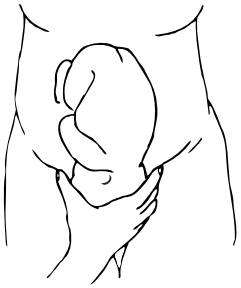


Figure 55. Third Leopold's maneuver

Fourth maneuver: this permits to evaluate the degree of flexion and engagement of the presentation in the pelvis. A transverse lie should be suspected when the fingers are introduced into an empty excavation.

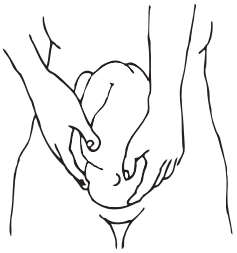


Figure 56. Fourth Leopold's maneuver

Laboratory

If any doubts about the fetal location persist after the clinical examination, ultrasound is the method of choice to establish the diagnosis. When ultrasound is not available, then radiology (X-rays) may be the appropriate choice.

Management of breech presentation and transverse lie

After the 28th week, the fetal situation and presentation must be determined at every visit.

Evidence available to date suggests that a planned cesarean section has a lower perinatal mortality and less neonatal respiratory depression, regardless of the woman's parity and the health care provider's training, as compared with vaginal delivery.

The elective cesarean section is recommended in cases of breech presentation and transverse lie at term.

In order to reduce the frequency of cesarean sections in pregnancies presenting with breech presentations or abnormal fetal situation, the case should be assessed, to determine the feasibility of accommodating the fetus with external maneuvers before the onset of labor.

External cephalic version should be limited to patients with no contraindications; it should be performed by staff competent in that specific procedure and in an environment with the resources needed to solve the complications that may arise as a result of the maneuver (acute fetal distress, detachment of the placenta). These resources are the operation room and instruments needed for resucitation of mother and child.

Contraindications for external version

- Gestational age under 38 weeks
- Feto-pelvic disproportion
- Previous surgery involving the uterus (cesarean sections, myomectomies, etc.)
- Increased uterine tone
- Presence of malformations and/or myomata in uterus

- Multiple pregnancy
- Demised fetus
- Major fetal malformations (hydro or anencephaly, etc.)
- Placenta previa
- Oligoamnios
- Maternal obesity
- There is no infrastructure for an emergency cesarean section

Objective *Detect potential pelvic dystocias to define the appropriate level of delivery care*

Activity *Gyneco-obstetric examination. Evaluating the pelvis*

Anamnesis

Collect data on previous deliveries and on the existence of conditions and trauma that may have affected the pelvis, (especially nutrition disorders, such as rickets). In multiparas, the history of live newborns weighing more than 3000 g in the past suggests the existence of a good bony pelvic cavity as a birth canal. Conversely, any abnormalities in the course of a previous delivery, with a newborn weighing less than 3,000 grams should lead to the suspicion of a pelvic abnormality.

Diagnosis of presentation engagement

The presentation is engaged when the plane of the biparietal diameter is below the plane of the pelvis inlet (promontory – innominated line– upper rim of pubis). The diagnosis is made through abdominal palpation and digital examination. On abdominal palpation, using Leopold's fourth maneuver, the presentation is considered to be engaged when the pole presenting to the pelvis inlet cannot be raised and/or bounced. Digital examination provides the diagnosis by relating the presenting part of the fetal head to the ischial spines; when these points are on the same plane, the head is usually engaged.

It is estimated that if the head presentation is engaged, changes of the pelvic inlet are unlikely.

The confirmation of an engaged presentation is an evidence of pelvic sufficiency of the superior and middle inlets.

Inner Pelvimetry and Digital Pelvigraphy

When there is no history of pelvic capacity available by week 34, it is advisable to conduct an examination of the canal with a pelvimetry and digital pelvigraphy. Radiology-guided pelvigraphy has not shown to be effective and it may put the fetus's future in jeopardy, as a result of the cumulative effect of radiations.

Technique for digital pelvigraphy

- Pregnant woman with an empty bladder, lying down in an obstetric position
- Sacrum leaning on the horizontal plane (ante- or retroversion alter results)
- Two-finger digital examination
- Try to touch the promontory (difficult to reach during pregnancy)

* If the promontory is not touched, the diagonal conjugate diameter is considered normal
* If you cannot touch the promontory, measure the promonto subpubian or conjugate diagonal diameter (usually 12 cm) figures 70 and 71 (PAG 155) The measurement obtained is subtracted 1.5 cm to obtain the minimum promonto pubic or obstetric conjugate or useful diameter (normal 10.5 cm)

- Slide finger along the pelvic walls
- Touch the ischial spines

Suspect a narrow pelvis when:
- There are changes in the symmetry of the pelvis, or changes in the woman's body stance or gait.
- In term nulliparas the presentation remains high.
- The promontory can be reached too easily

The diagnosis of a narrow pelvis is confirmed when:
- The diagonal conjugate diameter is smaller than 12 cm and consequently the obstetric conjugate is smaller than 10.5 cm.
- There is evidence of obstacles that reduce the lumen of the canal or that disrupt transit

Management

In cases where a narrow pelvis is suspected, the health provider must plan the patient's timely referral for high-risk childbirth care. If a narrow pelvis is confirmed, he/she must plan the proper time and place to perform elective cesarean section.

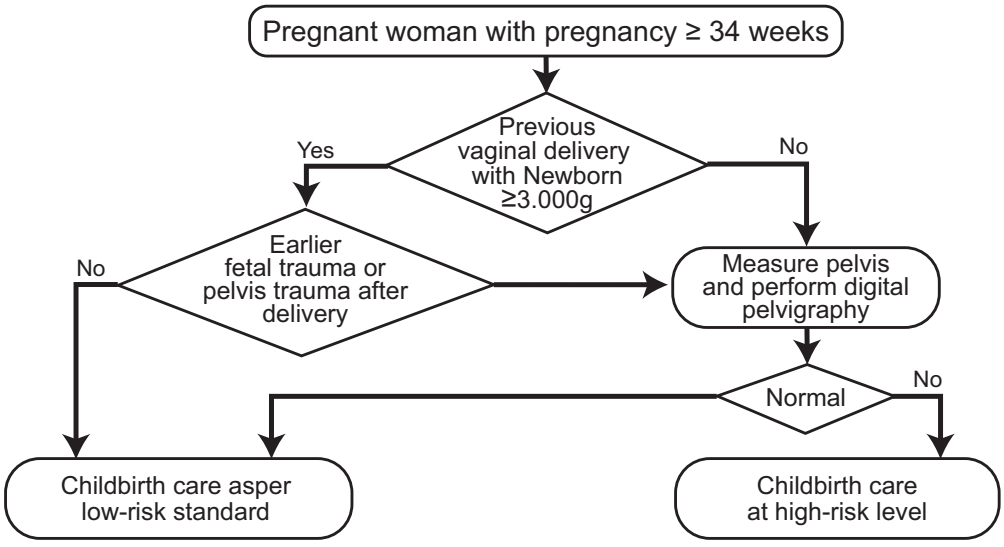


Figure 57. Decision tree for pelvic assessment

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IV CHAPTER IV

Care of the Low Risk Delivery

General Objectives

Provide quality evidence-based care during:

- *Admission.*
- *The dilation period (first period).*
- *Expulsive period (second period).*
- *Placental delivery and post-placental delivery period (third period).*

Care during admission

Objective *Diagnose labor and identify the degree of risk.*
Activity *Consultation at the reception.*

The pregnant woman consults because she presents, or thinks she presents, symptoms of labor:

- Perception of painful uterine contractions
- Loss of mucus, fluid or blood through the genitalia

The end of pregnancy is a continuation of phenomena, and many of its causal links have not been established yet. Hence, as it is impossible to determine the exact time of the onset of labor, is has been defined arbitrarily as:

- The presence of uterine contractions that become periodic and regular, being perceived by the mother or an observer for at least 2 hours
- Contractions should occur with a frequency ≥2 contractions every 10 minutes
- The cervix is at least partially effaced
- The dilation is greater than 2 cm in nulliparous women, or in progress in multiparous women

Labor is divided into three stages according to the dilation and descent of the presentation:

- Dilation period or first period
- Expulsive period or second period
- Placental delivery or third period

The dilation period is preceded by a variable duration phase that has received several names: pre partum, prodromal period, etc. The pregnant woman may seek care at any time; she must be adequately assessed, and the degree of risk should be determined at that visit.

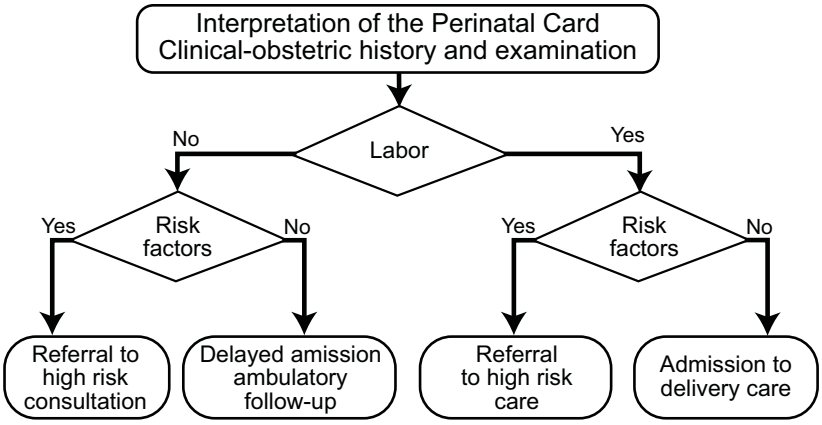

Figure 58. Stepwise decision-making algorithm for the reception of pregnant women

Components of the consultation at reception

- Questionnaire
- Interpretation of the Perinatal Book
- General clinical examination
- Obstetric examination

Questionnaire

Questions are designed to identify why the pregnant woman is seeking care and to assess her risk. The information obtained complements the data available in the Perinatal Card.

It enables providers to assess the symptoms of labor, the woman' history, detect any data missing from the prenatal controls, or new events occurring since her last visit.
If the pregnant woman has not controlled her pregnancy or comes to the visit without the Perinatal Book she must be questioned following "the road map" suggested by the Perinatal Clinical Record.

Identification

Most socio-economic and educational risk factors would not imply altering the management of delivery if both the mother and her baby are healthy by the end of pregnancy. At this stage, those factors are important when monitoring the post-natal risk factors with which they may be associated.

Family, personal and obstetric history

Certain conditions are associated with a higher maternal, fetal or neonatal risk during childbirth. Their presence at the onset of labor determines whether a specific pregnancy will be classified as "high risk".

- History of other newborns with LBW
- Age < 15 or > 40 years
- Intergestacional period less than one year
- Low pregestational maternal weight and insufficient weight gain
- Smoking habit
- Consumption of alcohol and other illegal drugs
- Mutiple pregnancy
- Hipertension and preeclampsia
- Heart disease
- Endocrine-metabolic disease
- Urinary and other infections
- HIV/AIDS
- HPV Vulvovaginal condylomatosis
- Vulvovaginal virus
- Pregnancy-related bleeding
- Chronic anemia
- Lack of inadequate prenatal control
- Rectovaginal colonization by GBS
- Uterine surgery

The following chart includes an analysis of probable risks produced by some of these conditions and the frequencies with which they generally appear during pregnancy.

Chart 24. Risk during delivery associated with maternal disorders

	Diabetes	Chronic Hypertension	Uterine Surgery	Cardiopathy
	0.3% - 1%	0.3% - 2%	2% - 30%	1%-2%
Maternal risk at childbirth	Obstetric trauma Metabolic decompensation	PANIP (4%) of hypertensive mothers. Stroke. Added preeclampsia.	Uterine rupture. Higher frequency of obstetric interventions	Heart failure Acute lung edema. Thromboembolic disease. Bacterial endocarditis
Fetus-neonatal risk	Malformations Macrosomia Neonatal infection Hypoglycemia	IUGR Acute fetal distress	Obstetric trauma related to maternal risk	IUGR Prematurity Acute fetal distress Neonatal depression

General clinical examination:
This examination assesses the mother's general (physical and psychological) status, her vital functions and it rules out any risk-enhancing disorders.

The clinical examination needs to be carried out by well trained staff capable of evaluating the main signs of conditions that increase risk such as:

- Hypertensive syndrome
- Severe infection
- Severe anemia
- Heart disease, etc.

A proper assessment requires focusing on the issues below; their presence may also suggest other possible disorders:

Skin and mucosae
Check normal color, temperature and moisture of skin and mucosae. Occasionally there may be signs suggesting various abnormal conditions, as summarized in the following chart.

Chart 25. Skin and mucosae changes and their relation with certain pathological conditions

Sign	Disorder suggested
Pallor	Anemia – Shock
Cyanosis	Cardiovascular or respiratory disorders – Shock.
Dry mucosae	Dehydration – Acute abdomen – Decompensated diabetes
Edema	Preeclampsia – Heart failure – Kidney disorders.
Skin lesions	Genital herpes – Human papilloma virus – Syphilis

Blood pressure
Hypertensive syndromes detected at the onset of term deliveries, are due to chronic hypertension and/or pregnancy-induced hypertension (preeclampsia/eclampsia). They are potentially harmful for the mother and fetus; they are frequently not detected by her, but their severity is associated with symptoms of central nervous system (CNS) irritability, as well as renal and/or liver impairment.

The presence of hypertension warrants asking about the following:

- Headaches
- Dizziness or vertigo
- Loss of consciousness
- Seizures
- Visual disorders (scotomas, amaurosis)
- Hearing disorders
- Oliguria or anuria
- Abdominal pain (particularly upper adbominal cramps)

The following must also be examined especially:

- Osteotendinous reflexes (patellar)
- Abdominal palpation (pain in the upper right quadrant or hepatomegaly, are signs of severity)

The presence of any of these signs or symptoms indicates severity of the hypertensive syndrome.

Hypotension at the end of pregnancy is less frequent. It may occasionally be a sign of shock. Obstetric-related shock is usually secondary to bleeding; more rarely it may be due to sepsis, amniotic fluid embolism, salt depletion or some other severe medical condition (heart disease, diabetes). In case of hypotension the following must be sought:

- Genital bleeding
- Uterine hypertonia
- Polypnea and oliguria
- Pallor and/or cyanosis
- Increased pulse rate and/or weak or fine pulse
- Cold and sweaty skin

The presence of any of these symptoms should alert about the potential occurrence of shock.

The technique recommended to measure and interpret blood pressure values is described in the prenatal section.

Mild hypertension may worsen and become severe at any time; it is advisable to refer all patients with hypertensive syndromes to the high risk group, whatever their severity.

Pulse

The normal pulse rate in a pregnant woman at term varies between 60 and 100 beats per minute. It is checked by palpating the radial artery on the subject's wrist for 1 minute.

Interpretation

- Normal 60 to 100 beats per minute
- Bradycardia < 60 beats per minute
- Tachycardia > 100 beats per minute

Management

Changes should be assessed in the context of the other findings obtained in the physical examination.

Temperature

The presence of fever may be a sign of severe infection or unimportant disorders with no impact on childbirth risk. Hence, there are other signs and symptoms that should be investigated to detect the cause of fever, such as:

- Loss of amniotic fluid due to rupture of membranes
- Abdominal pain (must be differentiated from pain caused by contractions)

- Dysuria, bladder straining and tenesmus
- Edema, pain and redness of the lower limbs

Any of the above signs suggests a potentially severe infection, egg infection, pyelonephritis, pneumonia, acute abdomen or sepsis (if fever is associated with other signs of shock), thrombophlebitis.

Record temperature.
Place the thermometer in the axilla, mouth or rectum, for at least 1 minute.

Interpretation. Normal – up to 37 ºC axillary.
– up to 37.5 ºC rectal or oral.

Management
- Refer to high-risk care if any signs and symptoms of severe infection are detected
- When findings suggest irrelevant conditions, the patient may be admitted to low-risk care, monitoring temperature, pulse and other signs and symptoms every 2 hours. The pregnant woman shall be offered fluids per os to keep her well hydrated. Specific (etiological) treatment must be implemented if the cause is identified. Anti-thermal agents are recommended if the temperature cannot be corrected with physical measures such as a tepid shower, light clothes and hydration

Weight
The present weight must be evaluated using a weight gain table correlating a pregnant woman's weight gain and gestational age. Insufficient maternal weight and a poor weight gain during pregnancy are related with Intrauterine Growth Restriction (IUGR). A sudden and exaggerated increase in maternal weight may be due to water retention, preeclampsia and/or diabetes, and should be assessed together with other signs and symptoms in order to define the etiology.

Clinical examination according by systems
Apply the standard examining techniques typically used by qualified staff.

Management
If the woman presents signs and symptoms suggesting a severe medical condition (heart disease, severe anemia, etc.) she must be referred to high-risk care.

Obstetric examination
Enables us to:
- Confirm the diagnosis of labor
- Evaluate the maternal-fetal risk during delivery and risk for the newborn

Abdominal palpation
Our objectives are to determine:
- Uterine volume
- Number of fetuses
- Fetal condition
- Fetal presentation
- Fetal size and position
- Amount of amniotic fluid
- Height of presentation
- Presence of uterine contractions

Multiple pregnancy, dystocic presentation, fetal-pelvic disproportion or changes in the amniotic fluid are all significant risk factors for delivery. Although in most cases these conditions would have been ruled out during the prenatal control, it is absolutely essential to rule these conditions in or out on admission in the case of uncontrolled or misdiagnosed mothers, or women presenting changes occurring after their last control visit.

This examination should be complemented measuring the fundal height following Leopold's maneuvers, as described in the prenatal section.

Suspected fetal-pelvic disproportion should be confirmed with the genital examination as detailed in the prenatal pages.

Fundal Height
Allows the assessment of fetal size and growth, as indicated in the prenatal chapter.

Management
Suspected intrauterine growth restriction (IUGR), macrosomia, multiple pregnancy, dystocic presentation and polyhydramnios warrant delivery care at high-risk level facilities.

Auscultation of fetal heart rate (FHR)
This information confirms fetal vitality and degree of wellbeing.

Auscultation of the fetal heart beats assures us that the fetus is alive. The assessment of the fetal heart rate (FHR) (before, during and after contractions), allows us to appreciate the fetus' health status, but only to a certain degree. The presence of severe changes of the FHR indicates a high level of presumption of fetal hypoxia with the ensuing risk of:

- Fetal death
- Depression at birth
- Neonatal morbidity
- Neonatal death

Under normal conditions the fetus tolerates well the reduction of the partial pressure of oxygen in arterial blood (PaO2) produced by uterine contractions. There are certain risk conditions that affect the fetal-placental reserve and produce a PaO2 below the critical level. This translates clinically as tachycardia (due to the increased sympathetic tone), transient post-contraction bradycardia (DIP II) or sustained bradycardia (due to the increased sympathetic tone). The isolated and sustained tachycardia may be the first sign of fetal distress.

During delivery we frequently observe decrease in FHR coinciding with the contraction (DIP I), especially with ruptured membranes, and/or if the fetus' head is engaged in the pelvis. This sign does not respond to systemic fetal ischemia, but rather to a vagal stimulation due to compression. DIPS I is generally not associated with fetal death or neonatal hypoxia.

Ill-defined DIPS may occur on other occasions, and it is hard to tell if they correspond to types I or II, because they seem to alternate. These variable or umbilical DIPS are produced by a transient occlusion of the umbilical vessels during the contraction of the uterus. When the occlusion is brief (less than 30 or 40 seconds) only a vagal stimulation occurs. Fetal hypoxia also occurs during longer occlusions (more than 40 seconds). In this latter case, the variable DIP will be a synonym of fetal distress.

Chart 26. Interpretation of the fetal heart rate

FHR between contractions (baseline FHR)	
Normal	Between 120-160 beats/min
Alert (Mild hypoxia)	Between 100-119 beats/min (bradycardia) Over 160 beats/min (tachycardia)
Abnormal (Severe hypoxia or congenital heart block)	FCF < 100 lat/min (bradycardia)

FHR associated with contractions

Normal
- **Without significant** variation compared with the baseline, transient accelerations
- **Dips I or early deceleration** synchronous with the uterine contractions (UC)

Warning
- **Variable or umbilical Dips**, of variable duration, amplitude at time of initiation in relation with the UC. (Possible funicular disorder)

Abnormal
- **Dips II or late deceleration.** Late onset in relation with the UC and recovery alter the UC has ended. Reaches its lowest value 20 to 60 seconds after the peak of the UC.
- **Sustained bradycardia** (< 100 beats/min) Onset of deceleration together with the UC, and lack of recovery after the latter has ended.

If there are risk factors, extreme care must be taken during fetal auscultation.

Extreme care must be taken during fetal auscultation in the presence of risk factors. The following method should be used during the auscultation technique described (in page 104) to detect decelerations in FHR. The baseline FHR is determined between contractions. Count the number of beats during 30 seconds and multiply by 2.
Variations should be examined during the contraction, and immediately afterwards. Auscultate from the onset of the contraction, until 30 seconds after it ends, and in 15-second periods. Multiply that rate by 4, compare them with each other and with FHR at baseline

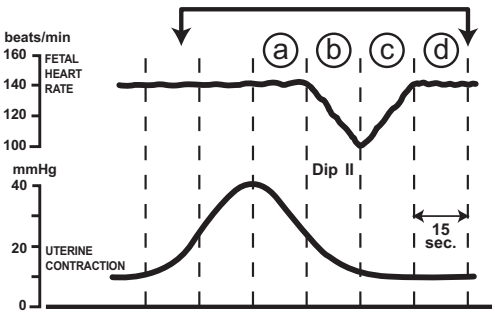

Figure 59.
Method to detect decelerations in FHR during and following contractions by clinical auscultation with the obstetric stethoscope

Management
When sustained bradycardia or DIPS II are recorded, delivery should be considered high risk. Tachycardia and variable DIPS are alarming conditions and warrant a careful surveillance of FHR, with the mother in the left lateral recumbent position.

Uterine contractility pattern

The uterine tone must be recorded together with the frequency, duration and intensity of contractions indicating when the pregnant woman notes an intensification of any of the aforementioned parameters.

An appropriate pattern of uterine contractions is necessary for the occurrence of effacement, cervical dilation and descent of the presentation. A normal contraction produces transient physiological modifications of the uterine-placental circulation and fetal oxygenation. Uterine hyperactivity (tachysystolia and/or hypertonia) may produce fetal hypoxia. It may likewise produce uterine rupture if predisposing factors are present (uterine scars, malformations, fetal-pelvic disproportion, etc.).

The parameters taken into account to establish the uterine contractility pattern are:

- Tone (lower pressure between contractions)
- Frequency or rate (number of contractions in 10 minutes)
- Duration (time elapsed from onset to end of contraction)
- Intensity (the difference between the maximum pressure reached by the contraction and the tone)

Contractions are not perceived unless their intensity exceeds a certain value (perception threshold during palpation). Under normal conditions, the average value of the perception threshold is 10 mmHg above the normal amniotic fluid tone. (chart 27)

RECORDING METHOD		Tone	Frequency (contract./10 min)	Duration (seconds)	Intensity
I RA-U ERI E PRESSURE	ormal	8-12 mmHg	2 to 5 (alert 6-7)	30-60	30-70 mmHg
	Abnormal	> 12 mmHg	< 2 > 7	< 30 > 60	> 70 mmHg (hypersystolia)
C I ICA	ormal	Fetal part may be palpated. The uterus is depressed between contractions	2 to 5	20 to 50	The uterus is not depressed at the peak of the contraction
	Abnormal	Hypertonia Impossible to palpate fetal parts Pain	> 7 (tachysistolia)	> 50	Hypersystolia. The uterus is not depressed at any time during the contraction

Note: For the purpose of simplicity, hypotonia and hyposystolia were not included in the chart

The first and last parts of the uterine contraction cannot be perceived through abdominal palpation; the duration estimated clinically using this method is less than the actual duration measured by registering intrauterine pressure.

The greater the intensity of the contraction the harder the uterine wall will become. When the amniotic pressure increases above 50 mmHg, the uterine wall will become so hard that it will not be possible to depress it with a finger.

An increase of any of these parameters above physiological values may jeopardize utero-placental circulation resulting in fetal hypoxia.

The reduction of uterine activity may result in a slow progress of delivery or even its detention.

Technique to assess contractility

The clinical control of uterine contractions should be carried out during periods of not less than 10 minutes, placing the extended hand over the mother´s abdomen without stimulating the uterine body.

Management

Chart 28. Recommended management in case of:

Normal Contractility	Primitive Hyperdynamia (hypertonia, tachy o hypersystolia) Secondary Hyperdynamia	Primitive Hypodinamia (brady or polysystolia)
Admission at low risk care level.	Place the woman in labor in the left lateral recumbent position.	Admission at the low risk care level.
		Observe progress of delivery
Observe progress of delivery	Initiate uteroinhibition with intravenous betamimetic agents.	If there is no progress of delivery apply intravenous oxytocin
	Explore the cause.	
	If these measures are not effective refer the pregnant woman	

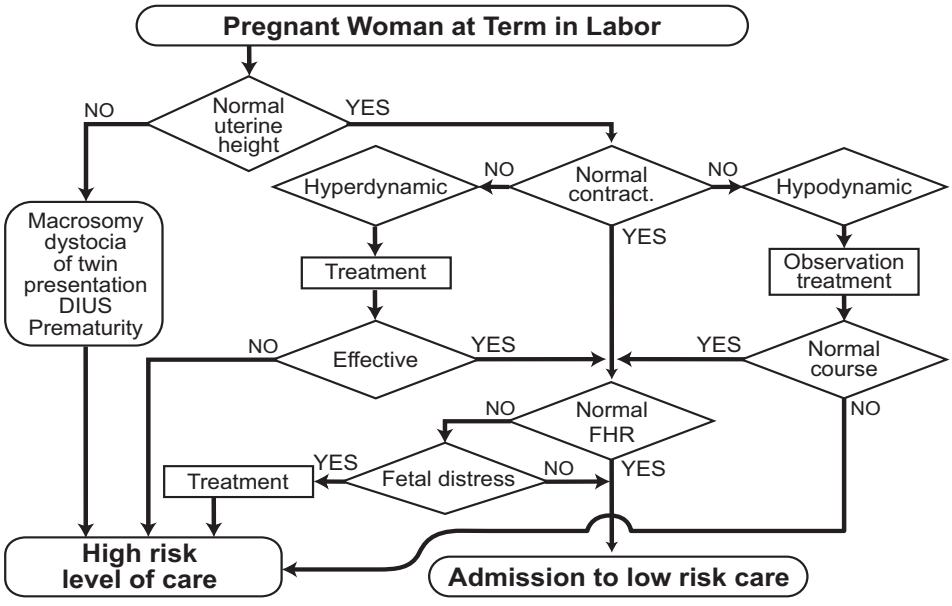

Figure 60. Decision-making algorithm based on the obstetric examination of the pregnant woman in labor.

Genital Examination
Vaginal digital examination
Allows the assessment of:

- Stretching and elasticity of the soft tissues
- Dilation, effacement and position of the cervix
- Condition of egg membranes
- Presentation, variety of position and height of the presentation
- Degree of engagement
- Evaluation of the pelvis structure and diameters (subpubic angle, bi¬-ischiatic diameter)
- Fetal-pelvic proportions

Vaginal digital examination technique
The genital examination should be carried out with an empty bladder through spontaneous micturition, with the pregnant woman in gynecological position, her sacrum firmly fixed against the table.

Procedure:

- Inspection of the external genitalia (lesions, varices, blood loss, secretions or presence of tumors)
- Cleansing of genitalia with disinfecting solution
- Sterile gloves
- Separate the labia minora with the index finger and thumb of the least dexterous hand
- Inspect the introitus
- In case of discharge of fluid or blood through the genitalia, it s origin and magnitude must be assessed through speculoscopy before carrying out the vaginal digital examination
- Introduce the index and middle finger of the dexterous hand horizontally in the direction of the vaginal axis, leaving the ring-finger and little fingers flexed and the thumb stretched.
- Palpate with the palmar surface of the fingers
- Keep the forearm in the horizontal position
- Hold the uterine fundus with the external hand
- Do not remove the fingers from the vagina until the exam has been completed
- When removing the fingers, explore to check if the rectum is empty
- Control the possible presence of mucus, blood or fluid in the glove

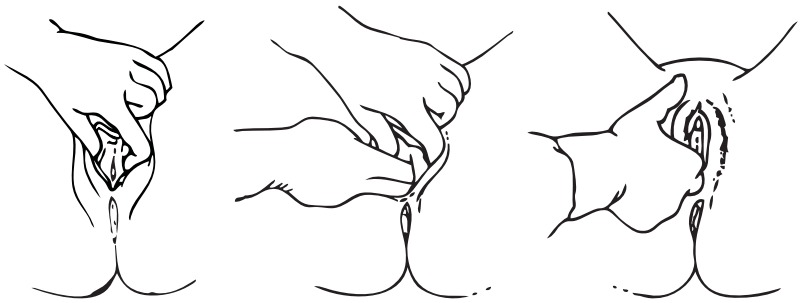

Figure 61. Technique for vaginal examination

Speculoscopy

- Separate the labia minora
- Delicately introduce the closed speculum, directing it backwards and obliquely lightly depressing the perineum
- Open the speculum and observe the uterine cervix, and the characteristics of the secretions that might be present (mucus, blood, fluid)

Evaluation of the width and elasticity of the birth canal.
It generally does not act as an obstacle for delivery, but the lack of elasticity and amplitude may prolong its duration.

Amplitude and elasticity of the birth canal are often impaired in the following conditions:

- Adolescent or eldery primigravida
- Hypertrophy of the perineal muscles
- Narrowing scars (plasties, caustic injuries)
- Uterine, cervical, vaginal or vulvar tumors (massive condilomatosis, cysts, prior tumors, etc.)
- Transverse vaginal septa
- Persistence of the hymen

Cervical dilation, effacement and position.
Cervical dilatation and effacement result from contractions and biochemical changes in the uterine cervix towards the end of pregnancy.

The term effacement implies the reduction of cervical length. When effacement is completed, the outer cervical os blends with the inner os. Effacement is usually complete in primigravidas before dilation starts, while in multiparous women both processes tend to occur simultaneously.

Effacement is described indicating the length of the endocervical canal, be it in absolute values (1 to 4 cm), or as a percentage of effacement (0 to 100%).

Dilation is the widening of the uterine cervix, and may range from a few millimeters up to 10 cm. It occurs through a double mechanism, i.e., the myometrial fiber pulling from the connective tissue of the cervix during the contraction, and pressure exerted by the amniotic sac or the fetal presentation on the inner cervical os. Dilation is measured by introducing the exploring fingers into the inner cervical os and separating them until they touch the edges of the cervix.

In the immature cervix the outer os is generally in the posterior cul-de-sac; with maturation the position changes and becomes central.

Even with normal contractions, some conditions may hinder dilation and effacement:

- Cervical agglutination (due to endocervicitis or other disorders)
- Cervical scars (conization, tears)
- Edema of the cervix

These are infrequent conditions that may arrest the progression of delivery. A posterior cervical position may prolong labor, since the anterior labia may become edematous if it gets compressed between the presentation and the pubis.

Loss of blood and secretions through the genitalis
When the woman seeks care because of some discharge through the genitalia, the following should be ruled out:

- The mucous plug
- Amniotic fluid
- Urine
- Blood
- Purulent secretions

Ask about the time of onset, amount and some characteristics such as appearance, color, odor, etc. It is also necessary to ask about the perception of the fetal movements, and whether they have varied or disappeared.

Mucous plug. A thick, sometimes bloody, discharge expelled as a result of cervical effacement and dilation.

Amniotic fluid The egg membranes in front of the presentation form the amniotic sac. A very prominent amniotic sac or hourglass shaped suggest:

- Fetal-pelvic disproportion
- Deflected cephalic presentation
- Dystocic situation or presentation

Under normal conditions the membranes remain intact until dilation is complete (75% of cases).

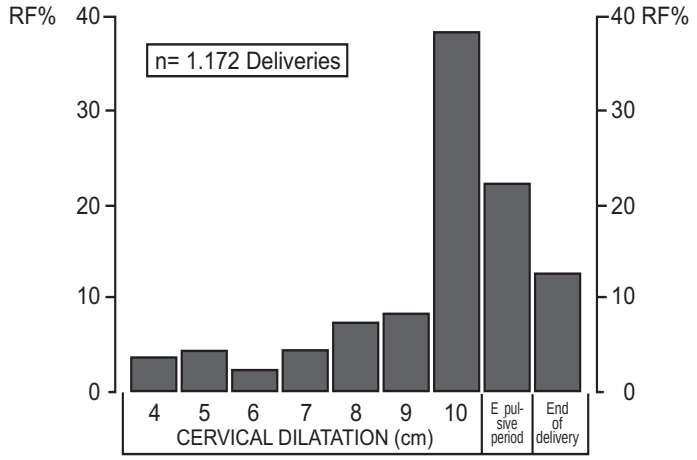

Figure 62
Stage of delivery at which the spontaneous rupture of the ovular membranes is accompanied by a conservative attitude

Rupture of membranes is usually accompanied by the discharge of a transparent fluid that smells like semen or bleach. On occasions, it may be yellowish or green (meconium), or purulent, if there is egg infection.

The diagnosis of rupture of membranes is generally simple. The woman reports the sudden loss of fluid through the genitalia. In 85% of cases it is confirmed with a simple genital inspection, if there is fluid coming out through the vulva.

As a differential diagnosis, we must rule out involuntary passing of urine, something relatively frequent at the end of pregnancy, and easily recognized by its characteristic odor.

The term Premature Rupture of Membranes (PROM) refers to the spontaneous rupture of the membranes from one hour before labor starts.

When the PROM occurs in term pregnancies, the onset of labor usually occurs spontaneous within 24 hours in over 80% of the cases.

The time elapsed between the rupture of membranes and delivery is known as the latency period. When it exceeds 24 hours it is considered a prolonged rupture of membranes, and its frequency is estimated to be close to 5%

The main complications of pregnancies with PMR are:

- Egg infection: 6% with PROM < 24 hours and 30% with PROM > 24 hours
- Fetal/neonatal infection with GBS with PROM > 18 hours
- Prematurity

Patients presenting with hydrorrhea (fluid loss) must be evaluated immediately, to allow for a timely referral to the appropriate level of care.

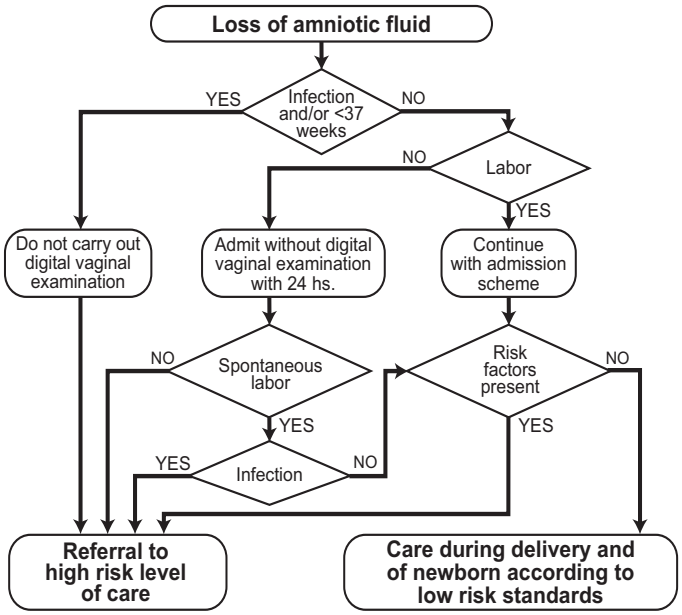

Fig. 63 – Decision-making algorithm with proven loss of amniotic fluid

Blood

It is common to find spotting (minor bleeding) in association with cervical dilation. However, all blood (and especially heavy) losses through the genitalia warrant an adequate assessment.

Severe hemorrhages are a high risk situation, and usually demand fetal extraction using the fastest procedure.

Approximately half the hemorrhages at term are due to:

- placenta previa
- premature abruption of normally implanted placenta (PANIP)

Placenta previa

Frequency varies between 0.25 to 0.8% of all pregnancies, and 20% of them are completely occlusive (total or partial). In 80% of cases the placenta previa is associated with multiparity.

Premature abruption of normally implanted placenta (PANIP)

The requency ranges from 0.5 to1.3% of pregnancies.

Nearly 40% of them are fatal for the fetus.

May be associated with hypertension (40%), short umbilical cord and a history of PANIP in previous pregnancies.

Other causes of bleeding

Less frequent causes of bleeding are cervical conditions including cervico-uterine cancer and uterine rupture.

The presence of hemorrhage demands a fast evaluation to allow a timely referral to the appropriate level of care.

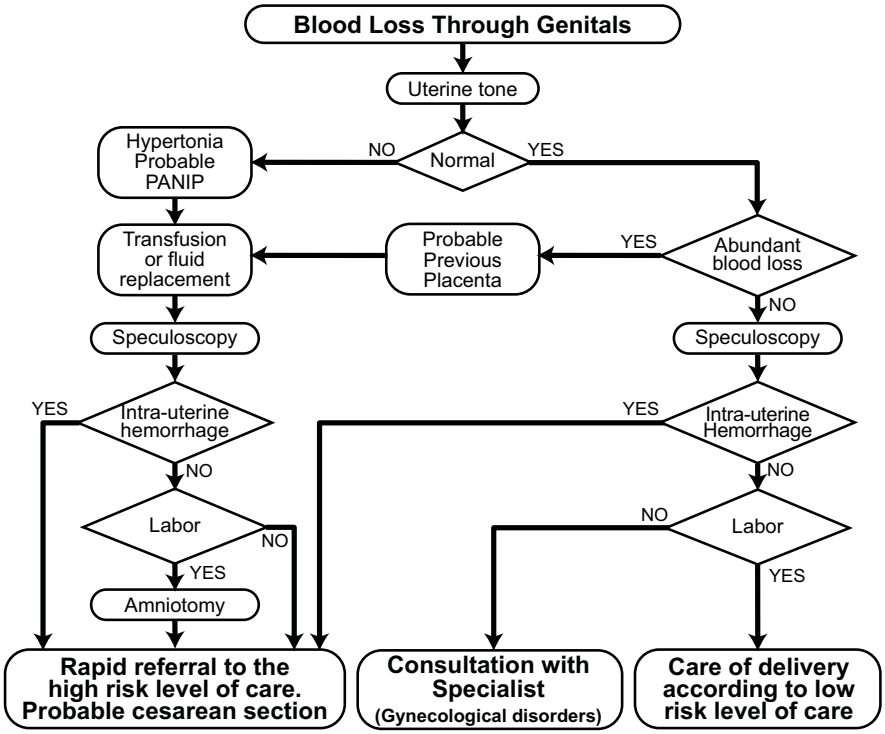

Fig 64 – Decision-making algorithm with proven blood loss through the genitals

Purulent discharges

They are generally related with infectious processes in the vulva, vagina or cervix, or may originate in an egg infection.

Vulvar and vaginal infections may infect the fetus during its passage through the birth canal. Membranes must be checked to confirm they remain intact, and the origin of the secretions should be specified through speculoscopy.

Evaluation of the presentation

Presentation types are identified through the digital vaginal examination. A hard and regular pole suggests a cephalic presentation. An empty basin or a large, soft and irregular pole, and a rebound of the uterine fundus or the flanks at abdominal palpation suggest a breech presentation or transverse lie, and the delivery will correspondingly be considered as high risk.

Height and variety of position of the vertex presentation.

Progress of delivery is evaluated according to the degree of engagement of the presentation, together with cervical contractility and dilation. Nulliparas usually initiate labor with the fetus's head engaged, and show an accelerated descent towards the end of the dilation period. On the other hand, dilation in multiparas usually starts with the fetal head insinuated or fixed at the time of complete dilation, which occurs during the expulsive period following engagement and rotation.

Two methods that relate the lowest point of the presentation with the pelvis are commonly used to assess the height of the presentation, they are generally known as the Hodge planes (for the European school) and the De Lee stations (for the American school).

Chart 29 Pelvic planes and their relationships with the height of the presentation

	Hodge Planes (European School)	**De Lee Stations** (North American School)
Upper rim of the puberal bone and promontory	I Plane	Station – 4
Lower rim of the puberal bone	II Plane	Station -2
Ischial spines	III Plane	Station 0
Vertex of the coxal bone	IV Plane	Station + 4
	Paralell planes	Planes perpendicular to the delivery canal

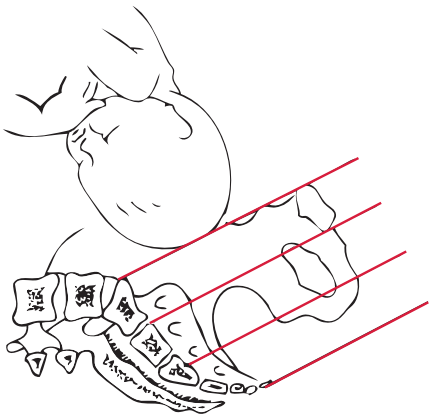

Figure 65. Hodge Planes

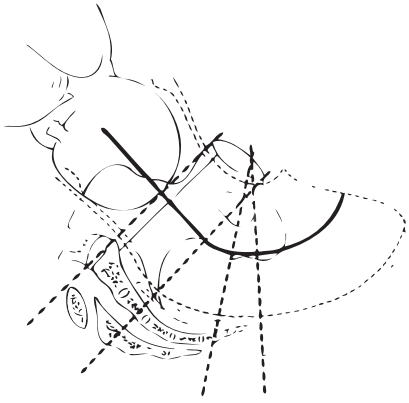

Figure 66. De Lee Stations

To diagnose the vertex modality of the cephalic presentation, the interparietal suture must be identified with the finger, which then slides until it reaches the posterior fontanel (minor occipital or lambda), which may be recognized because of its triangular shape and its smaller size compared to the anterior fontanel, (fronto-parietal or bregma), which is square and larger.

It may produce a delay in the fetal head descent in the posterior varieties, deflections and borderline degrees of fetal-pelvic disproportion. The variety of the position is defined according to the relationship between a fetal reference point (occipital in the case of the vertex modalities) and the mother's pelvis. Figure 67

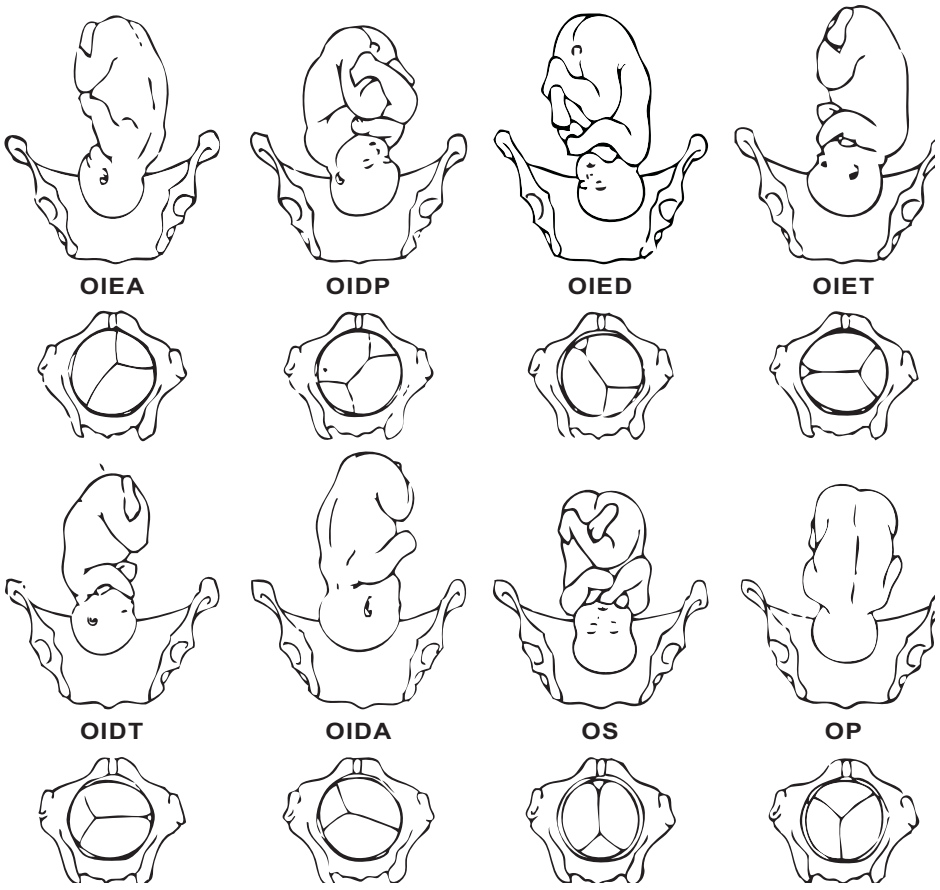

Figure 67. Varieties of positions in the vertex presentation. (O = Occipital, A = Anterior, P = Posterior, T = Transverse, I = Iliac, L = Left, R = Right)

Identification of the posterior fontanel allows the assessment of the degree of flexion, as it will be more eccentric with greater deflections. Figure 68

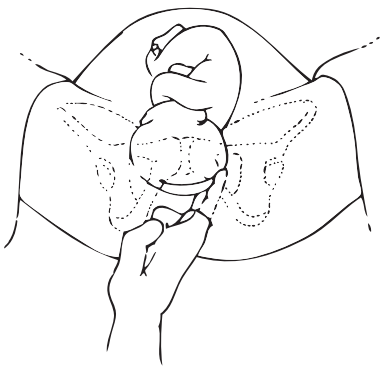

Figure 68. Identification of the posterior fontanel

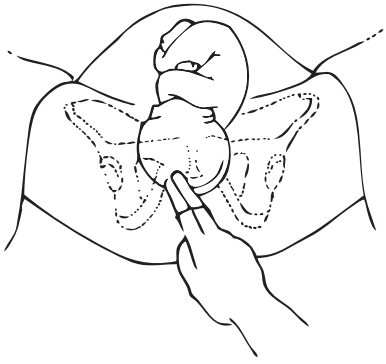

Figure 69. Identification of the anterior fontanel.

When it is impossible to identify the posterior fontanel while it is possible to feel the anterior fontanel, it may be due to an extreme deflection in a cephalic presentation with the face mode. This is-a high risk condition that requires referral to the appropriate level of care. Figure 69

In the face-first modality of the cephalic presentation it is possible to recognize the orbital arches, the eyes and nose. The diameter offered is mento-occipital, and measures 13.5 cm; this is the largest diameter of the cephalic pole, and consequently delivery (when successful) is extremely laborious and traumatic.

The face-first cephalic presentation is the maximal degree of deflection. It is associated with a flat pelvis and fetal malformations. It is diagnosed when the ciliary arches, eyes, nose, mouth and chin are identified during the digital vaginal examination.
Both presentations show the “axe-cut” sign during abdominal palpation.

Management
Dystocic presentations should be referred to high risk levels of care.

Assessment of the fetal-pelvic match and the mother’s pelvic capacity
Before birth, the size of the fetal head can only be estimated clinically in an approximate manner by evaluating the funal height, fetal size and the ratio between the fetal head and the upper inlet plane. The type of pelvis and its diameters may be assessed through the vaginal digital exam.

An engaged presentation is an indicator of compatibility for that specific fetus

If the proportion is slightly tight and does not constitute an obstacle for delivery, engagement will occur, but the course of labor will be slow and there will be a higher rate of deflection and asynclitism (borderline pelvis).

A pelvic disproportion is a contra-indication for vaginal delivery, and it may associate with a bulky amniotic sac and the corresponding risk of umbilical cord prolapse.

The digital exam permits an appraisal of the pelvis, trying to touch the promontory with the middle finger. When it is possible to feel the promontory, the radial aspect of the index is fixed against the symphysis pubis, indicating the point of contact. The distance between this point and the vertex of the middle finger is the conjugate diagonal or promonto-subpubic diameter; (fig. 70) it is 1.5 cm longer than the obstetric or promonto retropubic conjugate, that measures 10.5 cm. As the fetal biparietal diameter (BPD) at term is approximately 9.5 cm, a conjugate greater than 9.5 cm clearly shows that the vaginal delivery at term is feasible. Touching the promontory is difficult or impossible in the normal pelvis. The amplitude of the vagina and vulva, perineal relaxation and the length of the examiner’s fingers must be taken into account in the exam.

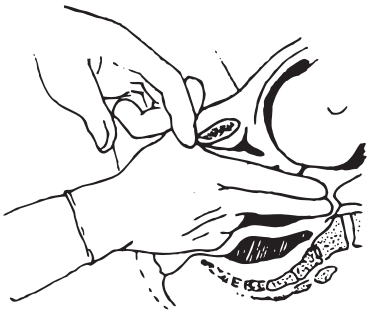

Figure 70. Internal pelvimetry measuring the diagonal conjugate or diameter

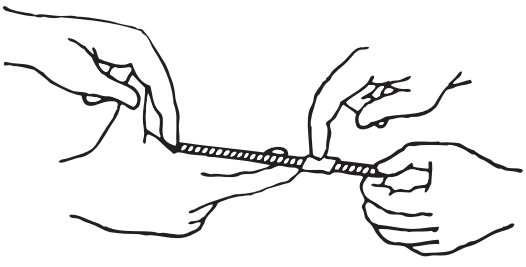

Figure 71. Confirmation of the measure of the diagonal conjugate

The fact that the promontory can be felt suggests a narrow pelvis; this must be confirmed with the measurements above.

Alter completing the genital exam, the appraisal of all the data allows:

- To diagnose labor
- To assess risk, deciding whether it is high or low
- Admission or referral, based on the woman's specific conditions

Management
If the genital exam does not show any pathological findings, the pregnant woman shall be admitted to receive standard low-risk care.
If the pregnant woman presents one of the following, she shall be referred to the high-risk level of care:

- Narrow or asymmetric pelvis
- Clear or suspected fetal-pelvic disproportion
- PROM > 12 hours or with signs of infection
- Pregnancy < 37 weeks of amenorrhea
- Hemorrhage
- Vaginal septa (transverse, stenotic)
- Other soft birth canal obstacles (previous tumor, large cysts, vaginal narrowing)

The following figure summarizes the decisions that must be taken during the complete el examination from admission to delivery.

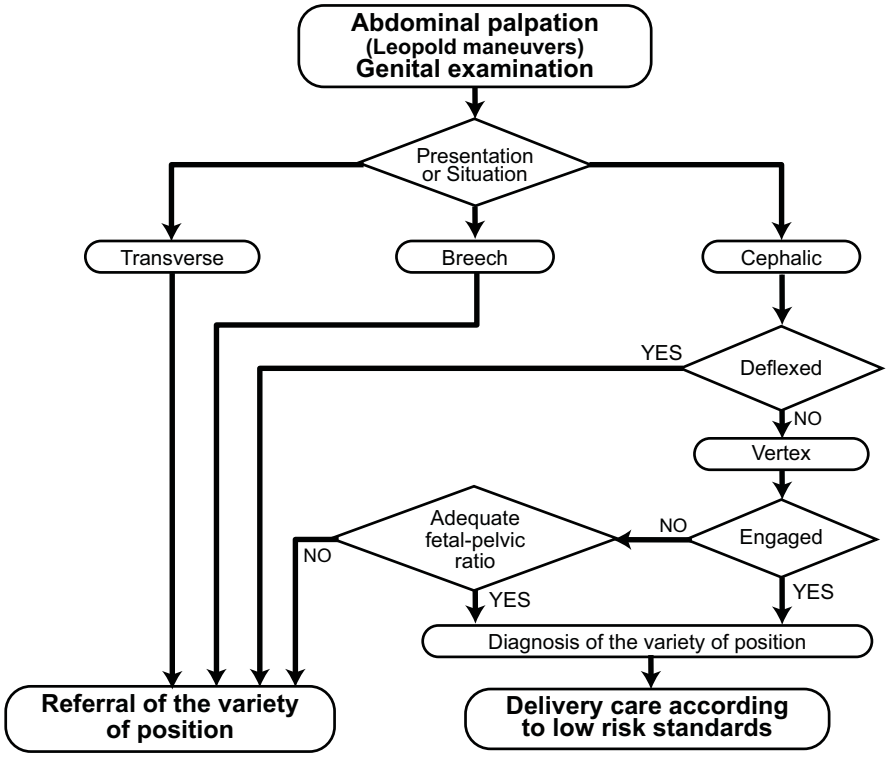

Figure 72. Decision-making algorithm according to diagnosis and height of the presentation, type of position and fetal-pelvic proportion.

Preparation of pregnant women at reception
Even with intact ovular membranes, prolonged labor increases the risk of infection.

The appropriate hygienic measures for the physical preparation of pregnant women reduce the risk of infection.
Women are recommended to take a shower on admission, and then to put on loose and clean clothes. Routine enemas and perineal shaving are not required at labor.

Delivery may be associated with a higher risk of infection under the following conditions:

- Poor maternal hygiene
- Poor hygiene at the health-care facilities
- Excessive vaginal exams or exams carried out with an inadequate technique
- Episiotomy, tears
- Prolonged labor
- Prolonged rupture of membranes

Care during the dilatation during the dilatation period (First period)

Objective *Control maternal and fetal wellbeing*
Detect and evaluate deviations from the physiological limits (progress of delivery)
Risk assessment and referral to the appropriate level.
Apply corrective maneuvers

Activity *Information for pregnant women*
Maternal controls
Obstetric controls
Record controls in birth chart with warning curves

Conservative care of normal deliveries seeks:

- To survey progression
- Not tp interfere with physiological and psychological aspects, avoiding unnecessary procedures
- To promote the mother´s active participation of the mother and accompanying family group
- To promote an early mother-child contact

Information for pregnant women

This should start at the preconception or prenatal visit, reinforcing it at every subsequent contact with the pregnant woman, who must also be reassured, avoiding shrillness or anxiety. Involvement of the spouse or other members of the family group during delivery should also be encouraged. The following contents should be stressed with the onset of labor:

- Information regarding labor.
- Recommendations regarding the mother's and her family's active participation
- Importance of the vertical position and perambulation during the dilation period
- Importance of hydration during labor

The information provided to the mother should be true and contribute to make her expect delivery without anxiety. Language should be adapted to her cultural level.

The active participation of the pregnant woman should be encouraged, making her aware of the changes she experiences, and urging her family to provide the adequate psycho-physical support required.
Free intake of fluids (preferably with sugar) should be recommended to reduce the risk of dehydration associated with the mother's increased physical activity and frequent hyperventilation.

Conservative management of delivery is the term used to describe the type of care that allows childbirth to occur naturally, avoiding any unjustified interventions.

Accompanying the mother during labor, most traditions include the presence of one or more persons accompanying the pregnant woman during labor and delivery.
The institutional care of childbirth poses certain constraints that have not yet been

overcome. The woman tends to be assisted exclusively by health-care personnel, and very often she has to stay alone during most of the dilation period. When the woman is not allowed to perambulate, she may feel more anxious; this is reflected in a higher requirement of pain-killers, sedatives and obstetric interventions such as oxytocin infusion, use of forceps, spatulas, vacuum or even cesarean section. Multiple controlled clinical trials have been conducted to measure the positive impact of accompaniment of labor and delivery by people outside the health team. In that respect, some specific studies have measured the positive impact of having a female companion from outside the family and the health team. Some investigators have proposed the name “Doula”, the Greek term applied to female servants that accompanied the parturient during labor in ancient Greece. All these studies conclude that the presence of a companion reduces the use of unnecessary interventions and results in better maternal and neonatal outcomes, and may even prolong breastfeeding. As a WHO/PAHO agency, CLAP/MRH recommends a number of practices that have proven to be beneficial for the woman and her future child; only two will be cited in this section:

- Emotional support by the health providers during labor and delivery
- Respecting the woman´s choice of company

Recent randomized clinical research indicates that in the services marked by strong obstetric interventions the companion cannot impact on the obstetric outcomes.

Maternal controls

Make sure the parameters below are monitored to prevent the occurrence of hemodynamic unbalance:

- The woman´s pulse
- Blood pressure
- Axillary temperature

These controls shall be carried out between contractions every 4 hours. If symptoms such as:

- Dyspnea
- Fainting
- Headache
- Photopsias
- Acuphens, etc.

Make sure the conditions below are met during controls:

- Place the parturient in the left lateral recumbent position
- Strict FHR surveillance
- Repeat the control every 30 minutes.
- If there is hypotension, consider infusing a saline solution.

If there are signs or symptoms suggesting severe preeclampsia, shock, cardiovascular disorder or high fever, the patient’s risk must be considered as high. In this case, the course of delivery will be evaluated with a view to eventually referring the woman to the appropriate level of care. Referral will also be required if the procedures recommended fail to correct the situation, or if FHR disorders or uterine hypertonia were associated. Spontaneous micturition will be encouraged to avoid bladder catheterization.

Obstetric Controls

Labor is a dynamic process and its normal course may be altered at any time. This requires the assessments below:

Uterine Contractility should be checked during 10-minute periods at 30- to 60-minute intervals, according to the criteria detailed in the admission chapter.

Fetal Heart Rate should be controlled every 30 to 45 minutes.

Duration of delivery: Table 9 shows the duration of the cervical dilation period in minutes, going from 4 or 5 cm up to 10 cm in a population of low-risk healthy mothers giving birth to singletons at term. All cases had cephalic presentation, had no cephalo-pelvic disproportion, and all deliveries started and ended spontaneously and with no medication; the mother´s position, parity and egg membranes status were considered.

Table 10. Duration of labor in minutes, according to maternal position, parity and membrane status

	Ruptured membranes at 4 - 5 cms			Preserved membranes up to 10 cm					
	Horizontal position			Horizontal position			Vertical position		
	P 2.5	P 50	P 97.5	P 2.5	P 50	P 97.5	P 2.5	P 50	P 97.5
Nulliparas	40	165	550	60	225	600	40	147	468
All parities	25	130	520	45	180	540	25	135	435

Significant evidence suggests that labor is more physiological when the mother is allowed to freely adopt the vertical position during the dilation period, and the advantage seems to be reside in the fact that:

- the angle between the fetal axis and the pelvic inlet favors engagement
- contractions are more intense and effective
- the woman is more comfortable and feels less pain
- duration of labor is shortened

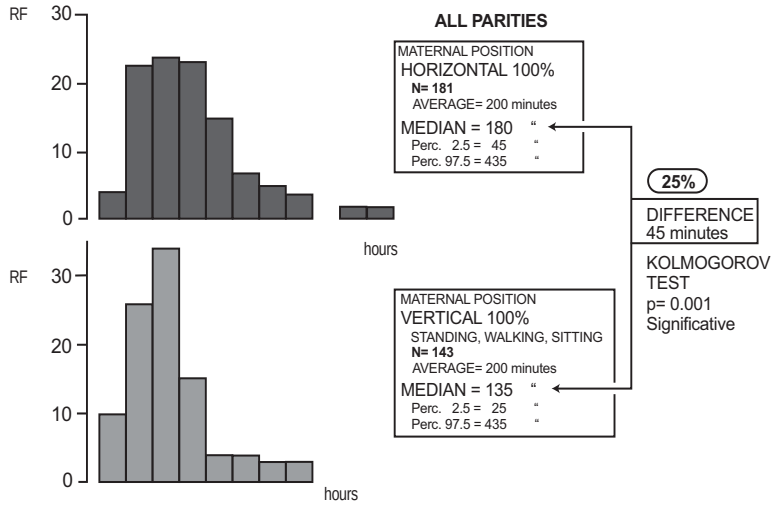

Figure 73. Duration of the dilation period (between 4-5 cm and 10 cm dilation)

The vertical position in itself, with no further maneuvers, shortens the duration of labor by 25% (Figure 46). This has no impact on the time of spontaneous rupture of membranes or on the frequency of the cephalic modeling (particularly on the serohematic sac when the membranes are intact) and promotes the internal rotation of the head.

If the mother chooses the horizontal position, it must be lateral recumbent, preferably left, to prevent the possible occurrence of maternal hypotension, which would increase the risk of fetal hypoxia

.

Amniotomy shortens the duration of labor, but is associated with a number of risks for mother and child.

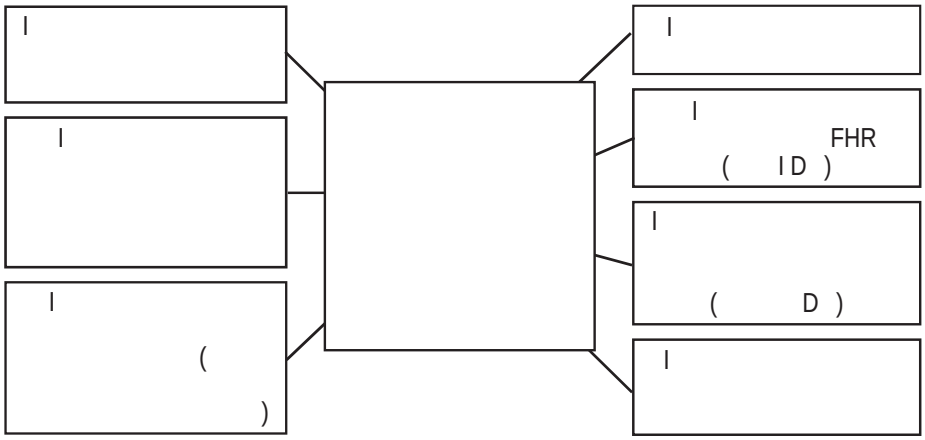

Figure 74. Early amniotomy during normal delivery

The duration of labor may be shortened by staying in vertical position. Amniotomy is not indicated as a routine procedure in normal labor.

It should only be prescribed if the following complications appear:

- Prolonged labor (alter ruling out fetal-pelvic disproportion and hypodynamia)
- Need to shorten labor due to maternal-fetal disorders not amenable for referral to high-risk level care
- Polyhydramnios
- Hemorrhage due to marginal placenta previa.
- Placental abruption of normally inserted placenta.
- Dead fetus or fetal malformation not amenable for referral

Progress of dilation and descent of the presentation

Progress is assessed through the genital exam. The examination of the vaginal route must be carried out with all due care to rupturing the membranes.

The progress of dilation is not a linear function, and it does not occur at a constant pace. Four to 5 cm are effaced in two thirds of the total dilation time, and the complete dilation is reached in the remaining third (figure 78). This normal pattern may be accelerated or prolonged.

The descent of the presentation is also a progressive phenomenon that is accelerated towards the end of the dilation period. It may be influenced by the:

- Variety of position
- degree of fetal head flexion
- degree of fetal-pelvic match
- parity
- maternal position
- egg membrane status

Dilation and descent are intimately related processes that should be assessed simultaneously.

The CLAP/MRH has developed the Partogram (figure 78), a form designed to plot the course of labor that complements the PCR. The values previously recorded in the PCR are transferred to this page. The Partogram is an instrument that facilitates a rapid assessment of the course of delivery, and is therefore much appreciated for teaching and supervision of the quality of care.

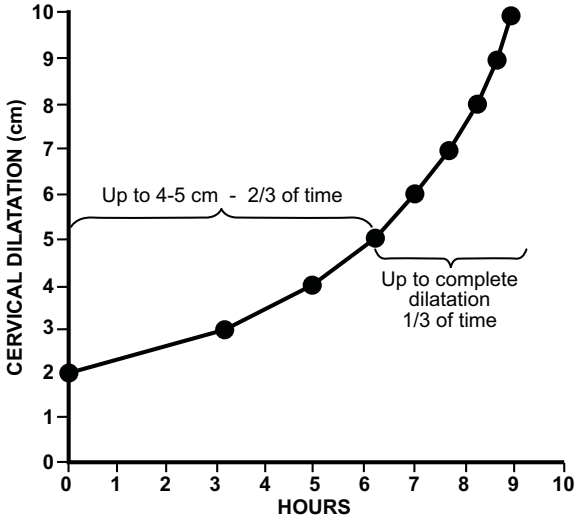

Figure 75. Dilation of the cervix as a function of labor time

Partogram with warning curves

This is a surveillance system for the prevention of protracted delivery and the prevention of interventions that may not always be timely, such as oxytocin stimulation or cesarean section. It is one of the indispensable instruments to evaluate the quality of care during childbirth, and at the same time, a practical tool to survey the progress of delivery in individual cases.

The curves show the course of cervical dilation as a function of time, marking a limit (percentile 10) that includes 90% of all normal deliveries. They serve as an early warning in cases where a certain limit is exceeded, indicating a slowing down that requires further surveillance to rule out a potential dystocia. Therefore, they provide enough time to either correct the anomaly on site or to allow a timely referral.

The warning curves present the period between cervical dilation from 4 – 5 cm up to the end of delivery. The values were obtained from two prospective studies conducted by CLAP/ MRH, including 1188 low-risk, medication-free deliveries, with spontaneous initiation and ending, with normal and vigorous newborns.

To establish the normal curve pattern, some characteristics of the population that could impact on the course of dilation were analyzed previously. The sample was subdivided according to parity, maternal position during labor and condition of the egg membrane. Parities were: nulliparae (no previous delivery) and multiparae (one or more previous deliveries). The position during the dilation period was vertical (90% to 100% of the time sitting, standing or walking) or horizontal (100% in bed). According to the status of the membranes, with a cervical dilation of 4-5 cm, the group was divided into ruptured and intact membranes.

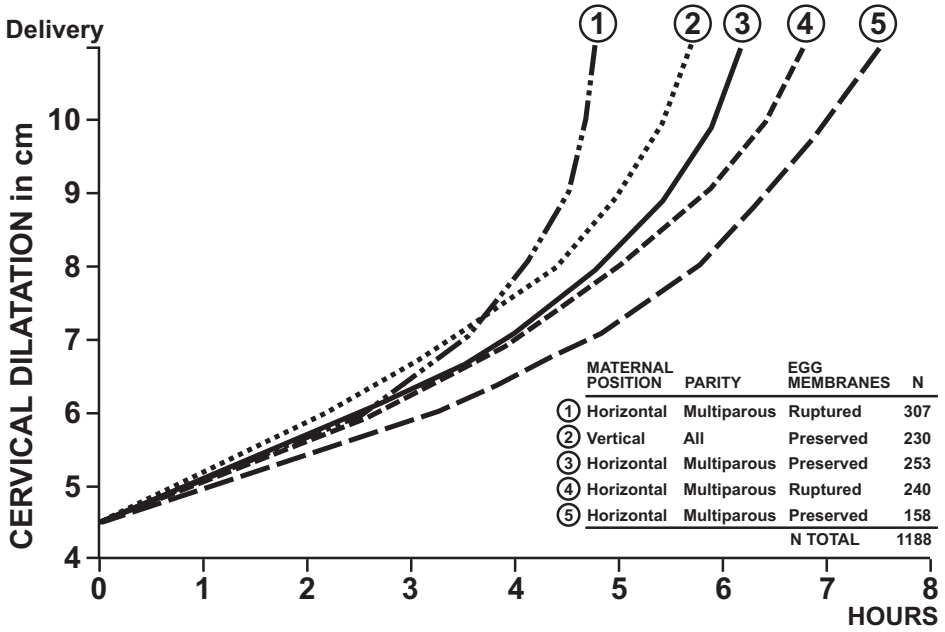

Figure 76. Patterns of cervical dilation as a function of time (P10).

In a population of African women, Philpot described only one warning curve. However, the advantage of developing several warning curves based on those five groups is that it increases the chances of locating the individual case within a normal pattern that reflects that individual's expected behavior as faithfully as possible (figure 77).

This Partogram form with values (P10) is used to draw the warning curves according to each situation. (figure 78)

MATERNAL POSITION	UPRIGHT	LYING			
PARITY	ALL	MULTIPARAS		NULLIPARAS	
FETAL MEMBRANES	IN-TACT	IN-TACT	RUPT.	IN-TACT	RUPT.
DATA TO PLOT THE ALERT CURVES * p10 hours	0:15	0:15	0:05	0:30	0:20
	0:25	0:25	0:10	0:35	0:35
	0:35	0:40	0:25	0:40	0:50
	1:00	0:55	0:35	1:00	1:05
	1:15	1:25	1:00	1:30	1:25
	2:10	2:30	2:30	3:15	2:30

Figure 77. Values used to build the warning curves (P10).

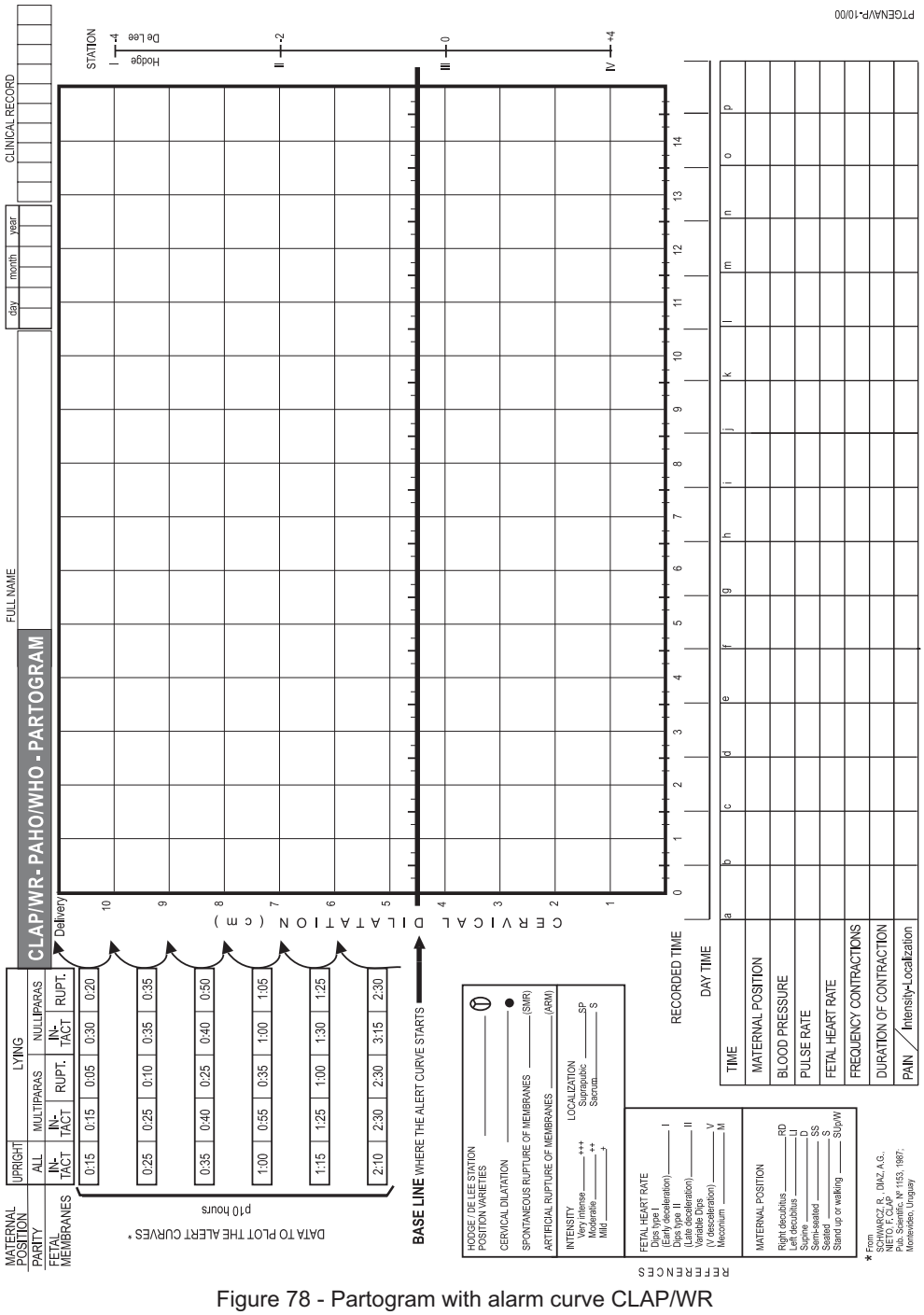

Figure 78 - Partogram with alarm curve CLAP/WR

Procedure used to plot cervical dilation and the warning curves

The data used to build the standard warning curves was obtained after 4 – 5 cm of cervical dilation (first reliable starting point for measurement with the vaginal digital exam). Hence, the curve chosen for each labor will be plotted after reaching or surpassing 4-5 cm of cervical dilation (baseline).

The left upper part of the Partogram shows a table with values corresponding to percentile 10 of the time during which each of the 5 previously mentioned subgroups increased dilation from 4-5 cm to 6, from 6 to 7, from 7 to 8, from 8 to 9, from 9 to 10 and from 10 to delivery.

Drawing of the warning curve is started when the dilation curve crosses the baseline. This intersection between both curves will be the starting point of the warning curve. The observer may then use the tables printed in the partogram to choose the values corresponding to those obstetric situations. After selecting the alternative best suited to each individual case, the values of the chosen pattern are marked starting from the baseline, at the point where it is crossed by the corresponding dilation curve.

Early Admission

In the example, recording of the data obtained in a nullipara with intact membranes and in horizontal position was started at 14:30, real time. The digital exam at that time showed a 3-cm cervical dilation. The point corresponding to this first observation was marked at the start of the recording. Spontaneous rupture of membranes was observed at 16:00 hs, real time, and the digital exam found a 4-cm dilation. A new point was marked in the intersection of the x-axis in the real time 16:00 (1:30 hour since recording was started) with the y-axis at 4-cm dilation (figure 54).

The line joining the points at 3 cm and 4 cm shows the progress of cervical dilation.

IIn the subsequent obstetric examination carried out at 18:00 hs real time, at 3:30 hs since the onset of recording in the Partogram, cervical dilation reached 6 cm.

It is clear that the intersection between the dilation curve and baseline occurred 2:00 hs after the Partogram recording was started. This is the starting point for drawing the warning curve at 4,5 cm of cervical dilation. (fig. 79)

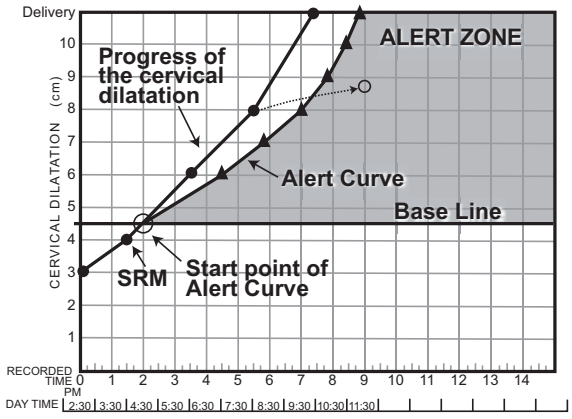

Figure 79. Example with early admission

The values corresponding to this case will be extracted from the table (horizontal position, nullipara, ruptured membranes). To start drawing the warning curves in the present case, mark a point corresponding to 6 cm of dilation, 2:30 hours after the point of departure. From this new point, mark the point corresponding to 7 cm 1:25 hs later. From there, mark the one corresponding to 8 cm 1:05 hs later, and proceed the same way until delivery is completed.

In the present case, both labor and delivery showed a normal course, and the cervical dilation curve remained to the left of the warning curve.

In the other case shown in figure 79, the dilation rate slowed down at 8 cm, and the plotted values intersect the warning curve (broken line). In this case, the conditions on admission were the same as in the previous case; at 23:30 hs real time and 9 hours after starting the recording in the Partogram, prolonging labor became apparent. Alerted by this surveillance system, the health team reviewed the case and managed to implement appropriate and timely measures.

Late **Entry**

Figure 80 shows a nullipara with intact membranes in horizontal position, entered in the registry with a 5-cm dilation.

The warning curve was initiated after that first digital exam. The curve was drawn with the values found thereafter.

Contrary to the previous example, when dilation is ≥ 5cm on admission, the starting point of the warning curve will always be the first value of cervical dilation marked in the warning curve

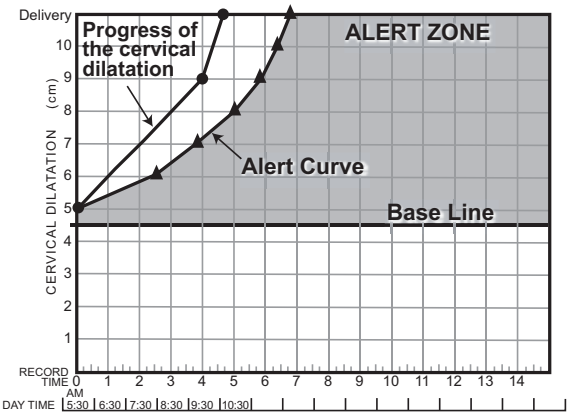

Figure 80. Example with late admission

Changing conditions during labor

If the conditions observed during admission change during the course of labor, the initial warning curve will have to be updated.

Figure 81 shows the case of a multipara in horizontal position and intact membranes. She was entered in the Partogram registry at 9:00 hs. with 4 cm of cervical dilation and reached 6 cm two hours later.

The dilation graph cut the baseline 30 minutes after initiating the Partogram. This case's appropriate warning curve was drawn thereafter.

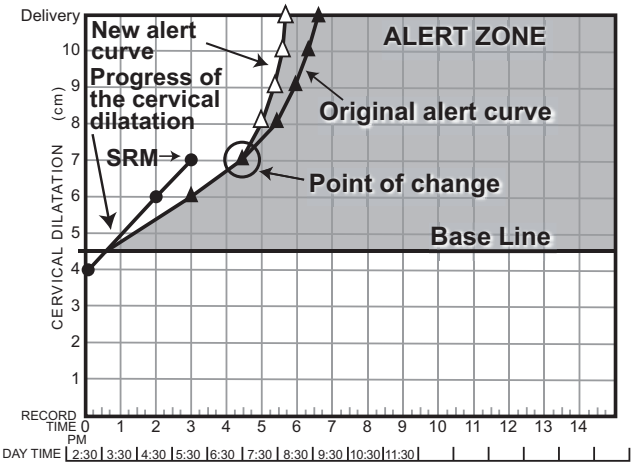

Figure 81. Example for changing conditions

As the membranes ruptured spontaneously at 7 cm, it was necessary to draw a new warning replacing the previous values for those of a multipara in horizontal position, but with ruptured membranes.

The drawing of the new warning curve was started at the 7cm level, where the rupture of membranes was confirmed. This last warning curve was the most suitable for the new situation.

To facilitate the construction of the warning curves, CLAP/MRH has designed a plastic template with 5 curved stencils for the abovementioned patterns. By placing this template over the Partogram form, the warning curve selected for the case can be drawn in a few seconds (figure 82).

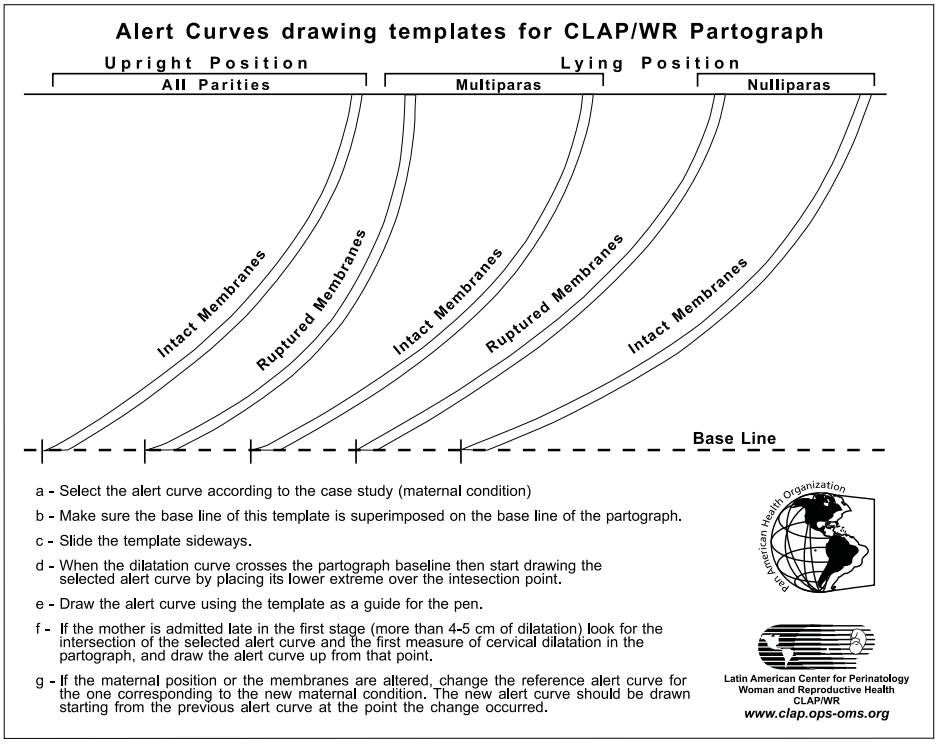

Figure 82. Slotted plastic template to draw the warning curves

Other useful elements of the Partogram for surveillance of labor and maternal – fetal conditions.

In the central grid of the Partogram, and apart from the cervical dilation and its corresponding warning curve, one can record height of presentation, variety of position, condition of the membranes, uterine contraction frequency and fetal heart rate. (fig. 78)

The lower grid of the Partogram is used to record blood pressure, pulse and maternal position, contraction intensity and pain, etc.

Prolonged labor

A prolonged labor causes physical exhaustion in the mother, increasing anxiety and the frequency of fetal distress and obstetric trauma (chart 33).

The protraction of labor is generally due to one or more of the following causes:

- Immature or pathological cervix
- Hypodynamia
- Iatrogeny (inadequate use of sedatives, pain-killers of conduction velocity anaesthetics).
- Presentation dystocias
- Fetal-pelvic disproportion

Chart 30. Management of the dilation period

Condition	Management
Normal course	Observation without maneuvers or medication or transportation to the delivery room.
Hyperdynamia	Change in position and utero-inhibition. Referral to high risk care
Hypodynamia	Stimulation with oxytocin
Fetal bradycardia Dips II	In utero treatment of fetal distress. Referral to high risk care
Fetal tachycardia	Lateral recumbent
Variable Dips Dips I with intact membranes	More frequent control of FHR
Prolonged delivery (as per warning curve)	Reassess history of cervical abnormalities, fetal pelvis proportion and contractility; correct hypodynamia; control in one hour. If it fails to progress, amniotomía: refer to high-risk care
Genital hemorrhage	Follow specific standards, amniotomy. Referral to high risk
Meconium-stained amniotic fluid	Increase frequency of control. Immediate suction of the NB

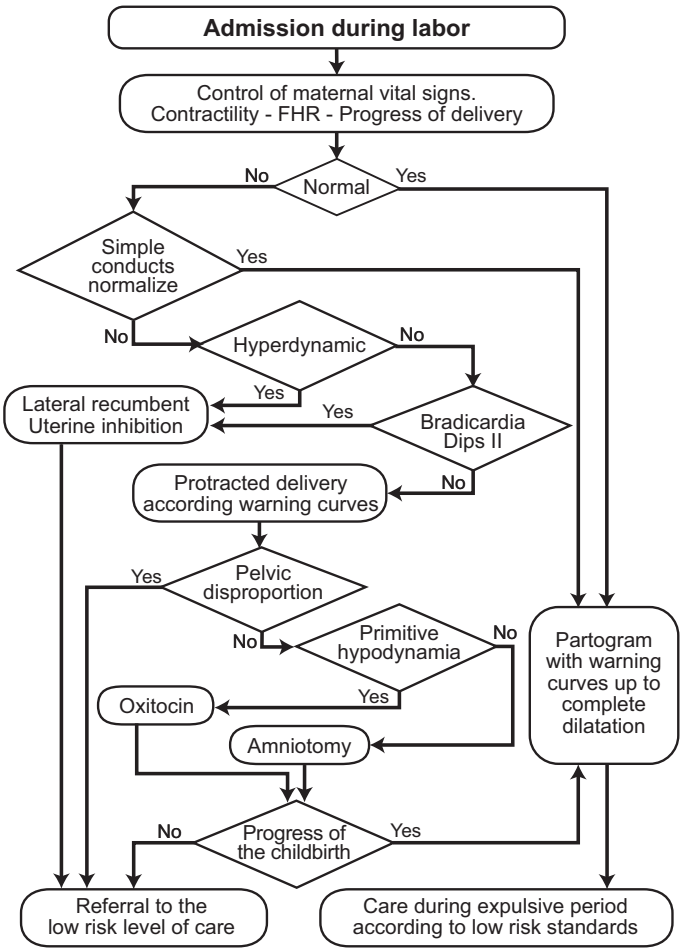

Figure 83. Decision-making algorithm during the dilation period

Care during the explusive period (Second period)

Objective *Detect and assess deviations from the physiological limits of the expulsive period*
Prevent obstetric trauma
Prevent fetal hypoxia

Activity *Control FHR*
Control contractility
Control the progress of the presentation and abruption

Aseptic standards will be rigorously followed.

During the expulsive period there are still hazardous situations that should be anticipated, and non physiological changes should be corrected, if they occur.

A prolonged expulsive period may be due to:

a) Hypodynamia
b) Mother bears down ineffectively
c) Head rotation defects
d) Undiagnosed fetal-pelvic disproportion

Obstetric trauma may produce in the mother:

- Vaginal-perineal tears
- Cervical and segmental tears
- Uterine rupture

Obstetric trauma in the fetus may cause:

- Fetal distress
- Marked cephalic (parieto-fronto-occipito) bone malalignment
- Cephalic bone overlap
- Sero-hematic mass or excessively large caput succedaneum
- Cephalohematoma
- Intracraneal bleeding
- Fractures
- Paralysis
- Tegumentary lesions

Expulsive period

Some of the complications mentioned may be overcome in low-risk conditions, either preventing them or through the timely adoption of corrective measures. Others cannot be overcome without implementing maneuvers or interventions beyond the low risk standard, and must be carried out by a well-trained professional (cesarean section, forceps, etc.).

Timely diagnosis of the fetal-pelvic disproportion prevents:

- Detention of expulsion
- Mother-fetal trauma
- Fetal distress

Mothers usually bear down spontaneously and adequately for fetal expulsion, when it is synchronic with the uterine contraction. Guided pushing should be avoided when it forces the mother to prolong the Valsalva maneuvers beyond the contraction, because it may lead to maternal exhaustion.

Adequate perineal protection prevents tears.

Routine episiotomy is not recommended as a rule, and its use should be limited to women in labor with a very resistant perineum that can get torn.

Controlled clinical trials have shown an increased number of anterior perineum tears when the use of episiotomy was restricted, as compared to liberal use. On the other hand, posterior perineal trauma was less frequent in the restricted group when compared with the liberal group. A three-month follow-up showed no significant differences in spontaneous pain, time of onset and pain during sexual intercourse, and urinary incontinence.

Preparation

Asepsis standards shall be strictly followed during the expulsive period. An adequate preparation requires:

- Clean clothes
- Sterile instruments to assist birth.
- Sterile gloves
- Chemical hand-washing
- Perineal asepsia
- Sterile surgical field

Position of the parturient

Both the litotomy (lower limbs hanging and/or tied at the ankles) and the classical gynecological positions should be avoided. Choose among the following positions:

- Tilted (110 to 120º angle tilt between head and foot of delivery bed)
- Sitting (on the delivery bed with the back-support at right angles or on chair)
- Squatting (hinders fetal heart auscultation and perineal protection)

Controls to be carried out during the expulsive period:

FHR every 5 minutes between contractions. Reductions of up to 100 to 110 fetal heart beats per minute are normal during the expulsive period due to head compression. A sustained FHR of less than 100 beats per minute between pushes suggests fetal distress. (figure 59)

Efficacy of uterine contractility and maternal bearing down

Both contractility and bearing down should be monitored constantly. The progress of descent and head rotation indicates normality when there is progression.

General management

a) Primitive hypodynamia should be treated with oxytocin stimulation (Chart 29). In secondary hypodynamia, when indicated, use oxytocic agents (after ruling out contraindications)
b) Encourage spontaneous maternal bearing down at the appropriate time (together with the contraction) and avoid exhaustion
c) Encourage adequate ventilation and relaxation between contractions

Amniotomy

Amniotomy is indicated if there is no descent and rotation 15 minutes after completing dilation in nulliparas, or 10 minutes in multiparas (in the presence of maternal bearing down), but only if the cephalic pole is occupying the whole pelvic cavity (fixed or engaged presentation).

Amniotomy technique

Proceed as follows: with the strictest asepsis, introduce an instrument with a sawed tip (e.g., amniotome or one side of a Kocher clamp) between the index and the middle finger of the hand carrying out the palpation, up to the sac and open it with the serrated tip of the one arm of the clamp .

Perineal protection

Perineal protection is the main preventive measure to avoid tears. (figure 85) The risk of tears depends on:

- parity
- tissue elasticity
- fetal size
- expulsion rate

When the assessment deems that these conditions increase the risk of tear, it is necessary to carry out a perineal infiltration with local anesthesia before the detachment starts in order to carry out the episiotomy later.

The episiotomy shall be done at the time of the perineal distension by the cephalic pole (when the mother bears down) diagonally towards the ischiatic tuberosity, including the section of all tissue of the labia majore. The section is deep and proportional to the extension of the vulva required. Mediolateral episiotomy is preferred.

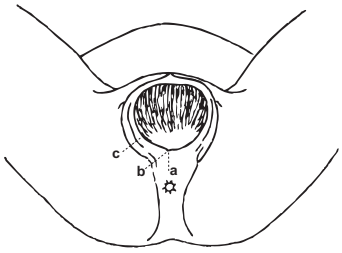

Figure 84. a) medial,
b) mediolateral
c) lateral

Advance of the presentation and detachment

- Allow the progress of the presentation, maintaining the flexion until the suboccipito-bregmatic circumference has passed the distended vulvar ring
- Instruct the mother to pant and not bear down right then
- Slow down the detachment, placing the left hand to support the presentation so that the deflection occurs slowly, gradually distending the tissues to prevent tears. Later instruct the mother to push slowly

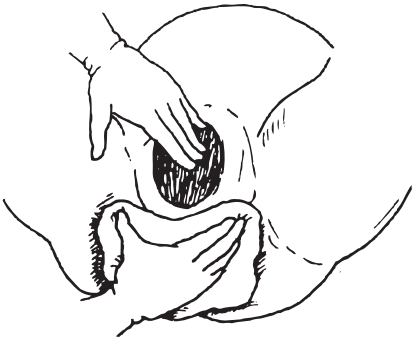

Figure 85. Perineal protection

- Place a dressing with the right hand over the perineum, supporting it between the thumb and the remaining fingers of the hand. Support the presentation to prevent its sudden progress and deflection. Bring the lateral perineal tissues towards the perineal raphe, as if puckering them to reduce tension (figure 85)
- End the detachment slowly when the forehead, the face and chin come out. Instruct the mother again not to push

Although the rest of the body often detaches spontaneously, the final exit is usually aided. To this aim, once the head has detached and rotated spontaneously towards its primitive position (external rotation of the head), it is necessary to check if the umbilical cord is not wrapped tight against the neck; if this is the case, slide it over the head or shoulder. If the tension of the cord does not allow this, immediately section the cord between two Kocher clamps.
Take the head with both hands holding the parietal bones in the anterior and posterior and gently pull downwards first to descend the shoulder in anterior position at the same time until it passes the pubis, and immediately reverse the direction of traction, now pulling upwards to detach the posterior shoulder. The rest of the body is easily expelled, as it is less bulky than the segments that are already detached; the fetus should be held back to avoid sudden movements.

The anterior shoulder must necessarily descend deeply before continuing with the traction; if this is not the case, it will be retained behind the pubis and cause fracture of the clavicle or elongation of the corresponding brachial plexus. (figure 86).

Figure 86. Manual aid to detach the shoulders

Special situations **Shoulder Dystocia**
Breech Delivery

Shoulder Dystocia

This is a potentially severe condition characterized by the detention of childbirth after the head has exited.

Diagnosis

The usual maneuvers used to release the anterior shoulder have failed.
The following maneuvers must be carried out when shoulder dystocia occurs, with the anterior shoulder impacted behind the symphysis pubis:

- If you have not done an episiotomy, do it now; if you did a small one, extend it
- With the woman in labor is in the dorsal recumbent position, ask her to flex her legs firmly
- Request an assistant to compress the supra pubic region trying to release the anterior shoulder and drive it towards the vagina
- Always apply a firm and continuous traction pulling downwards (fig. 86)
- If you do it too energetically you may produce paralysis of the brachial plexus
- If these maneuvers fail, attempt a careful rotation carrying the shoulder in the anterior position backwards (towards the back of the fetus), this usually manages to release it (figure 87). Applying pressure in the anterior shoulder of the fetus towards its chest may contribute to its rotation and detachment

Failure of this maneuver forces the need to try to extract the arm in posterior position:

- Introduce the hand corresponding to the fetus' abdomen in the vagina
- Press the antecubital fossa of the posterior arm; this will produce a descent of the forearm that should be held and carried through the child's chest until it exits. (fig. 88) This will reduce the fetal diameter presented to the pelvis and allow the release of the anterior shoulder

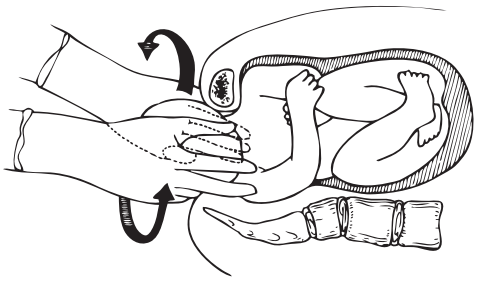

Figure 87. Rotation Maneuver in shoulder dystocia

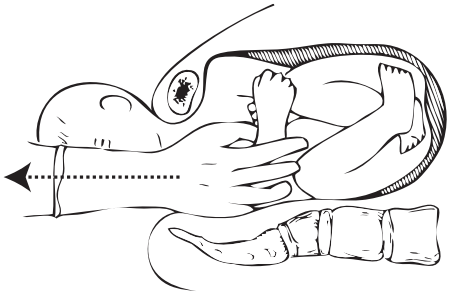

Figure 88. Posterior arm release

If all these maneuvers (carried out in barely 2 minutes) fail, proceed to fracture the fetal collarbone.

The fetal clavicle will sometimes be accidentally fractured during the traction maneuvers. This should be explained to the mother, and not be hidden from her, as it could contribute to save the life of the retained fetus.

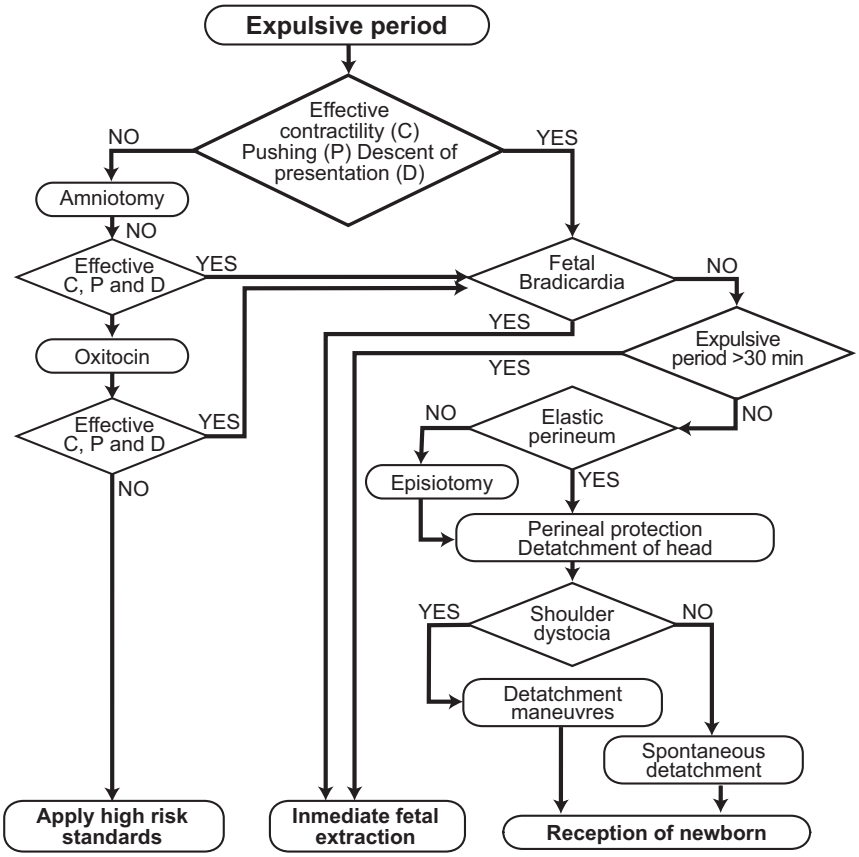

Figure 89. Decision-making flow chart during the expulsive period

Assistance in breech presentations

There is evidence stating that cesarean section is safer in the case of a breech presentation as compared to a vaginal delivery.

But sometimes there is no choice and we must assist childbirth with this presentation. The best outcomes will be obtained when the caregiver remains calm and intervenes when necessary with delicate and precise maneuvers. Before starting, systematically place a catheter in the bladder keep it empty during the procedure. If there is a forceps available, keep it ready at the delivery table, in case there is head retention.

It is important to try and preserve the membranes intact until dilation is complete; if the membranes rupture, check to make sure there is no cord prolapse; also assess the modality of presentation.

Maternal bearing down will be avoided until total cervical dilation is confirmed and the presentation enters the vagina.

Detachment of the lower limbs

- Try to avoid pulling the limbs; place one hand opposing resistance to the detachment of the presentation as soon as it reaches the perineum
- Make a wide episiotomy and allow expulsion of the buttocks until the back appears
- We recommend to avoid bearing down until the buttocks have been expelled spontaneously as a result of contractions

- Once the buttocks have become detached, wrap the fetus' abdomen with a tepid gauze
- The active phase of the obstetrician's participation commences when the fetal umbilicus appears; the obstetrician must then pull the cord and a make a loop
- If the legs do not exit spontaneously, extract one leg at a time delicately, flexing the knee and pulling from the ankle.

Detachment of the upper limbs:

- When the angles of the shoulder blade appear the woman will be allowed to bear down. Occasionally maternal pushing will be enough to expel the shoulders. If the expected result is not obtained in two or three pushes, the Bracht maneuver should be used (this maneuver has the advantage of serving simultaneously for shoulder and head detachment, and does not require the introduction of the hand into the vagina). Meanwhile the assistant compresses the fetal head against the pelvis. The operator shall hold the fetus by the trunk and thighs, compressing the thighs over the trunk, lifting the fetus without pulling and making it swing around the maternal pubis in the direction of the mother's womb

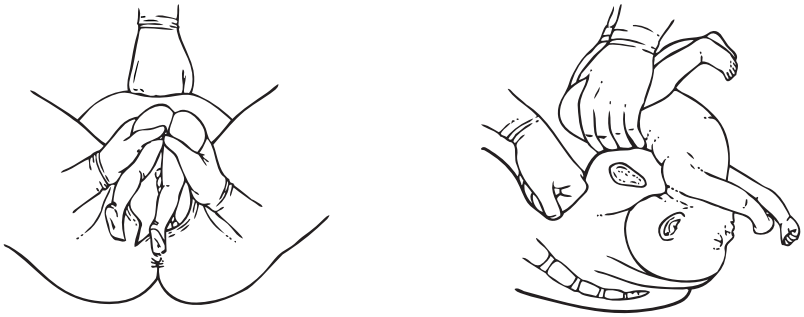

Figure 90. Bracht Maneuver

- If the Bracht maneuver fails to detach the shoulders, proceed to perform Rojas' maneuver: holding the fetus' thighs delicately and fixing the thumbs of the sacrum try to make the fetus rotate, apply a slightly descending traction to obtain the detachment of the posterior shoulder; once this has occurred, swing in the opposite direction to detach the anterior shoulder

Figure 91. Rojas Maneuver, 1st part

Figure 92. Rojas Maneuver, 2nd part

- The Pajot Maneuver is also helpful to detach the shoulders;it requires raising both ankles, using two fingers to detach the posterior shoulder and then take the fetus down to detach the anterior shoulder

- When the arms are raised behind the head of the fetus it is necessary to introduce the hand inside the vagina to flex the elbow and descend the arm in front of the face of the fetus towards the chest

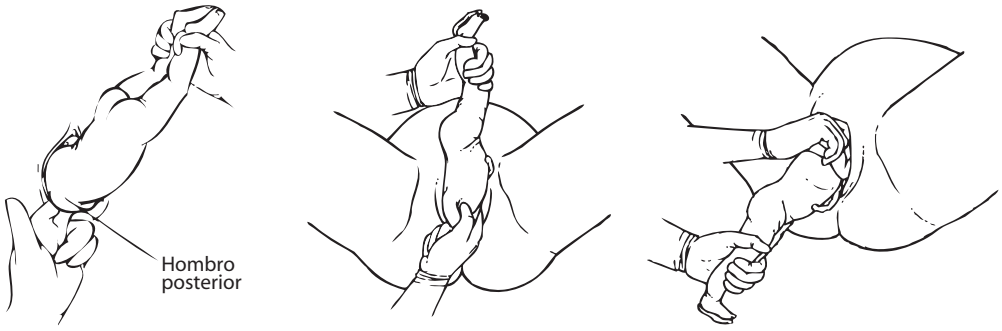

Figure 93. Detachment of the arms located over the presentation

Detachment of the head:

- When the Bracht Maneuver is not effective to detach the head, the assistant must maintain pressure on the fetal head above the pubis towards the vagina, to aid in the descent of the head and prevent deflection
- Support the fetus with the mouth looking down, riding on the forearm of the operator's most skillfull hand (Moriceau Maneuver)
- Place the index and middle finger of the hand holding the fetus inside the fetus' mouth, pulling the mandible towards the chest of the fetus to flex the head
- The index and middle fingers of the other hand will rest like a "fork" against the fetus's shoulders, without pulling
- Pull delicately while the fetus is raised towards the mother's abdomen

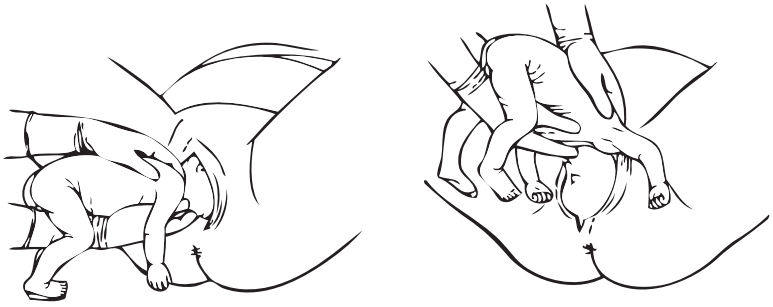

Figure 94. Moriceau Maneuver

- If these maneuvers fail we recommend applying a forceps to the head last. An assistant will raise the fetus holding it by the ankles; the operator shall apply both blades of the forceps from the ventral aspect of the fetus trying to do so symmetrically. Then he shall pull, first downwards to descend the head, and finally upwards to detach it. See figure 95

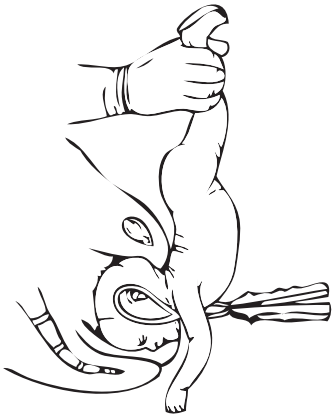

Figure 95. Applying the head forceps of head last

Assisting the infant in the Delivery Room

We now summarize a series of steps for the immediate care of the normal newborn; all these issues and others may be found in further detail in chapter V (Caring for the Newborn).

- After delivery, place the infant on a surface covered with a soft cloth below the level of the mother, or on her thighs in a cesarean section
- Drythe newborn's face and body, and cover it to prevent it from getting cold
- Confirm it breathes normally
- Suction only when there is meconium and the infant has not breathed yet; if it breathes before suction it will not be useful to do so
- If everything is normal (there is no asphyxia), cut the umbilical cord only after checking it has stopped pulsating or does so almost imperceptibly and the cord is flaccid
- Place a gauze soaked in alcohol around the cord stump to help it dry as fast as possible

Cord ligation technique

Aseptic standards shall be carefully followed. Place a clamp (e.g. a Kocher clamp) firmly at 2 or 3 cm from the fetal umbilical insertion and another clamp at the same distance but towards the placenta. Cut with scissors between both clamps. The fetal lasso clamp will be replaced by a plastic clamp or ligation with thick sterile thread (make sure the clamp is closed firmly, or tie the thread with a surgical knot and leave it tight).

Other interventions that should be carried out immediately after receiving the newborn are:

- Prevention of gonococcal ophtalmia, following the country's guidelines (different options are described in chapter V)
- Prevent the hemorrhagic disease of the newborn following the country's guidelines or the recommendations detailed in chapter V

Recommendations regarding the use of medication during low-risk childbirth

Childbirth is a natural physiological process, hence no medication should be routinely prescribed. Medication is only required for the prevention and treatment of complications.

The usual reasons for using medication are:

a) intense pain and anxiety
b) uterine contractility disorders
c) acute fetal distress

a) Intense pain and anxiety

They can usually be managed through:

- the mother's adequate psycho-affective preparation during the prenatal period
- the mother's interest in natural childbirth
- the father's or any other relative's psycho-affective support during labor
- the psycho-affective support provided by the health team
- the mother´s freedom to choose her position

Nevertheless, some mothers with intense anxiety and pain may occasionally lose their self-control. This may interfere with uterine contractility and progress of normal delivery, with extreme consequences such as fetal hypoxia due to a reduction of the utero-placental irrigation. Furthermore, this may also be a rather unpleasant experience for the woman.

If the psycho-emotional support measures and the physical measures for treatment of pain (massage in the lumbo-sacral region or tepid showers) do not manage to reduce this considerably, it will be necessary to resort to medication.

Analgesics.

- Meperidine 100 mg dissolved in 100 cc of saline solution, administered in a slow intravenous infusion
- As a rule, it should not be used after 5 cm dilation
- The dose administered must be the minimal dose needed to relieve the pregnant woman´s pain
- It is preferable to use drugs for which there are antidotes; make sure these are available

Undesired side effects:

- Depression of the CNS (including the respiratory center) in the mother and child. Secondarily, maternal hypoventilation with hypoxemia and hypercapnia
- Neonatal hypotonia, hyporreflexia and apnea
- Reduction of the fetal defense mechanisms against hypoxia
- Interferes with the mother´s active participation in childbirth
- Interferes with the early mother-child relation and breastfeeding

Regional anesthesia (epidural, spinal). Regional anesthesia is a procedure that should only be carried out by very well trained medical staff.
The undesired side effects are:

- Maternal hypotension with reduction of placental perfusion and fetal hypoxia
- Interferes with the mother's perambulation during labor
- Interferes with maternal pushing during the expulsive period
- Increases obstetric interventions

b) Uterine contractility disorders (dynamic dystocias)
Hypodynamic or hyperdynamic contractility disorders may affect the progress of delivery and the mother and child´s wellbeing. Both require correction.

Hypodynamia (Includes hypodynamia caused by poor uterine coordination),

The drug of choice is synthetic oxytocin, which increases the frequency and intensity of contractions. It is a dangerous drug when people are not very familiar with the dosage, route of administration and control.

When stimulating the uterus with oxytocin it is necessary to remember that the initial dose depends on the existing degree of contractility. We recommend starting with 1 mU/min i/v:

We will start infusing 5 IU of oxytocin in 1 liter of saline with 5% glucose at a rate of 4 drops per minute (0.2 ml per minute). If no changes are observed in 20 minutes, double the dose. The need for higher doses requires an exhaustive revision of the case under strict medical surveillance. The infusion, and therefore the mother and fetus, require constant monitoring.
Consider the following issues:

- The individual response to oxytocin is variable and unpredictable
- An inadequate myometrial stimulation may cause: hypertonia, utero-placental hypoperfusion and fetal hypoxia
- Uterine hypertonia produced by the inadequate administration of oxytocin may produce uterine rupture and other severe consequences such as acute fetal distress
- It is necessary to rule out fetal distress, fetal-pelvic disproportion and inappropriate presentations. In case of previous cesarean section, uterine scars or malformation, the use of oxytocin should be carried out under strict surveillance; when surgery is not available, it is preferable to refer the woman to a higher complexity level

Hyperdynamia
Beta-adrenergic agents should be preferred in the uterus is to be inhibitied during delivery, due to:

a) their rapid onsett
b) their more potent uterine inhibition

Fenoterol and ritodrine are generally chosen due to their less intense side effects. In Table 10, we detail the doses and utero-inhibitory effects during continuous intravenous infusion.

Side effects of beta-adrenergic agents.
The most important are cardiovascular: cardioacceleration; vasodilation and hypotension
(Table 10).

They also produce increased lipolysis and glycogenolysis, nausea, vomiting and chills.
Contraindications for use:

- Maternal hypotension
- History or signs of heart disease.
- Severe diabetes
- Hyperthyroidism

Method of administration
Place the mother in left lateral recumbent position. Adjust the rate of infusion according to the uterine inhibition effect and maternal heart rate. Tachycardia above 120 beats/ min should be avoided

If the administration of these drugs does not correct the hyperdynamia in 30 minutes, the patient must be referred to the high risk level of care.

c) Acute (intra partum) fetal distress
In-utero treatment of fetal distress procedures are those carried out prior to the fastest mode of extraction.

Change position. Left lateral recumbent.

Correction of maternal hypotension. If the maternal hypotension does not improve with the left lateral recumbent position, refer the mother to the high-risk level of care.

Other useful measures are the Trendelemburg position or raising of the mother´s legs.

Utero inhibition. The bases for treatment with betamimetic agents are the possibility of improving utero placental circulation and fetal oxygenation through a reduction or suppression of uterine contractions.

Table 11. Utero inhibitory and cardiovascular effects in the mother caused by some betamimetic agents

Drug	I/V Infusion mg/min	Amplitude of contractions	Frequency of contraction	Instalation of maximal effects (min)	Duration of effects after discontinuation of drug (min)	MHR	Blood pressure	
							Syst	Diast
Ritodrine (Prepar)	0.2 - 0.3	↓	↓	10	30 to 90	↑	↓	
Fenoterol (Partusisten)	0.002 0.006	↓	↓	5 to 10 5 to 10	>30 >30	↑	↓	↓

↓ Reduces
↑ Increases “
Individual response is very variable

Oxygen therapy. Administer oxygen to the mother with a mask (2 a 5 l/min),

Conduct

- The progress of delivery should be evaluated to decide if it is possible to refer to a high risk level of care; the referral may only be made if childbirth is not imminent
- If the delivery will be carried out at the low risk level of care, it is necessary to be prepared for immediate fetal resuscitation

Care durint placenta delivery and post-placenta delivery (Third period)

Objective *Detection and assessment of deviations from the physiological limits of placenta delivery and post placenta delivery*

Activity *Maternal control*
Examination of the placenta

Placental delivery is the period that extends from the infant's exit to expulsion of the placenta. It is a high risk period because an important number of maternal deaths (especially those due to bleeding) are triggered during this period. Although the prevalence of post partum bleeding is variable, it is still the main cause of maternal death throughout the world.

The first minutes following childbirth there may be intense painless contractions that do not require any intervention; in most cases placental delivery will be produced spontaneously 5 to 10 minutes following childbirth, and may take up to 30 minutes without this necessarily entailing a greater risk.

Symptoms and signs of placental detachment

- Reappearance of pain during contractions
- Changes in the shape of the uterus that becomes globular, gets smaller and firm with the fundus located below the navel
- A moderate volume of blood comes out through the genitals
- The cord protrudes outside genitals, and when compressing the uterine fundus through the abdomen it will not ascend towards the inside of the uterus, indicating that the placenta is totally detached. This may be also confirmed when the uterine fundus is raised with one hand through the abdomen and no changes are felt by the hand that is gently pulling the cord (Fisherman's sign)

Under normal conditions once the placenta has exited the uterus bleeding is considerably reduced.

Examination of the placenta and membranes

After expulsion, the placenta and membranes must be thoroughly examined. We recommend placing the placenta on a flat surface and observe the maternal aspect first, checking if all the cotyledons are present and intact. A bleeding gap suggests that a cotyledon fragment is missing.

The exam shall end with the exploration of the fetal aspect of the placenta, checking whether the vascular distribution ends at the edge of the placenta or extends further. Vessels extending beyond the disk suggest an aberrant cotyledon. If this is the case, check the presence of the cotyledon that corresponds to that vessel in the maternal aspect.

Examination of the membranes implies reconstructing the amniotic sac to make sure nothing is left behind.

Controls during placental delivery

The parameters below must be monitored when events occur spontaneously:

- The mother´s blood pressure and pulse
- Blood loss through the genitals
- Color and degree of moisture of the mucosae
- Signs of placental detachment

Suture of the episiotomy

After confirming uterine retraction following placental delivery, the birth canal should be examined to detect the occurrence of cervical or vaginal tears. If an episiotomy was performed, it must be sutured. Episioraphy may be carried out while waiting for placental delivery; this reduces bleeding and unnecessary interventions. If you choose to leave the episioraphy after the delivery of the placenta, we recommend ligation of the largest bleeding vessels to minimize blood loss.

Suture technique

It is generally not necessary to re-infiltrate the tissues with local anesthetic. Confront the same type of perineal tissues on either side of the incision, i.e. mucosa with mucosa, muscle with muscle and skin with skin. Initiate the suture, starting at the upper angle of the vaginal mucosa, with interrupted or continuous stitches. Confront the muscular and subcutaneous layers trying not to leave “dead” spaces; use interrupted stitches of the same suture used in the vaginal mucosa and finish it by suturing the skin with interrupted stitches or continuous suture. Rigorous antisepsis of the region the following days will guarantee suture success.

Care must end with genital cleansing and assessing blood pressure, pulse, uterine retraction and blood loss.

Preventing the retention of egg remains

An expectant attitude should be adopted to prevent the retention of placental or membrane remains, allowing the spontaneous development of phenomena during this period. All maneuvers should be carried out gently.

- Do not pull the cord or try to hasten placental delivery until you observe signs of detachment
- After confirming placental detachment, pull softly and evenly
- When placenta begins to show through the vulva, support it with one hand below the perineum and raise the uterus with the other
- Membrane detachment may be facilitated by twisting the detached placenta.
- After the delivery of the placenta, confirm the presence of Pinard’s balloon as an indicator of uterine retraction, and check the intactness of the placenta and membranes

Prevention of Post Partum Hemorrhage (PPH)

Different prophylactic treatment schemes such as utero tonic drugs, massage and uterine compression have been developed due to the important burden of disease and death involved in PPH, especially in relation with uterine atonia.

Utero-tonic drugs

The most commonly used drugs are Oxytocin, Methylergonovine, Misoprostol, and more recently Oxytocin-agonist drugs (Carbetocin).

Schemes vary according to the drug used, dose, route and timing of administration.

- Immediately alter the anterior shoulder exits, the injection of 5 to 10 IU of Oxytocin during this period has proven to reduce bleeding and the number of transfusions. The downside is that it increases placental retention and reduces the blood transfusion from the placenta to the newborn. This increase the risk of anemia in the infant

- Immediately following childbirth, the injection of 5 to 10 IU of oxytocin or 0.5 mg of Methylergonovine or Misoprostol, 0.4 to 0,8 mg per os or transrectal, showed similar effects. They have all increased the risk of placental retention and anemia in the newborn. Methylergonovine, produces side effects such as increase blood pressure and vomiting

- After placental delivery, the three previously mentioned drugs have been used, at the dosage and routes indicated. The oxytocin agonists (Carbetocin) were added more recently and have proven to be more potent than Oxytocin. The major advantage of using any of these agents during this period (following placental delivery), is to eliminate the risk of placental retention and anemia in the infant

Traction of the cord

"Controlled" traction of the cord alter ligation has only been associated to the use of oxytocic agents and massage after expelling the placenta. There is no evidence that this maneuver is capable of reducing the risk of severe postpartum bleeding. On the contrary, its routine use increase the risk of neonatal anemia (when associated with early ligation) and uterine inversion

Uterine massage and compression

Uterine massage and the action of compressing the body of the uterus through the abdominal wall stimulate uterine contractility together with the formation of the Pinard security balloon, and reduce post partum hemorrhage

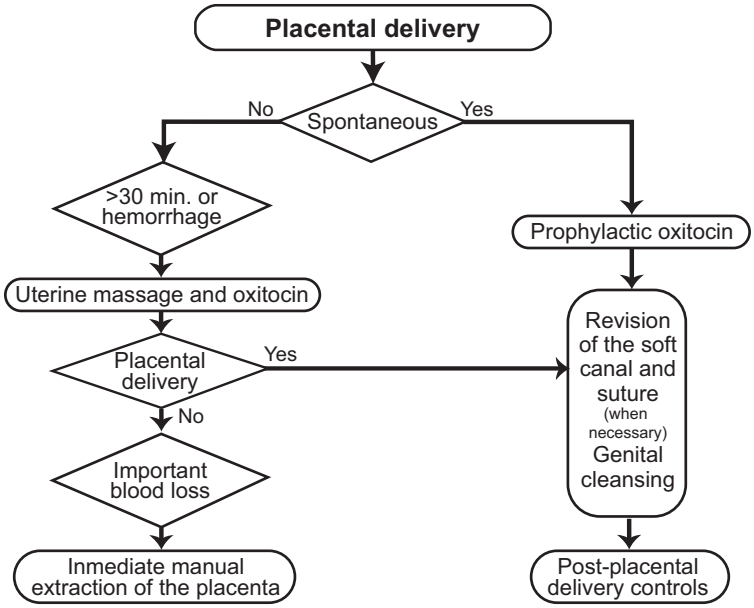

Figure 96. Management and decision-making algorithm during placenta delivery

Period following the delivery of the placenta

The period following the delivery of the placenta includes the 2 hours following childbirth. During these 2 first hours the woman is exposed to a higher risk of hemorrhage

and shock. The newborn may likewise present hemorrhage in case of inadvertently declamping the cord. For these reasons we recommend that the woman and infant remain in a sector that can guarantee nursing supervision during the first two hours.

We therefore recommend that the mother be accompanied at all times by a relative during the first 2 hours after leaving the delivery room, and that the health team survey the following every 30 minutes:

- The mother´s blood pressure and pulse
- The degree of uterine retraction
- The Pinard security balloon
- Genital bleeding

If everything is normal after completing this observation period, the puerpera and her child may be sent to a more traditional rooming-in sector, with less frequent controls.

The stepwise decision-making algorithm below describes the necessary measures to be taken during placenta delivery according to its course.

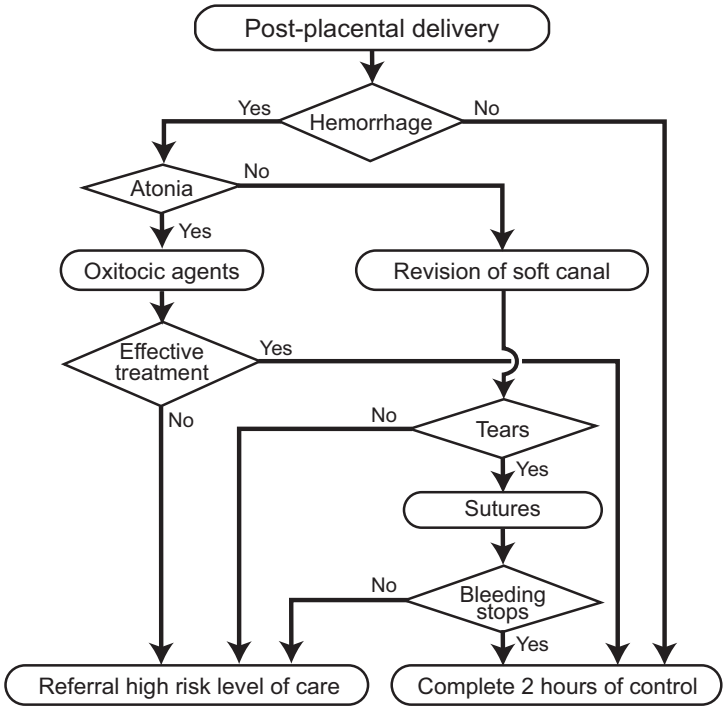

Figure 97. Decision-making scheme following placenta delivery

Placenta delivery disorders

- Retention of the placenta
- Post partum hemorrhage
- **Retention of the placenta,** If the placenta has not been delivered after a 30-minute wait, and in the absence of hemorrhage, the uterus should be massaged. If the retention persists, infuse 5 international units (IU) of oxytocin i/m or i/v. If these maneuvers are ineffective, proceed to the manual extraction of the placenta

Retention of the placenta may be total or partial.
Total-all, when all the placenta remains adhered to the uterus; this may be due to ineffective uterine contractions (atonia) or to an abnormal adhesiveness of the placenta in relation to the uterus (acretism).

Partial-one, or more placental cotyledons are retained; although cotyledon retention may be due to the same causes that generate total retention of the placenta, in this case it is more commonly produced by inadequate maneuvers during delivery of the placenta.

Technique for the manual delivery of the placenta
The manual extraction should be carried out under general anesthesia, of surgical level. If there is no hemorrhage and referral to high risk care is easy and fast, refer the patient with a venoclysis, infusing saline with 5 IU of Oxytocin for every 500 ml of solution. Do not use Methylergonovine because it may worsen retention of the placenta.

- Hold the uterine fundus with one hand
- Introduce the dexterous hand in the vagina and uterus until you reach the edge of the placenta
- Slide the fingers between the placenta and the walls, tearing adhesions
- Alter totally releasing it remove the hand together with the placenta
- Slowly infuse 5 IU of intravenous Oxytocin (diluted in 10 ml)

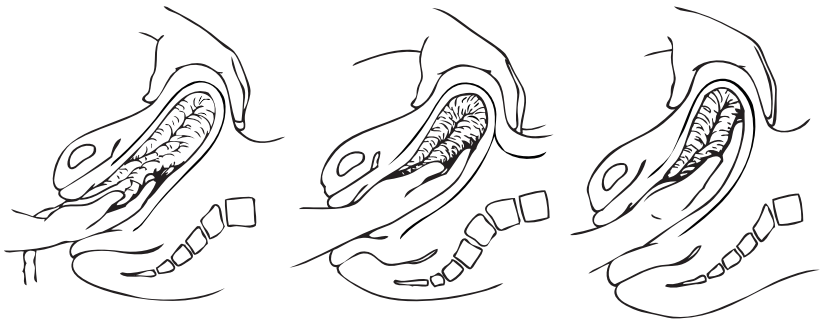

Figure 98. Manual placenta delivery technique

The maneuver is generally effective.
If it is impossible to detach the placenta, it may be due to acretism. This failure requires immediate referral of the puerpera to a level with surgical facilities.
Excessively firm pulling of the cord and an exaggerated compression of the uterine fundus may trigger intense pain, cord rupture, retention of placental remains or uterine inversion.

Intrauterine revision
This should not be done routinely because the risk of infection is higher than its potential benefit.

If a retention of placental remains (partial retention) is suspected, carry out an intrauterine digital examination and, when possible, remove the remains manually. Curettage with Pinard's blunt curette is recommended unless there is certainty about completeness of evacuation.

Retained membranes may be removed using a long Kocher clamp; twist and pull the membranes out with slow and firm motion.

Post Partum Hemorrhage
The volume of blood lost under physiological conditions during this period following childbirth is generally not more than 500 ml, and must be less than 1000 ml following a cesarean section. Any bleeding exceeding those limits is considered a post partum hemorrhage (PPH).

Classification
PPHs are generally classified depending on their time of onset
- Primary PPH (it occurs within 24 hours of childbirth)
- Secondary or late PPH (it occurs between 24 hours and 7 days)

This classification is important because it is usually related to its cause. While primary PPH is usually produced by uterine atonia, the secondary hemorrhage tends to be related to retention of egg remains.

Risk factors for post partum hemorrhage
Although PPH is unpredictable, there are certain risk factors that justify anticipation of safety measures such as ensuring that childbirth occurs at a level with enough safe blood available and surgical facilities; or, in the worst case scenario, ensuring conditions for immediate treatment.

The following are risk factors for PPH:
- Related to parity (primigravidae and great grand multiparity)
- Causes that distend the uterus (macrosomia, polyhydramnios, multiple pregnancy)
- protracted and/or induced delivery
- ante partum hemorrhage
- PPH in previous pregnancy
- coagulation disorders
- operatory delivery (forceps, vacuum)
- previous cesarean section
- obesity
- ovular infection
- myomatosis

Causes of post partum hemorrhage
The causes of PPH may be summarized in 4 main groups:
- Tone disorders (atonia or hypotonia), due to factors that over distend the uterus or exhaust the uterine muscle fiber. They are usually the most frequent cause (frequency between 75 and 90% of all PPH)
- Retention of ovular remains (placenta or cotyledons) due to iatrogeny caused by traction, placentation anomalies (placenta with some degree of acretism, placenta previa) or of unknown cause. Placenta retention accounts for 20 to 10% of PPH)
- Traumatic, caused by cervical and/or vaginal tears, rupture or uterine inversion.
- Coagulation disorders, due to coagulopathies (HELLP, infections) or the use of anticoagulants

Conduct
Even though the definition of PPH is related to volumes equal to or greater than 500 mL, the repercussion caused by bleeding is related to the mother´s previous hemoglobin level. A woman with prior anemia will not tolerate hemorrhage as well as another woman with appropriate hemoglobin levels. Therefore, in a region where chronic anemia is present

in more than one third of pregnant women, treatment of PPH starts during preconception and prenatal care, helping women reach childbirth with normal hemoglobin levels.

Faced with any post partum hemorrhage:

- Request collaboration from the rest of the personnel at the center where you are assisting the delivery
- Ensure a peripheral venous line with an appropriate gauge needle (Nº 16 or greater)
- Commence replacement with saline solution or lactate Ringer at high speed. The solution's perfusion rate will depend on the detection of signs of shock.
- If the uterus is under involuted (above the navel and soft) massage it as required to evacuate blood and clots and obtain better contractility

In case of bleeding due to atonia, if you confirm that the hemorrhage is due to uterine atonia:

- Continue massaging the uterine fundus
- Administer 5 IU of oxytocin and one vial of Methylergonovine 0.2 mg i/v, followed by 20 IU of Oxytocin dissolved in 1000 ml of saline solution at a rate of 60 drops minute. Another option is using Methylergonovine, 5 vials of 0.2 mg (total 1 mg), dissolved in 1000 ml of saline at a rate of 60 drops per minute

If the hemorrhagehas not been solved, the clinical situation is severe and you have the alternative of surgery carry out a total or subtotal convenience hysterectomy.

If surgery is not possible, continue replacement with the previously mentioned solutions and packed red blood cells or total blood, and refer the patient to a higher level of care.

Transfer with raised limbs and carrying out the bimanual compression of the uterus. Bimanual compression is done using sterile gloves, one fist inside the vagina pressing the anterior wall of the uterus, while the other hand compresses through the posterior wall of the uterus.

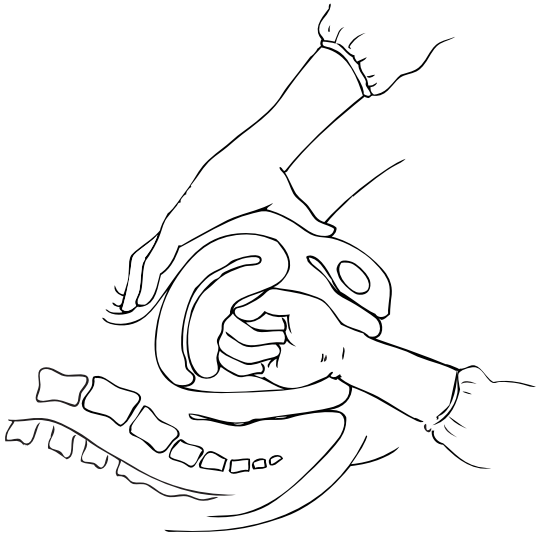

Figure 99. Bimanual compression of the uterus

Bleeding is due to retention of placental remains. If you confirm that the bleeding is due to the retention of placenta remains (placenta with some cotyledons missing), proceed to evacuate them with the Pinard curette, telling the mother that the procedure will be carried out using pain killers or anesthetics.

If there are still any doubts regarding the persistence of remains, an intra uterine exploration may be performed, paying careful attention to the asepsis and antisepsis measures.

On rare occasions the placenta or any of its fragments (cotyledons) may be difficult to separate from the uterus; this is called placental acretism.

In these cases it is convenient to refer the woman to a higher complexity level, as these procedures may be complicated with uterine perforation, or severe hemorrhage and may require hysterectomy.

Presence of tears. If the uterus is retracted and continues to bleed, examine the soft canal. If there are tears, suture them after applying local anesthetics. If there aren't any, or if the maneuvers fail, refer the mother to the high risk level of care, ensuring blood replacement or saline solutions if necessary.

Presence of uterine inversion. Uterine inversion may occur in exceptional cases, and is generally related with sudden maneuvers. Administer a potent analgesic agent (Meperidine, 1 vial of 100 mg, diluted in 20 cm of saline solution, slowly injecting 2 cm at a time, to test tolerance. If an anesthesiologist is available, the procedure should be carried out with general anesthesia.
Do not use oxytocic medication because it may worsen the situation.
Try to put back the uterine fundus in its right place with the manual procedure as shown in figure 100.

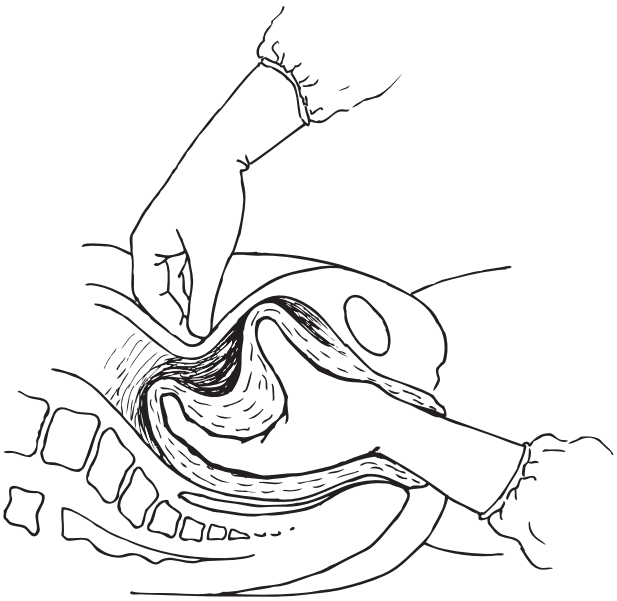

Figure 100. Correction of the uterine inversion

Care during the immediate post partum period

Rooming-in

The unjustified separation of the mother and her infant following childbirth and interference with breastfeeding on demand the first hours of life are poor practices frequently observed in institutions assisting childbirth, and should be discouraged.
Conversely, CLAP/MRH recommends encouraging early contact between mother and child during this period, while supporting early initiation of breastfeeding, within hours of delivery.

The relationship between the mother and her newborn is a complex biological and psycho-affective process of key importance for the child´s survival and the wellbeing of both. Initiation of this relationship is the basis for development and the promotion of mental health.

Studies supporting this concept of psycho-affective care have evaluated the impact of an unjustified separation, which may reduce breastfeeding and increase the risk of negative maternal behaviors, ranging from child abuse to child neglect. Institutions that do not separate the mothers from their newborn children have created wards where both remain together all day and receive nursing care together, while benefitting from the time spent in hospital for health education activities. These wards are generally called “rooming-in facilities”; they still have not become universal in the Region.

In an attempt to improve the quality of care and the outcomes, we now present the different practices of care during delivery according to four categories.
In these categories we include practices that have proven to be useful and should be encouraged, and, in the other end. those that are unnecessary and entail risks.

Category A

Practices that have proven to be useful and should be encouraged:

- A personal plan prepared together with the woman and her family during pregnancy determining who will assist in the delivery and where
- Risk assessment during prenatal care, reassessing during each follow-up (at the time of the first contact during childbirth and throughout the whole process)
- Control of the mother’s physical and emotional wellbeing during childbirth and at the end of the birth process
- Offer fluids per os during labor
- Respect maternal informed choices regarding the site chosen for childbirth
- Provide labor care at the most peripheral level where the delivery is possible and safe, and where the woman may feel safe and reassured
- Respect the woman’s right to privacy at the site of delivery
- Provide empathetic support during delivery and childbirth
- Respect the woman’s choice regarding the person who will accompany her during delivery
- Give the women as many explanations and as much information as required
- Use non-invasive and non-pharmacological pain-relief methods, such as massage and relaxation techniques
- Fetal monitoring with intermittent auscultation
- Only use disposable material, with appropriate sterilization of re-useable material during delivery

- Use of gloves during the vaginal examination, when handling the newborn and during manipulation of the placenta
- The woman should be free to move and to choose her posture during delivery.
- Encourage a non supine position during delivery
- Careful monitoring of the progress of delivery, using the Partogram for example
- Prophylactic administration of Oxytocin during the third period of delivery in women at risk for post partum hemorrhage or who have presented a small blood loss
- Sterile conditions during umbilical cord section
- Prevention of hypothermia in the newborn
- Prevention of neonatal hemorrhage through the use of Vit.. K
- Prevention of gonococcal ophtalmia using silver nitrate or antibiotics
- Early skin to skin contact between the mother and her newborn. Support placing the child at the breast following the WHO recommendations for breastfeeding
- Rooming-in
- Suppress breastfeeding in HIV-positive mothers
- Routine examination of the placenta and membranes

Category B

Practices that are clearly harmful or ineffective and should be banned:

- Routine use of enemas
- Routine use of pubic shaving
- Routine use of intravenous infusions during childbirth
- Routine use of a prophylactic intravenous line
- Routine use of the supine position during labor
- Rectal examination
- Repeated or frequent vaginal examination, particularly when performed by more than one person
- Use of radiological pelvimetry
- Administration of oxytocic agents at any time prior to the expulsive period, when the effects can no longer be controlled
- Routine use of the lythotomy position with or without “dangling” legs during childbirth
- Protracted pushing (Valsalva maneuver) during the second period of delivery
- Massaging and stretching the perineum during the second period of delivery
- Liberal or routine use of the episiotomy
- Use of Ergometrine tablets during the third period of delivery to prevent or control bleeding
- Routine use of parenteral Ergometrine during the third period of delivery
- Routine uterine lavage following the expulsive period
- Routine examination (manual exploration) of the uterus after the expulsive period
- Kristeller, or other similar maneuvers applying inadequate force to the uterine fundus during the expulsive period
- Liberal use of the cesarean section
- Routine nasopharyngeal suction in the normal newborn
- Artificial cooler air in the delivery room during childbirth
- Early clamping of the cord

Category C

Practices for which insufficient evidence does not allow a definite recommendation; they should be used cautiously until further research settles their benefit:

- Non-pharmacological methods to relieve pain during childbirth such as herbs, immersion in water and nervous stimulation
- Routine early amniotomy during the first period of childbirth
- Maneuvers related with perineal protection and management of the fetal head at the time of delivery
- Active manipulation of the fetus during the expulsive period
- Routine Oxytocin-controlled cord traction or a combination of both during the third period of delivery
- Nipple stimulation to increase uterine contractions during the third period of delivery

Category D

Practices frequently applied inappropriately:

- Food and fluid restriction during childbirth
- Pain control with systemic agents
- Pain control with peridural analgesia
- Electronic fetal monitoring
- Use of sterile masks and gowns during assistance of childbirth
- Routine use of Oxytocin during labor
- Routine mobilization of the woman in labor to a different room at the start of the second period
- Bladder catheterization
- Encouraging the woman to bear down when complete dilation has been diagnosed, before she feels the urge to do so herself
- Sticking too rigidly to the theoretically “normal” durations (e.g. the second period of delivery should not exceed one hour) when materno-fetal conditions are good and labor progresses
- Instrumental delivery
- Liberal or routine use of the episiotomy
- Manual exploration of the uterus following childbirth

Puerperal care

Objective *To try to control the puerperal woman's wellbeing.*
To detect and assess deviations from physiological values.
Risk assessment and referral to the appropriate level of care.
Apply corrective measures.

Activity *Education of the puerperal woman.*
Clinical controls of the mother and child.
Record controls in the perinatal clinical history

Definition:
Puerperium as such starts alter the end of placenta delivery and lasts approximately six weeks. All the physiological changes produced during pregnancy will be reverted during this period, with the single exception of breast changes that will be intensified to maintain successful breastfeeding.

Immediate puerperium: encompasses the first 24 hours post partum, and includes the 2 first hours following placenta delivery. It is important because it is during this period that most severe complications occur, especially those related with bleeding disorders.

Due to the higher risk of hemorrhage and shock, the period following the delivery of the placenta (first 2 hours of puerperium) was already discussed together with delivery of the placenta.

Controls during the first 24 hours shall include:

- Facies, skin and mucosae should be well colored, unless the woman had an existing anemia
- Consciousness, the woman in labor must be lucid and calm
- Pulse must be strong and heart rate normal (ranging from 90 to 100 beats per minute at baseline conditions)
- Blood pressure should not differ substantially from previous values
  Body temperature should be normal, not exceeding 37º C. Occurrence of chills after the delivery of the placenta is normal; they rarely last longer than 30 minutes
- Uterine retraction (Pinard's security balloon), in the first 24 hours the fundus should not be beyond the navel and its consistency should be firm and elastic, becoming woody when stimulated and painless on palpation. Pain will only be present when the child is put to the mother's breast (afterpains). Common pain relievers and non-steroid anti-inflammatory agents are indicated if it hurts
- Vaginal bleeding, if bleeding is heavy and the uterus is well contracted warrant a thorough inspection of the birth canal, to rule out vaginal and/or cervical lesions (tears)
- Regional changes- swollen hemorrhoids may be occasionally observed at the anus; they partially improve with local application of ice and creams containing topi¬cal anesthetic agents. Urinary tract infections are rather exceptional and should be managed with intermittent bladder catheterization. They usually re-solve after a few hours

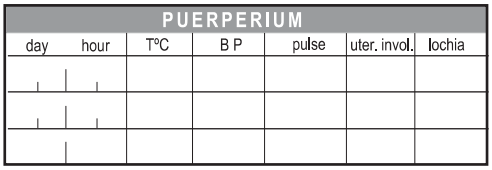

Figure 101. PBF. Controls during puerperium

Perineal hygiene

With or without episiotomy, after childbirth, we recommend that each time the woman needs to change her dressing the area be cleansed with soap and clean water with an antiseptic agent. The washing will be done gravitationally, always from front to back (from the vulva towards the anus). Drying should be complemented with a clean cloth or gauze.

Underwear will be separated with a dressing (gauze-cotton wool-gauze) or with “night-time” protection pads usually available in the market.
Intra vaginal lavage is discouraged.

In case of episiotomy, care will be similar, trying to keep the area as dry as possible.

Caring for the nipples

During pregnancy the woman should try to keep the nipple and areolar area as aired as possible, lubricating it with a drop of her own colostrums, and exposing them to the sun 10 to 15 minutes every day. While breastfeeding we recommend repeating the procedure substituting the colostrums with milk.

Guides for cord care and breastfeeding: will be developed in the neonatal chapter.

Mediate Puerperium

- Extends from the second to the 10th day post partum
- Vital signs (temperature, heart rate and arterial blood pressure). Any alteration of the vital signs will require a search for the etiological agent and if there are any doubts, they should be sent for assistance to a more complex level of care
- Evaluation of lochia (amount, aspect, composition and odor). As it is hard to estimate the amount, we recommend looking at the mother to see if she has or doesn´t have any anemia. At this stage of puerperium the color should be red or pink. A chocolate-brown color will lead us to suspect infection. They usually contain small tissue fragments and blood. The odor may be strong; if fetid, suspect infection
- Control of uterine involution. Involution is extremely fast, approximately 2 centimeters per day, and is measured through palpation of the uterine fundus. At 6 days of puerperium it should be located between the navel and the upper rim of the pubis, and at 10 days it should be close to the pubis
- Regional alterations: occasionally we may find inflamed and painful hemorrhoids that do not improve with medical treatment; in these cases it is necessary to rule out hemorrhoid thrombosis; this may be easily solved with a minimal surgical drainage using local anesthesia. At other times pain may indicate an anal fissure that may revert after a few weeks of medical treatment. As for the bladder and the containment mechanisms, urinary incontinence may be observed, and usually remits spontaneously after a few days or weeks
- Milk secretion. During this period mature milk replaces colostrums

Long-term puerperium
This stage goes from the 11th to the 42nd day post partum. It is an appropriate period to monitor the course of lactation and prepare the woman to resume active sexuality. During this period recommend counseling on contraception and intergestational spacing.

The uterine involution continues and the pregravid state is recovered. Normal vaginal bleeding may be observed 25 days following delivery, and is gener¬ally due to an endometrial proliferation (exclusively related with estrogens). Only rarely is it due to estrogen–progesterone proliferation.

Resumption of sexual intercourse is recommended after the disappearance of the lochia, which usually occurs 30 to 40 days after puerperium.

In some cases this will be the woman's last control by the health team. We therefore recommend a general clinical and gynecological examination (if necessary), together with counseling on contraception, resuming sexual intercourse and breastfeeding.

Late Puerperium
This period extends between day 42 and no further than a year. It is important because there are some morbid or even eventually lethal situations that may occur during this period.

Discharge
We recommend discharging the woman 48 hours after childbirth, unless there are complica¬tions or if she is incapable of providing competent care to her newborn.
When an early discharge is required, home follow-up must be ensured; if possible, implement a telephone consultation system to allow the woman to reach reference members at the health center or in the community; remember that the first 24 hours are usually more life-threatening both for the woman and her child .

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CHAPTER V

Neonatal Care

This section presents the most important specific objectives and activities for primary neonatal care

OBJECTIVES	ACTIVITIES
Receive the newborn and start the first spontaneous breathing	Watch if the newborn is breathing; if apnea persists, determine whether it is due to fetal asphyxia or pharmacological depression, and provide assisted ventilation to the newborn in apnea
Protect the preterm newborn's adaptation to extrauterine life	Provide immediate care to facilitate adaptation, especially in preterm newborns that present signs of ventilatory immaturity
Identify the newborn	Facilitate the mother´s identification of her newborn and meet the local requirements for identification at birth.
Evaluate fetal growth and development at birth	Make the anthropometric measures and assess the adaptation functions in accordance with gestational age.
Adapt the initial management of newborns with major congenital defects	Implement specific measures for each defect early.
Detect, prevent and treat congenital defects and/or asymptomatic infectious and non infectious diseases.	Evaluate all newborns systematically or selectively to prevent and treat the infectious diseases transmitted by its mother. Systematic detection of congenital defects or non infectious diseases by bioclinical or instrumental laboratory methods.
Prevent gonococcal opthalmia	Instilate antimicrobials into the newborn's conjuntives at birth.
Prevent the newborn's hemorrhagic disease	Administer Vitamin K1
Start and maintain exclusive breastfeeding	1. Do not separate the newborn and its mother and promote family support 2. Feed on demand and do not offer any bottles 3. Promote exclusive breastfeedinga
Prevent infant TBC	Immunize with BCG at birth
Prevent infant sudden death	Put the baby to sleep face up
Reduce risks in 35-to 38-week preterm newborns	Increase monitoring during the adaptation period, while they stay in the room with their mothers

Objective *Recieve the infant and assess the initiation of spontaneous breathing.*

Activity *Observe if the infant breathes or not, if not consider if it is due to asphyxia or drug-induced central nervous system depression.*

The first spontaneous inspirations that trigger a newborn's regular breathing a few seconds after birth are the most relevant physiological event in adapting to life outside the mother's womb.

The newborn's failure to show any spontaneous respiratory movements is due to depression of the Central Nervous System. This depression may be caused by a severe fetal asphyxia or by the depressant action of sedatives administered to the mother either during labor or in the context of general anesthesia.

Intrauterine Fetal Asphyxia

The characteristics of fetal heart rate are indicative of the severity of that asphyxia. Initially there is tachycardia (more than 160 beats per minute) and as the fetus's condition progressively worsens, there will be periods of bradycardia following each uterine contraction (DIPS II) or a maintained severe bradycardia. At birth there is a severe disruption of the child's hemodynamics; the newborn is bradycardic and shock may develop in the most severe cases. In the latter cases there is extreme pallor and the umbilical cord is flaccid as a result of a drop in arterial blood pressure and vein collapse. Fetal asphyxia tends to be more frequent in fetuses with intrauterine growth restriction or weight loss caused by placental failure.

Drug-induced central depression

When depression is purely pharmacological, the fetus's intrauterine heart rate is not changed: at birth the cord is erectile, with normal pulsation rates, but the newborn does not to show any inspiratory movements. If the newborn fails to breathe within the minutes that follow, as the placental function ceases, it will develop asphyxia (hypoxemia, hypercapnia and acidosis), leading to progressive hemodynamic impairment.

Neonatal Resuscitation

About 10% of the newborns require some type of care to start ventilatory movements. However, less than 1% requires any specific resuscitation maneuvers.

The need to implement ventilatory support measures can be assessed in a simple manner. No specific resuscitation maneuvers will be required in children with the characteristics below:

- Full-term neonate
- The newborn is either crying or showing evidence of ventilatory movements
- Good muscular tone

A full-term infant that presents crying and with a good muscular tone does not require the implementation of resuscitation measures, and the newborn should not be separated from its mother.

When the above conditions are not met, the newborn must receive one or more of the interventions below:

A. Basic stabilization steps (avoid cooling, clear airway if needed, dry and evaluate the color of skin and mucosas)
B. Ventilation
C. Chest compressions
D. Administration of adrenaline

The measures included in items A to D correspond to increasingly intensive measures in response to the severity and persistence of specific signs or symptoms. The decision about the scale-up of interventions, from A to D, will depend on the thorough evaluation of two vital signs:

- Ventilation: presence of apnea or impaired ventilatory movements ("gasping")
- Heart rate: assess whether the heart rate is higher or lower than 100 beats per minute

An adequate evaluation and monitoring during pregnancy and at birth permit the identification of the presence of risky conditions that will be key to predict the need for implementing resuscitation maneuvers (prematurity, fetal distress, intrauterine growth restriction, inter alia.).

The implementation of the basic steps– warming the baby under a radiant heat source, determining airway patency, drying the baby and stimulating breathing- is essential, since those measures are basic neonatal stimuli.

Figure 102 shows the sequence of issues that need to be assessed and the management recommended.

If ventilation continues to be impaired despite the basic measures, or if the heart rate is under 100 beats per minute, the newborn should receive assisted ventilation support with a mask.

When there is no evidence of improvement and the bradycardia worsens and reaches a heart rate of less than 60 beats per minute, the infant will require rhythmic chest compressions. If bradycardia persists under those levels, adrenaline is indicated.
Additional support must be considered when there is cyanosis and persisting ventilatory distress despite a heart rate over 100 beats per minute.

Once positive pressure ventilation or the administration of supplementary oxygen have been started, added to the assessment of the heart rate and breathing, the oxygenation status must be closely monitored, preferably with a pulse oxymeter. The heart rate and its variations are indicative of the adequacy of response at each step. A heart rate increase indicates the infant's proper response. Therefore, the administration of oxygen requires the evaluation of outcomes and safety:
Outcome – heart rate increase (>100)
Safety – monitoring of oxygen saturation

Oxygen should be administered ONLY when deemed necessary, for unless it is administered correctly, it may lead to significant neonatal complications and damage.

A caviat on airway patency

There is evidence showing that aspiration of the nasopharynx, as well as the endotracheal aspiration of intubated newborns under mechanical ventilation, when performed routinely, (i.e. in the absence of evidence of nasal or oral secretions), may favor undesired effects such as bradycardia, or be associated with an impairment of pulmonary distensibility, brain oxygenation and a reduction of the blood flow rate.

Consequently, aspiration (including with rubber pear-shaped aspiration devices) is *ONLY* recommended when there is overt obstruction of spontaneous breathing, or when positive pressure ventilation (PPV) is required.

Meconium aspiration before or during childbirth or during resuscitation may result in the meconium aspiration syndrome. In that regard, in the absence of randomized clinical trials, there is insufficient evidence supporting a recommendation to change the current practice of performing endotracheal aspiration of non vigorous infants presenting with meconium-stained amniotic fluid.

As expressed above, the supplementary administration of oxygen is another key aspect that needs to be considered. The recommendation indicates that the maneuver should be started either with air or a mix of oxygen, together with the above-mentioned monitoring of oxygen concentration.

The availability of a skilled staff that is duly trained on these issues is paramount; there should always be someone in the staff attending a delivery with the primary responsibility of receiving and assessing these features in the newborn, and capable of implementing a timely and adequate intervention. This person should be capable of initiating resuscitation, including the administration of positive pressure ventilation and chest compressions, and monitoring of the administration of oxygen and/or any drugs required.

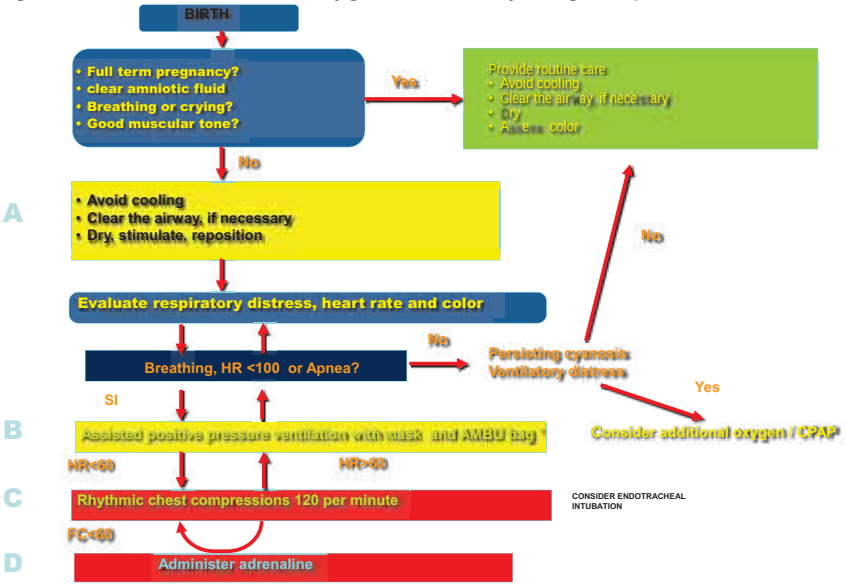

Figure 102 - Algorithm for neonatal resuscitation

Source: Modified from Kattwinkel J, et al; American Heart Association. Neonatal resuscitation: 2010 American Heart Association Guidelines for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care. Pediatrics 2010 Nov; 126(5): e1400-13.

Receiving the newborn and assessing vitality at birth in the first seconds of life

- Hold the newborn exiting from the mother's womb and place it on a surface covered with a soft cloth at the same level as the mother's perineum or on her thighs in the case of a cesarean section
- Count the heart rate the first seconds after birth by watching or palpating the arterial pulses in the umbilical cord or by auscultating the heart beats. The normal umbilical cord is erectile, showing an ingurgitated vein and two arteries with visible pulses with a rate greater than 100 beats per minute. The presence of a flaccid cord or weak pulses and bradycardia is abnormal; those signs are frequently an expression of fetal asphyxia
- Watch for the onset of respiratory movements
- Avoid aspiration of the upper airways
- There is no need to aspirate the amniotic fluid present in the nasopharyngeal cavity. In fact, the entire respiratory tract is full of amniotic fluid at birth, and it gets reabsorbed naturally through physiological mechanisms within the first minutes of life
- Newborns presenting with meconial amniotic fluid should be managed by staff competent in the use of the laryngoscope. Under such circumstances, if the newborn fails to show any spontaneous inspirations immediately after birth, its prognosis will improve if the meconium in the upper airway is aspirated before the first inspiration. Aspiration must be performed under laryngoscope guidance, aspirating the meconium contained in the supra and subglotic airway before the newborn's lungs get filled with air. Aspiration will no longer be required if spontaneous breathing occurs before the procedures are performed

If the child is not breathing, start it on artificial ventilation by insufflating the airway with an AMBU[1] with a mask or mouth-to-mouth ventilation.

- Physiological breathing is the most effective way of ventilating the alveoli, since even in premature infants spontaneous inspiration may cause negative intra-thoracic pressures over 40 cm H2O without jeopardizing the integrity of the alveoli
- If the umbilical cord is flaccid and bradycardic and no respiratory movements are observed after 20 seconds, the child may be stimulated with a soft cloth, vigorously rubbing its trunk and limbs
- If the newborn fails to respond to this skin stimulation right away, it must be placed lying on its back, adjusting a naso-oral mask and insufflating the airway with air (initially) exerting pressure at a rate of 40 cycles per minute with an AMBU equipped with a safety pressure valve. This support is maintained until the onset of regular spontaneous inspiratory movements

Expected course of the airway insufflation procedures

- If lung insufflation is effective, the heart rate will soon recover; the newborn's color will then get better, its lips and tongue turning pink. With the onset of spontaneous breathing and crying, the insufflation procedures may be stopped
- Persistence of bradycardia is the clearest sign of an ineffective pulmonary insufflation. When that happens, check whether the mask is correctly fitted, and if the AMBU ventilation pressure and rate are appropriate

1 AMBU (Artificial Manual Breathing Unit) is the usual name given to self-inflatable bags equipped with a valve system that permits insufflation of the newborn's lungs at pressures lower than 40 cm water thanks to a safety valve

- Once resuscitation is started, air may be replaced by additional Oxygen (FiO2> 0.21) to insufflate the lungs of newborns with gestational ages greater than 34 weeks. However, there are doubts as to whether resuscitation with additional Oxygen actually contributes to improve these children's prognosis

Assess Vitality at 1 and 5 minutes: APGAR Score:

In 1953 Virginia Apgar, an American obstetric anesthesiologist, proposed a scoring system to ascertain the newborns' vitality.
This score is put together by watching 2 functions that are required for spontaneous breathing to occur:

- Regular inspiratory movements, and
- Hemodynamics (represented by heart rate and color)

and it is complemented with the observation of the central nervous system functions through:

- Reactiveness to stimuli and
- Muscular tone

Table 12. APGAR SCORE

	0	1	2
HEART RATE	Absent	<100	100-140
RESPIRATORY EFFORT	Apneic	Irregular, shallow ventilation	Breathes and cries loudly
REFLEX IRRITABILITY	Absent	Weak response	Facial grimace sneeze/cough/ with gentle suction of the oropharynx
MUSCLE TONE	Flaccid	Weak tone	Good tone, flexed arms and legs
COLOR	All cyanotic	Peripheral cyanosis	Entire child is ping

Assessment of this score 1 and 5 minutes after birth has been used universally ever since.

Interpreting the APGAR Score
Although scoring may be influenced by the intervention of the person attending delivery in the first seconds of life, it is widely accepted that the score at the 1st minute expresses the child's condition at birth. A score of 3 or less is indicative of severe respiratory depression. The presence of bradycardia suggests that depression is due to a severe fetal asphyxia.

Score at the 5th minute summarizes the severity of initial depression and the outcome of the procedures performed. Persistence of bradycardia indicates that insufflation failed to get lung ventilation started, or that the condition is extremely severe. The newborn's prognosis improves when an initially low score (0-3) rises significantly within the first 5 minutes of life.

Recording Activity

Before the baby leaves the Delivery Room, a thorough record must be kept of the Apgar score and the procedures performed. The PCR is designed so that procedures may be recorded in chronological order, as they are scaled up. The order at which the resuscitation maneuvers are recorded on the PCR depends on the intensity of the procedure.

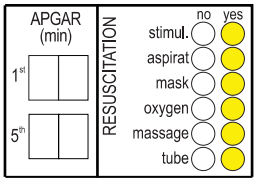

Figure 103.
PCR fragment.
Apgar and resuscitation

The boxes in yellow indicate the procedures that are not needed in a healthy newborn that starts to breathe spontaneously soon after birth.

Objetive *Protect the adaptation of preterm newborns to extra uterine life.*

Activity *1. Provide immediate care to facilitate the newborn's adaptation, especially in preterm infants with signs of immaturity of the ventilatory pump.*

2. Develop strategies to avoid heat loss, assess the two-way blood flow through the umbilical cord from the placenta to the fetus, support and sustain the beginning of breathing; monitor the supply of O2.

No resuscitation measures are required in most cases, since the children do not usually present with asphyxia or shock. The newborns requiring resuscitation are typically under 1%.

Preterm infants are in a particularly vulnerable situation, and their first minutes of life have a particular impact on their survival and long-term morbidity. In most cases they do not require resuscitation because they are not asphyctic or in shock; what they usually need is proper care so they can adapt to the changes that occur at the beginning of extra uterine life.

Preventing heat loss

Hypothermia due to and excessive loss of heat and / or cessation of production of heat resulting from hypoxia or energy deficit is an adverse condition for newborns in general, and for preterm babies in particular, because of their immaturity. Hypothermia delays the first spontaneous breathing; it may alter the physiological changes of the hemodynamic adaptation, maintaining a persistent status of pulmonary hypertension and metabolic acidosis.

To keep temperature between 36.5 and 37.5, the heat loss due to convection, evaporation, contact and irradiation should not exceed the endogenous production of heat.

A simple protective manoeuvre at the time of birth, is to move the infant from the hands of the obstetrician into a polyethylene bag without even drying the baby, leaving the head out of the bag and covering it with a cap.

A complete transfusion of the placenta increases the hematocrit the first hours of life and reduces the risk of the infant's iron deficiency anemia.

Completing the passage of blood in the final minutes of placental function.
During the first minutes of life, the staff attending birth must wait for the best time to clamp the umbilical cord.

The cessation of the umbilical cord pulses in the mother's side (closest to the perineum) indicates that the passage of blood from the placenta through the umbilical cord to the newborn's body has been completed and that the cord's function has ceased. This indicates the best moment to clamp the umbilical cord.

The full placental transfusion increases the hematocrit in the first hours of life and decreases the risk of iron deficiency anemia in infants, particularly in those with a low birth weight and in those whose mothers had anemia during pregnancy. Preterm babies whose umbilical cord is clamped before their first 30 seconds of life required more transfusions; they require more treatment for hypotension and they tend to have intracranial hemorrhage more frequently.
The observation of the umbilical cord can be performed safely and without risk of hypothermia by moving the newborn from the hands of the obstetrician into a polyethylene bag in a well-heated room.

The common practice of immediately removing the extremely premature newborn to be managed in a remote place implies severing the umbilical cord. This practice is being reviewed after new evidence has shown the deleterious effects of ligation before the first 30 seconds of extra uterine life - and even before the first 3 minutes. The newborn must remain united to its mother by the cord longer, as long as the physiological circulation of the placenta is preserved.

Support and sustain the beginning of breathing while trying to provide the greatest comfort
The inspiratory chest movements are intermittent during fetal life; cyclic movements get established during the infant's first minutes of extra uterine life. Immediately after birth those inspiratory efforts get the air ventilation started, and those efforts are to persist for life without interruption. In less mature preterm infants, this ventilatory dynamic is less effective and may be insufficient because of the immaturity of the respiratory center, the weakness of the rib cage and respiratory muscles, and the airway's tendency to collapse associated with surfactant deficiency. A simple practice of ventilatory support in preterm infants to be started from their first spontaneous breaths in the delivery room consists of the early nasal or oronasal administration of an air flow that achieves continuous expiratory pressure (CPAP) and keeps the alveoli distended. If necessary, assisted ventilation can be applied using cyclic inflations with an initial frequency of 40 r.p.m.

Ventilatory support has evolved to ways that avoid damage due to excessive supply of oxygen, by incorporating the administration of antenatal corticosteroids, the initial support with nasal CPAP, early administration of surfactant, ventilation applying minimal parameters and early extubation (if the neonate had required orotracheal intubation). Even the smallest babies (26-28 wk GA) can adapt with minimal support, without requiring tracheal intubation. The weight and gestational age criteria traditionally used to conduct an immediate intubation at birth should not be used routinely. When deciding a tracheal intubation to administer surfactant or to increase ventilatory support, the procedure must be done with the utmost skill; it should be brief and it should preferably follow a protocol of ultra short sedoanalgesia.

The aspiration of the oropharynx and the nasal fossa causes apnea and bradycardia, so these procedures should be also abandoned as a routine. Likewise, the blood on the preterm infant's skin and scalp should not be cleaned with water, to prevent any further heat loss. Maneuvers conducted to explore anal and esophageal patency also cause bradycardia due to vagal stimulation, and should not be performed as a routine. The judicious observation of adaptation permits to select those infants that require such maneuvers. For example, when there is polyhydramnios, excessive salivation, imperforate anus, or failure to pass any meconium in the first 48 hours.

Control of O2 supplementation

Evaluation of neonatal oxygenation poses difficulties in the first minutes of life and often leads to errors and to the excessive use of oxygen. Cyanosis in the first 5 minutes of life is physiological, since it takes up to 5 minutes for oxygen saturation to reach 95% in normal infants with a gestational age over 35 weeks breathing air. It is not possible to differentiate the physiological hypoxemia that normally occurs in fetal life and the first few minutes of extra uterine adaptation, from the hypoxemia due to asphyxia. Only persistent apnea and bradycardia suggest the presence of neonatal asphyxia.

Because of the affinity of fetal hemoglobin for O2, the SaO2of preterm babies that maintain a normal heart rate should be kept between 88 and 93% to ensure an adequate level of oxygen in blood.

The use of oxygen at birth is a very common practice and sometimes it is the only procedure used for the resuscitation of a newborn. But today there is sufficient evidence to indicate that the use of supplemental oxygen to all newborns in apnea requiring resuscitation is not really necessary. Oxygen also is known to cause adverse effects, from a delay in the onset of spontaneous ventilation, to tissue damage due to the toxicity caused by oxygen or free radicals produced in post-hypoxia or hyperoxia.

The administration of supplemental oxygen should be limited to those infants that remain cyanotic after the first 5 minutes, or in those in whom the measurement of SaO2 by pulse oximetry reveals values below the physiological threshold. The additional use of oxygen (FiO2> 0.21) instead of air during lung inflation of newborns with a gestational age over 34 weeks should not be initiated if air ventilation is good enough.

The use of pulse saturometry to determine the Oxygen Saturation in blood is an extremely valuable non-invasive technique that permits to adjust the supply of oxygen to the newborn's needs. This technology is becoming more affordable thanks to the development of simple and inexpensive models. Saturometry is also useful to handle other very common situations, such as respiratory failure conditions occurring in children and adults; it also permits a better monitoring during general anesthesia.

Air and oxygen gas mixers are also required to permit the delivery of the concentration of oxygen required. Systems that regulate the humidity and temperature of the mixture may also be needed to avoid damage to the upper airway mucosa.

Plan for the treatment of preterm newborns from their first minute of life

Time of life	Objectives
1st minute	Preserve heat and moisture (polyethylene bag – cap) Complete the passage of blood from the placenta to the newborn (Clamp the umbilical cord as soon as the pulse of the umbilical arteries has ceased) Watch initiation of breathing (consider prophylactic or rescue CPAP before endotracheal intubation). Assist ventilatory/respiratory failure with safe equipment, avoiding excessive pressure. Avoid any unnecessary use of supplementary O2 the first 5 minutes and further SaO2 values over 95%. Aspirate the upper airway only to visualize the glottis while intubating or removing meconium in cases of severe asphyxia. Do not explore esophageal and anal patency routinely. Ensure the newborn is identified with the proper mother, and provide the latter with free access to the place where the baby is staying whenever there is a need to treat them apart.
1st day	Maintain room humidity (80%) and skin temperature between 36.5 and 37.5°C. If it is necessary to administer surfactant, do it immediately within the first two hours. Early CPAP Intubate only for the purpose of administering surfactant or for brief periods of initial ventilation, trying to extubate very early. Avoid any unnecessary use of supplementary O2 with SaO2 values over 95%. Do not initiate supplemental O2 unless SaO2 is lower than 88%. Early parenteral feeding: amino acids (1.5 to 2 g/Kg/day; glucose > 6 mg/Kg/min. Evaluate initiation of enteral feeding exclusively with human milk Evaluate hemodynamics and decide need for support. Prevent infections (minimize manipulation and ensure thorough asepsis during invasive procedures) Implement a restrictive protocol for the extraction of blood for lab testing. Meet the mother's emotional needs and establish communication and availability with family. Start supporting the mother to initiate breastfeeding.
1st week	Reconsider the permanent need for AMV and O2, trying to extubate very early Start and increase enteral nutrition (start 48 hours: trophic – increasing 24-30 ml/kg/day Consider second opinion whenever the decision to reduce or discontinue enteral feeding is suggested (e.g.: evidence of gastric residue and suspected GI disorder) Advance parenteral nutrition with no pauses /caloric goal: 120 cal./kg/day) Strict monitoring of water and calorie balance, minimizing the deficit accumulated in the first week. Plot weight gain versus standard fetal and postnatal weight gains. Prevent infections (minimize invasiveness and manipulation) Determine the need for maternal care and promote the mother's will to participate in the baby's care. Facilitate the extraction of mother's milk and its fresh use.
1st month	Plot weight gain versus standard fetal and postnatal weight gains. Advance enteral nutrition based on growth outcomes: maximize caloric potentials (fortifier, creamatocrit) Start iron supplementation Prevent infections (no invasiveness; hand hygiene with gel alcohol). Maintain mother's milk extraction and oral administration of fresh milk. Screenings: ROP control (35 days, >31 weeks). Involve the mother in the daily care, based on her own needs and those of her baby (company, hygiene, feeding, breastfeeding) Assess maternal depression and need for additional psychosocial support on Day 14.

Objective *To identify the newborn*
Activity *Make it easier for the mother to identify the newborn and meet the local requirements for identification at birth.*

The newborn's identification seeks to ensure the bond between mother and child. The appropriate elements will be used to meet local requirements; these may include taking the fingerprints of both or simply placing them both an ID band with their names, or an identifying code.

The aim in all cases is to put the mother as close as possible to her child and for as long as she wishes, to the extent possible, and depending on the newborn's status.
Putting mother and child close to each other immediately after birth is a right, and the subsequent separation is only justified by the need for special care of both mother and child or by the mother's request of help to take care of the baby.

Objective *Assess fetal growth and development before birth.*
Activity *Calculate gestational age and perform anthropometry.*

During antenatal control, fetal growth may be estimated using indirect measurements of fetal size: fundal height and ultrasonographic fetal anthropometry.

At birth, size can be determined with precision using three simple measurements, weight, length and head circumference or girth. The analysis of antenatal and postnatal measurements enables us to deduct the characteristics of fetal growth.

The newborn's growth is evaluated by comparing it with the growth of a normal population of the same gestational age.

Calculating Gestational Age
Gestational age is calculated as the difference between the date of the last menstruation (DLM) and the day of the assessment. It must be calculated at birth or during neonatal care.

If there are any doubts as to the DLM, GA may be calculated on the basis of the earliest ultrasound. (See Calculating Gestational Age)

When birth occurs before week 35, the measurement of the Head Circumference at birth is just as valuable as an early obstetric ultrasound.

The Neonatal Tape developed by CLAP/WR provides the mean head circumference values for each gestational age.
When the DLM is unknown and there are no previous ultrasound measurements of the fetal head or femur available, the HC may be taken as a basis for calculating GA as of that date.

E.g.: If we know that newborns with a head girth =24 cm, GA p50 = 26 weeks, GA p10 =24 weeks and GA p90 = 28 weeks. We can estimate that Gestational Age of a newborn with a head girth = 24 cm is 26 ± 2 weeks.

A rule of thumb for the estimation of Gestational Age is to add 2 to the head circumference value.
E.g.: The mean GA for newborns with a PC=27cm is 29 weeks.

Estimating Gestational Age

Before the development of fetal ultrasound anthropometrics, the newborn's somatic characteristics were used to estimate gestational age. (Methods by Dubowitz, Ballarrd or Capurro).

These estimations vary broadly (±2 weeks), and the gaps are even greater in preterm infants and newborns with intrauterine growth restriction. Therefore, these methods are not useful in clinical settings, since they are not precise enough to guide in the care of those newborns.

Neonatal anthropometry

Birth weight

This is the first weight recorded after cutting and clamping the umbilical cord with the neonate naked. The timeliness of the umbilical cord clamping affects neonatal weight. Early clamping of the cord, while it is still swollen and the placental side continues to pulse, prevents blood from flowing from the placenta to the newborn; the neonate's weight may be reduced by as much as 4% as compared to neonates in whom clamping was not performed early.
Measurements are in grams

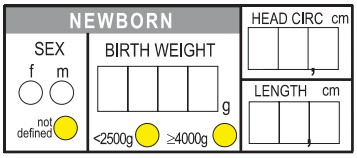

Figura 104.
Fragmento de HCP. Datos RN

Length

Crown-to-feet length is measured with a pediometer, with the newborn lying flat on its back, one of its lower limbs stretched.
It is measured in centimeters, recording up to one digit after the comma.

Head circumference

The head girth or head circumference is measured at the maximum occipital-frontal plane. The measuring tape is placed around the neonate's head while it is held against the forehead. At the maximum girth it should be possible to slide the tape tightened over the occipital bone.

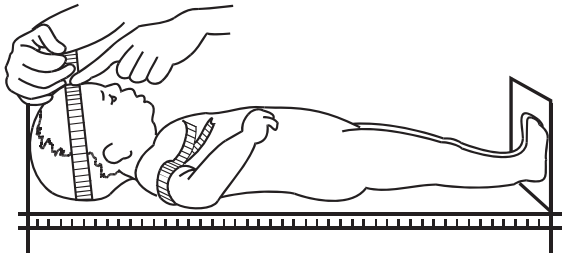

Figure .
MEASUREMENT TECHNIQUE
Head girth
Arm girth
Length

Weight for gestational age

- The weight for Gestational Age can be determined as Appropriate, Small or Large at birth. This is compared with the 10th and 90th percentiles of the population for each week of gestation. Small for GA babies are born with a weight below p10, Appropriate between p10 and p90, and Large ≥ p90. These values can be found in the gestogram (Fig. 2), the obstetric tape and the neonatal tape

There are two types of factors that control growth:

- Constitutional or genetic factors, independent of the nutritional supply to the fetus
- Conditions associated with restriction or excess of the potential growth rate

Objective: *Adapt the initial management of infants with major congenital defects*
Activity: *Establish the specific measures for each defect promptly*

Birth defects are among the causes of neonatal death that have shown less decline in relative terms. The most efficient way of reducing neonatal mortality related to congenital defects is to implement prevention and prophylaxis measures before conception occurs. This implies identifying risk factors and acting on them to reduce the direct or indirect causes, as discussed in detail in the appropriate chapter.

When the fetal congenital defect prevents respiratory autonomy, and the baby's immediate postnatal death can be anticipated, the neonate should receive compassionate care and comfort to the extent possible, and parents should be offered emotional support.
Faced with the news that their child will be born with a defect, the family goes through emotional stages that are similar to those described for bereavement or other losses.

Communicating parents about their newborn and the birth defect in question requires more emotional availability from caregivers. The people that break in the news concerning the child, that accompany the family thereafter, or in charge of making care-related decisions should be duly trained; they also need to have someone with whom to share the difficult task of accompanying the family for long periods.

Although the antenatal talks with parents and the pictures and explanations available allow them to understand their child's defect, it is usually hard for them to imagine or focus on the normal parts of their child. At the time of birth, what parents see may be different from what is seen by the doctors and the rest of the health team. The health care personnel may not expect parents to see their child differently. The usual thing is that if you show them the baby with the defect covered, parents see a hitherto unimaginable part of their child. Even in extreme situations, such as a newborn with anencephaly, the practice of showing the skull covered allows parents to remember their child that later died in a more humane way.
When the congenital defects are not life threatening and there are treatment opportunities, the neonatal management must begin at the moment of birth:

Omphalocele and gastroschisis
Abdominal wall closure defects are manifested by protrusion of the abdominal viscera through an opening (omphalocele) or adjacent to the umbilical cord (gastroschisis). Its incidence is 1 in 3,000-5,000 live births. These babies may be born through vaginal delivery or cesarean section; after birth they can be protected using a nasogastric tube to degravitate the GI contents through gentle suction, to prevent the bowel loops from dilating. The sac or the viscera must be covered with a sterile plastic bag to reduce the loss of heat and prevent the leakage of fluid. The newborn must remain in a lateral recumbent position to avoid kinking of the bowel, which may jeopardize its blood supply. The surgical repair is not necessarily an emergency to be performed immediately after birth; it can be coordinated once the neonate is stabilized or referred to a specialized surgical center.

Myelomeningocele
This is a defect in the closure of the bone structure surrounding the spine, which exposes an arachnoideal and dural sac that may or may not be lined with skin, with cerebrospinal fluid and an abnormal spinal cord inside.

Its incidence is from 1 to 1.5 per 1,000 live births.
At birth the baby should be placed in prone recumbent position to prevent any injuries to the plaque; it should be covered with a sterile dressing, after disinfecting the healthy skin surrounding the defect with an antiseptic agent. The defect is covered with sterile

polyethylene that is attached on healthy skin with adhesive tape around the edges. If there is no sterile polyethylene film available, the defect may be covered with gauze, impregnated with sterile vaseline, to prevent it from sticking to the plaque.

Diaphragmatic Hernia

The diaphragmatic hernia results from a flaw in the normal closure of the pleuroperitoneal folds. This produces a defect in the diaphragm, that leaves way to the abdominal viscera that rise into the chest. Its incidence is 1 in 2,200 live births - 85% are left, 10% are right and 2% bilateral. It is manifested by respiratory distress that appears immediately after birth and progresses thereafter.

If the newborn requires ventilatory support, the procedure should be done through endotracheal intubation, since mask ventilation may insuflate the intrathoracic digestive tract and increase ventilatory restriction.

The digestive tract contents can be degravitated by aspirating gently with a nasogastric tube until the defect can be repaired surgically.

The magnitude of the defect is proportional to its severity; it conditions the growth of the fetal lungs in uterus, and presents with severe pulmonary hypertension that affects survival once the baby is born. This condition requires continuous care at a high complexity care center.

Objective *Detection of asymptomatic congenital defects and/or diseases*

Activity *Systematic detection in the neonatal period using laboratory assays*

Childbirth provides a good opportunity to reduce the damage potentially caused by certain asymptomatic congenital diseases. Early detection requires the systematic work-up of newborns using specific diagnostic procedures.

Screening may be “universal” when it is indicated for all newborns, or “targeted”, when it is limited to conditions that only affect newborns presenting with risk factors that are rare in the general population.

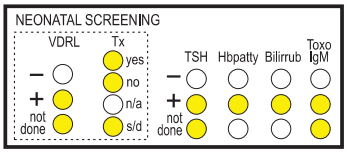

Figure 106.
PCR fragment.
Neonatal screening

Universal screening is applied to:

- Vertically-transmitted infectious diseases:
  - Syphilis
  - Toxoplasmosis
- Congenital hypothyroidism, phenylketonuria, pancreatic cystic fibrosis, galactosemia, congenital adrenal hyperplasia, biotinidase deficiency, retinopathy of the premature, Chagas
- Severe hearing deficit
- Neonatal jaundice

Targeted screening is needed in:

- Vertically-transmitted diseases:
  - Hepatitis B in HBV-positive mothers
  - HIV in HIV-positive mothers
  - Group B Streptococcus in women carrying the organism when bearing the child
  - Tripanosoma Cruzii in mothers with Chagas Disease
- Rh typing if the mother is Rh negative, immunized or not
- Sickle cell anemia, in parents of Afro-American descent
- Severe retinopathy of prematurity, if it is a Very-Low-Weight infant

Congenital syphilis

Screening, therapy and follow-up of congenital syphilis

Definition

Congenital syphilis is defined as any of the 4 conditions below:

- All live births, stillbirths, or products of gestation (genital ulcer or lesions compatible with secondary syphilis) or with reactive or positive treponemic or non treponemic tests (including rapid tests) during pregnancy, delivery or puerperium, that have not been treated or that have been treated inadequately

Or

- All newborns with RPR/VDRL titers four times as high as their mothers' or the equivalent to one change in ≥ two dilutions or more as compared to their mothers' (e.g., 1:16 to 1:4)

Or

- All children with one or several clinical manifestations suggesting congenital syphilis on the physical examination and/or evidence of congenital syphilis in the X-ray and/or positive result of a treponemic or non treponemic test

Clinical manifestations suggesting SC: Dystrophies, pneumonias, laryngitis (hoarse and persistent crying), gastroenteritis, hepatosplenomegaly, osteochondritis of the long bones evidenced in the X-ray, mucopurulent rhinitis, pseudo paralysis, jaundice and/or anemia, mucocutaneous lesions (papules, infiltrating reddish plaques around the mouth, limbs, palms, soles, perianal and perigenital areas, large roseolas, palmoplantar blisters)

Or

- All the products of pregnancy with evidence of T. pallidum in the dark field test, immunofluorescence or other dye or specific procedure in lesions, placenta, umbilical cord or autopsy material

Given that the mother's VDRL is more sensitive than the newborn's, all mothers must be tested at the time of childbirth. Children born to syphilitic mothers that were not treated because their titres were low or because their infection was too recent may have negative neonatal VDRL.

Screening also includes VDRL of the newborn's blood, preferably from the umbilical cord. The newborn's cord blood test is not needed when the mother's syphilis test at the time of childbirth is negative. However, it would not be advisable to abandon universal systematic detection of all newborns, since there is still a significant percentage of mothers that do not have a valid test and the repetition of the test at the time of delivery is not implemented as part of the standards of care.

If despite the mother's positive syphilis test she was not adequately treated, added to the newborn's VDRL test, the following below must be ruled out:

If the mother has a positive syphilis test and is treated inappropriately, the work-up should include the measures below, apart from the neonatal VDRL:

1. Clinical examination of the newborn, focusing on the search of (signs in order of specificity):
   - Radiological signs showing osteitis and perichondritis
     - Ragadies, hemorrhagic nasal discharge
     - Condylomatosis
     - Eczematous or bullous macular lesions (pemphygo) on palms and soles
     - Mucose patches
     - Hepato-splenomegaly
     - Jaundice

- Hydrops fetalis
- Generalized lymph node enlargement
- Neumonitis
- Increased size of the placenta
- Intrauterine Growth Restriction

2. Cerebrospinal Fluid Test:
   - White blood cells (over 5/mm3) or increased protein levels
   - Positive VDRL (unless the CSF sample is contaminated with blood)

Clinical management

A) Abnormal physical examination compatible with congenital syphilis or, quantitative VDRL/RPR with values 4-fold the mother's levels, or dark field or positive fluorescent antibodies in body fluids.

Evaluation

- VDRL, cell count and proteins in cerebrospinal fluid
- Complete blood count w/ platelet count
- X-rays of long bones, chest, liver function, transfontanelar brain ultrasound (TBU), hearing evoked potentials, if appropriate

Therapy

- Crystalline Penicillin G in aqueous solution 100,000–150,000 units/kg/day, administered 50,000 units/kg/dose IV every 12 hours the first 7 days and every 8 hours thereafter, completing a 10-day course or
- Procaine Penicillin G 50,000 units/kg/dose IM once a day for 10 days.

If the subject misses more than 1 day of therapy, the complete therapy must be repeated.

In the settings below, also consider the mother's history of the disease and her therapy, to decide how to conduct the newborn's work-up and management.

B) Normal physical examination with quantitative VDRL/RPR values ≤ 4 times the mother's values.

If the mother:
received no therapy or inadequate therapy, or if there are doubts in that regard,
or if she was treated with erythromycin and some other non penicillin course, or if she received therapy but less than 4 weeks before delivery

Evaluation

- Lumbar tap
- Complete blood count with platelet count
- X-rays of long bones

Patients that receive 10 days of parenteral therapy do not require a thorough evaluation, but the lumbar puncture may show CSF abnormalities and hence demand a stricter follow-up.

Recommended therapy

Crystalline Penicillin G in aqueous solution 100,000–1 50,000 units/Kg/day, administered as 50,000 units/Kg/dose IV every 12 hours the first 7 days and every 8 hours thereafter; complete 10 days or Procaine Penicillin G 50,000 units/Kg/dose IM in a daily dose for 10 days or Benzathine Penicillin G 50,000 units/Kg/dose IM in a single dose.

Monitoring
All VDRL positive newborns must be monitored and the VDRL should be repeated every 2 to 3 months until it turns negative or until it drops 4 fold. Titles should fall by 3 months and turn negative within 6 months.

C) Normal physical examinations and non treponemic tests equal to or 4 times lower than the mother's.

If the mother:
Was adequately treated during pregnancy for more than four weeks before delivery and there is no evidence of re-infection

Recommendations
Do not evaluate any further
Recommended regimen
Benzathine Penicillin G 50,000 units/Kg/ IM single dose

D) Normal physical examinations and non treponemic tests equal to or 4 times lower than the mother's.

If the mother:
Has been adequately treated before pregnancy and her VDRL titres are <1:2, RPR <1:4,
She does not require any further work-up or therapy.

Congenital hypothyroidism
Screening, therapy and monitoring of congenital hypothyroidism

Congenital Hypothyroidism (CH) affects 1 in 3,000 newborns. When it is not diagnosed and treated immediately, it has devastating effects on the infant's psychomotor development.

Clinical signs of CH occur late, the first 3 months of life, when damage to the Central Nervous System is irreversible.

The diagnostic method used is the assessment of the TSH and/or T4 levels in blood obtained from the umbilical cord or after the first 24 hours of life. The physiological increase of TSH observed in the first 24 hours of life may lead to many false positives.

The ideal screening requires assessment of both hormones in all newborns.

When the approach applied chooses to determine TSH in everybody and T4 only when TSH is high, the CHs caused by a defect of the hypothalamus-pituitary axis will be missed. (<20% of cases)

When only T4 is screened, the mild forms of CH with normal T4 that maintain high levels of TSH are not diagnosed, and yet, they require therapy.

TSH values greater than 20mU/L should be re-assessed immediately. TSH values greater than 40mU/L with a low T4 (most CHs) must be treated immediately.

Information provided to parents
Initially parents must be informed that therapy should NEVER be interrupted and it will probably be required for good.

The degree of normalcy of the child's intellectual development depends on how early the therapy is started and whether it is continued at sufficient dosages the first 3 years of life.

Therapy
Start immediately with oral Levothyroxin, T4, at a dosage of 10-15 mcg/Kg/day, to be adjusted according to the levels of T4 and TSH. High dosages (15 mcg/Kg/day) succeed in normalizing T4 in 3 days and TSH in 2 weeks. The daily doses must be quickly adjusted as the child gains weight and in accordance with the serum values of T4 and TSH obtained periodically. The expected value of T4 after one week of therapy must range around 10-16 µg/dl.

Follow-up
The assessments of T4 and TSH must be repeated two and four weeks after the onset of therapy, and then every 1 or 2 months the first year; the intervals may be extended to 3 months up to 3 years thereafter.

Sickle cell anemia
Universal or Targeted Screening of Hemoglobinopathies

Sickle cell anemia is the most common hemoglobinopathy, transmitted through a recessive autosomal inheritance that changes Hemoglobin A into Hemoglobin S. When oxygen concentration is reduced, this form of Hemoglobin alters the shape of the red blood cells and increases their adhesion to the endothelium, paving the way for vascular occlusions.

Among black women, the frequency is 1 every 400, 10% of which are heterozygote.
Countries where the black population is greater than 15% should implement universal neonatal screening, while those with less than 15% could implement a targeted screening covering newborns borne to Afro-American families.
The technique used for screening is hemoglobin electrophoresis.

The condition becomes clinically apparent in early childhood.
The diagnosis needs to be made in the neonatal period, so that families may learn to manage these children, so they can diagnose the typical bouts in a timely manner, and thus prevent complications by implementing appropriate interventions.

The disease is characterized by chronic hemolytic anemia with bouts and episodes of ischemia resulting from vascular occlusion, which may cause avascular bone necrosis, painful spinal infarctions, painful edema of hands and feet (dactilitis), spleen infarctions, renal disease and stroke.

These patients are also more prone to associate severe infections caused by Pneumococcus, Hemophilus and Salmonella.

Early detection permits to provide counseling to the families about child care, as well as to implement preventive interventions such as vaccination against Pneumococcus, Influenza and antibiotic prophylaxis with Penicillin V the first 5 years of life.

Non hemolytic neonatal hyperbilirubinemia
Universal screening of hyperbilirubinemia

Jaundice is a common finding in the healthy term newborn; it is even more frequent in babies younger than 38 weeks and in those exclusively breastfed.

Severe hemolytic jaundice cases that require exsanguinotransfusion will become apparent already within the first 24 hours of life; they must be managed by qualified staff.

In the healthy newborn's jaundice, serum bilirubin levels continue to worsen until the 3rd to 5th day, so before discharging the patient, the professionals in charge must ascertain the child's risk of presenting figures that may cause bilirubin-induced encephalopathy.

The diagnosis of the intensity and progression rate may warrant a stricter follow-up and the eventual use of phototherapy before the child is discharged from hospital.

The clinical assessment of the intensity of jaundice is not a sensitive method. Cephalo-caudal progression does not reveal the alarming values demanding intervention.
When jaundice becomes evident in the course of the first 36 hours of life, the newborn must undergo serum bilirubin testing or a skin assessment with an icterometer to determine the intensity of its yellow color.

When proper instruments are available, skin icterometry has an excellent sensitivity but a low specificity. Consequently, it is used as a non invasive screening method, to reduce the number of blood tests needed. Hence, serum bilirubin levels are checked only in newborns with high values as determined by icterometry.
The therapy and follow-up criteria must be adapted to the diagnosis of the cause. If hemolytic disease can be ruled out on the basis of the woman's history and the absence of hemolysis, the child will be managed according to its bilirubin levels and age in hours.

In newborns presenting with jaundice in their first 36 hours, the initial serum bilirubin value must be compared with the reference values in the chart below, also considering the rate at which jaundice progresses.

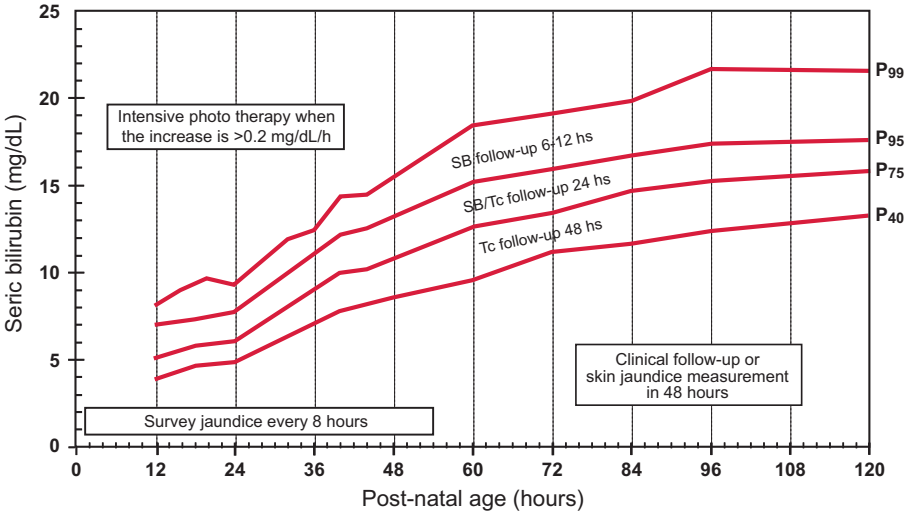

Figure 107. Reference values for the prevention of the acute stage of bilirubin encephalopathy. (According to Vinod Bhutani et al, 1999)

Suggested management of term newborns without hemolytic disease as per initial values:

- >p 95 Start intensive phototherapy.
  Maintain exclusive breastfeeding
- p 76-95 If increase exceeds 0.20 mg/dL/ hour
  Start intensive phototherapy
- p 40-75 Discharge
  check serum bilirubin levels or transcutaneous icterometry control in 48 hours
- p <40 Discharge; schedule clinical monitoring visit in 48 hours

When the instrument to measure skin jaundice is available, the systematic assessment of all newborns is recommended at discharge, following the above criteria.

Table 13. Below are the criteria suggested to guide decision-making for neonatal discharge

Age in hours at the time bilirubin levels are tested	Keep the child at hospital if the value is greater than	If the values are within this range		If the value is ≤ this value, come for follow-up in: 3-5 days
		24 hours	48 hours	
41-44	**12.3**	**10.0-12.3**	**7.9-10.0**	**7.9**
44-48	**12.7**	**10.4-12.7**	**8.2-10.0**	**8.2**
49-56	**13.2**	**11.0-13.2**	**8.7-11.0**	**8.7**
57-64	**14.7**	**12.2-14.7**	**9.4-12.2**	**9.4**
65-72	**15.2**	**13.0-15.2**	**10.3-13**	**10.3**
Higher than 72	**15.2**	**14.0-15.2**	**11.0-14.0**	**11.0**

(Modified from Vinod Bhutani et al 2006)

The re-admission rates and the exceedingly high values of bilirubin seen in outpatient care are significantly reduced when all newborns are screened before their discharge from hospital, and they meet the suggested criteria. The neonatal re-admission rate is reduced to 0.6%, the use of phototherapy is close to 4% and the exsanguinotransfusion rate is lower than 1/10,000.

If the values are within the phototherapy range, the procedure must be performed at the hospital, keeping the child by the mother and preserving exclusive direct breastfeeding.

Congenital toxoplasmosis
Systematic Detection of Congenital Toxoplasmosis

Congenital Toxoplasmosis is an infectious condition caused by Toxoplasma Gondii, which is transmitted by the mother suffering primo infection during pregnancy.
Many countries have a high prevalence of Toxoplasmosis, with the consequent risk for the mother to acquire it during pregnancy. The most successful preventive programs recommended to the mother are based on hygiene practices to avoid acquiring the infection during pregnancy, i.e., the only time at which its consequences may be extremely severe because of their deleterious impact on the fetus's Central Nervous System. Preventive measures adopted before conception and during pregnancy are analyzed in antenatal care, as well as the interpretation and management of maternal acute toxoplasmosis detected during pregnancy.

Neonatal screening of all newborns, irrespective of the mother's condition, is an effective intervention. Neonatal screening detects asymptomatic infections that may follow their natural course in the infant, leading to a severe eye damage with progressive and irreversible vision loss.

It is detected by determining anti-toxoplasma specific IgM antibodies in the newborn's blood. Blood may be collected from the cord, and it may be transported on filter paper, as already implemented for other screening tests (e.g. Congenital hypothyroidism).
In some areas, as many as 20 cases of asymptomatic congenital toxoplasmosis are detected in 10,000 births. If left untreated, 20% of them may suffer from corioretinitis the first years of life. The method detects from 50 to 80 % of the neonates affected and it is quite specific; it is estimated that more than 1 in 4 IgM-positive newborns will be sick.
Pirimethamine (50-100mg/Kg/day)-sulfonamide (1 mg/Kg/day) supplemented with Folinic Acid (7.5 mg twice a week) is the chemotherapy most frequently administered to the newborns in whom an asymptomatic toxoplasmic infection is detected. This therapy may have adverse effects, such as neutropenia as a result of bone marrow toxicity. Trials testing alternative therapies such as spyromycin, co¬trimoxazole and azytromycin are currently under way.

Severe hearing deficit
Systematic detection

Congenital permanent and severe bilateral hearing loss (more than 40 decibels) affects 1 in one thousand newborns. Half these children have no risk factors and it is impossible to recognize them clinically.

Parents and health care services tend to detect congenital deafness very late, after the first year of life.

There are electro-physiological methods that help detect this deficit in the newborn much earlier than the clinical methods, to start sensorial rehabilitation early. The use of hearing aids started within the first 6 to 8 months of life significantly improves the verbal development of these children, as compared to those diagnosed later, after the first 6 months of life.

The systematic detection of Congenital Hearing Deficit (CHD) is the first timely and essential step in a Comprehensive Care Program because it allows for an early intake and it significantly facilitates rehabilitation. In cases where screening for CHD can be reasonably incorporated, investigation of the cochlear oto-acoustic emissions and evoked hearing potentials of the brain stem can be implemented.

Objective *Prevent GONOCOCCAL OPHTHALMIA*
Activity *Instill antimicrobials in the conjunctivas at birth*

At the time of vaginal delivery, the newborn may be inoculated with Neisseria Gonorrhea (Gonococcus) present in the genitalia of the mother presenting with an untreated cervicitis.

The most severe manifestations of the infection caused by N. gonorrheae in the newborn are Neonatal Ophthalmia and sepsis, which may include arthritis and meningitis. Less severe forms include rhinitis, vaginitis and urethritis.
Eye infection usually starts from 2 to 5 days after delivery and it may present complications such as eye perforation and blindness.
The diagnosis is suspected when the conjunctival exudate shows the presence of Gram negative diplococci, and it is confirmed by bacteriological culture.

Prevention

The “safe sex” practice, a timely antenatal diagnosis and therapy constitute the way to prevent this neonatal infection.

Prophylaxis

The instillation of antimicrobials immediately after vaginal delivery or cesarean section is a safe, simple and low-cost practice.
The choices available are:

1. Freshly prepared 1% Silver Nitrate solution.[2]
2. (0.5%) Erythromycin eye ointment or (1%) Tetracyclin as a single application at birth.

The therapy of ophthalmia is Ceftriaxone 25-50 mg/Kg (not exceeding 125 mg) administered IV or IM in a single dose.

Objective *Prevent NEWBORN’S HEMORRHAGIC DISEASE*
Activity *Administer Vitamin K*

The Newborn’s Hemorrhagic Disease is a classical clinical entity characterized by an unexpected spontaneous bleeding in a healthy-looking newborn. Its early form occurs within the first 7 days and its natural incidence ranges from 0.25 to 1.7% of all newborns. The late form, with an onset between the 2nd and 12th weeks, occurs less

frequently, between 4 and 7 per 100,000 births, but it presents as a sudden intracranial hemorrhage, potentially life-threatening or leading to severe handicap.

The main indicator of hypocoagulability is a reduction of prothrombin time.

The intervention of choice consists of administering one single 0.5 -1 mg dosage of Vitamin K IM at birth. This suffices to prevent the Newborn's Hemorrhagic Disease that occurs the first days of life. The administration of a single 1 mg oral dose improves the coagulation indicators the first 7 days of life. However, there are no clinical trials showing the efficacy of administering one or several oral dosages to prevent Neonatal Hemorrhage.

Objective *Start and maintain a successful breastfeeding.*
Activity *1. Do not separate the newborn from its mother; facilitate family support.*

From the time of birth, the newborn and its mother have the right not to be separated. All the care must be provided trying to reduce the instances in which each of them receives care separated from each other to a minimum.

This practice has been known as Rooming In for 50 years. A health care institution respectful of family rights must ensure that the mother has the family support she requests so she can take care of her child.

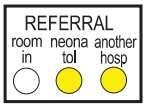

Figure 108. PCR fragment. Newborn's Reference

Regular breathing is established the first minutes of life, after the umbilical and placental flow have ceased and after the cord collapses. Later, the first hour of life the newborn is in a remarkable state of alertness, frequently exploring the mother's breast and making its first attempts to suckle.

The mother's comfort, family and staff supports are essential for successful initiation of breastfeeding.

2. Feed ad libitum and avoid bottle-feeding.

Starting breastfeeding early, ensuring uninterrupted availability of breastfeeding (on demand) and refraining from offering the bottle are all measures that contribute to initiating and maintaining a successful breastfeeding.

3. Record the newborn's feeding at discharge from the Maternity Unit

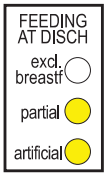

Figure 109. PCR fragment. Feeding upon discharge

The PCR includes a box to record de type of feeding the newborn received 24 hours prior to discharge. Checking the box that indicates Exclusive Breastfeeding implies that the newborn has only been fed with its own mother's milk 24 hours prior to discharge.
The precision of this information helps to monitor the quality of natural feeding practices at the institution and to correct the situations that interfere with good practices.

Objective *Prevent severe tuberculosis in the infant*
Activity *BCG immunization at birth*

Figure 110.
PCR fragment.
BCG vaccination

The reduction of tuberculosis in the population is the result of the implementation of a set of hygiene and preventive measures, early detection and therapy of the cases confirmed.

BCG (Bacillus Calmette & Guerin) immunization at birth is part of this set of measures. Even when initially its practice was restricted to newborns in contact or exposed to TBC patients, it was later adopted universally and administered to all newborns for over 50 years.

BCG immunization consists of injecting Mycobaterium Bovis to induce protection against M. tuberculosis infection.

Newborns, infants and young children are extremely susceptible to TBC.

BCG administration increases the vaccinated newborn's protection by more than 50%, but it will not alter the transmission chain. Although it does not provide immunity against all the potential forms of tuberculosis, it is important because its does prevent severe forms of meningitis and disseminated or miliary tuberculosis.

It may produce a local papular reaction and fever, and less frequently lymph node involvement and local abscesses.

Objective *Prevent Sudden Infant Death*
Activity *Put the newborn to sleep FACE UP*

Sudden infant death occurs in healthy children during sleep, in the absence of any acute conditions accounting for it. Its frequency ranges from 1 to 2 children every one thousand live births.
For more than one decade, several countries have implemented practices involving management of the child and its environment that have reduced the frequency of sudden death by 50%.

During antenatal control, the most important preventive intervention to tackle that problem is to help the mother quit smoking and to ban smoking from homes. Studies showing a higher frequency of sudden death in infants that slept face down versus infants of similar age and childrearing that did not die in the same neighborhood and at the same point in time, led to promoting the practice of putting the baby to sleep FACE UP to prevent sudden death.

The time immediately after delivery and while the mothers and their babies are still at the hospital is appropriate to check whether the mother puts the baby to sleep face up and to provide counseling on the best practices.

Figure 111.
PCR fragment.
Newborn's position in the crib

There are also protective factors, such as:

- Avoid excessive clothing and room temperature over 20 ºC
- The use of excessively soft mattresses and bulky pillows and blankets should be

avoided; instead, use firm mattresses and one or two thin blankets
- Tell parents not to let their baby sleep on the same couch where they are watching television

Maternal breastfeeding would provide a significant protection, probably because night sleep is lighter and the mother attends the infant more frequently to feed it.
Pacifiers appear to provide some protection, and although this concept is not universally accepted, at least there is enough evidence not to discourage its use if parents request the health team's opinion.

Objective *Reduce the risk of those born at a gestational age between 34 and 36 weeks (late preterm) and from 37 to 38 weeks (early term)*

Activity *Increase surveillance in the adaptation period, while they stay with their mothers (rooming in)*

The conventional clustering of infants by gestational age divides them into three groups: Preterm until 37 weeks; Term from week 37 to week 42, and Post term over 42 weeks.
The decision on the timing of childbirth is a common clinical fact in modern obstetrics. These selective births are increasing the number of infants born at younger ages than those that occurred spontaneously. The decision to stop pregnancy after 41 weeks because of the increased risk of fetal death is fully justified.

A significant number of births occur after a gestational age of 34 weeks and before reaching full term. These neonates can be distinguished from those of lower gestational age because they often have full lung maturation and can latch to initiate breast-feeding.

Most selective births start after a gestational age of 34 weeks and they are different from those of a lower gestational age, as they have already achieved lung maturation and they can latch and swallow, i.e., the functions that are key to their autonomy. However, selective births between weeks 34 and 39 have a higher morbidity associated with adjustment disorders. Morbidity increases with each week of gestational age that is anticipated.

The period with the lowest morbidity extends from the 39th week to the 41st week of gestation. As week 37 is conventionally considered the beginning of the full-term period, selective births have been divided into two groups, i.e., late preterm - when birth occurs from weeks 34 to 37- and early term, from 37 to 38 weeks.

Late preterm
Late preterm infants are defined as those born from 34 weeks 0 days to 36 weeks 6 days, and they represent up to 70% of all preterms; they account for 8.8% of live births, when the preterm rate is 12.5%.

The factors that have been implicated in the increase of late preterm births are:
- The improved antenatal diagnosis of fetal or maternal complications has led to an increase in obstetric interventions
- Inaccurate calculation of gestational age
- Increased number of multiple births, in part explained by the increase in assisted reproduction

- The mistaken belief that full maturity is reached at 34 weeks
- Increase in elective cesarean sections

While most of these babies have full lung maturity and can be often breast fed in the room with their mothers, that does not occur in 100% of the cases, leading to a higher mortality and morbidity at older ages.

Neonatal mortality (0 to 27 days) of those born between 34 and 36 weeks is 4.6 times greater than mortality of full-terms; likewise, infant mortality (from zero to 364 days of chronological age) is 3.5 times higher than the mortality of those born at term. Compared with term infants, these neonates have more difficulties feeding (32% versus 7%), hypoglycemia (16% versus 5%), jaundice (54% versus 38%), temperature instability (10% versus 0%), apnea (6% versus less than 0.1%) and RDS (29% versus 4%). They are also 3.5 times more likely to have 2 or more complications during hospitalization. When the infant is discharged before the 4th day of life, re-hospitalization is 1.5 to 3 times more frequent due to jaundice (71%), suspected infection (20%) and feeding difficulties (16%).

Early Term

The early term infant is defined as the baby born between 37 weeks 0 days and 38 weeks and 6 days. They are 17.5% of live births. This group shows a higher incidence of adaptation problems, presenting as transient tachypnea of the newborn, respiratory distress syndrome and persistent pulmonary hypertension. Those born at 37 weeks are 3 times more likely to present a respiratory distress syndrome than those born at 38 weeks, and 7.5 times more likely than those born at 39 to 41 weeks gestational age.

Table 13: Respiratory Distress Syndrome between weeks 34 and 41 of gestational age

Gestational age (weeks)	Incidence of RDS (per 1000 live births)
34	**30**
35	**14**
36	**7.1**
37	**1.8**
38	**0.6**
39 - 41	**0.08**

Data from: Madar J, Richmond S, Hey E. surfactant-deficient respiratory distress after elective birth at term. Acta Paediatr 1999, 88:1245

The caesarean section is an important independent risk factor that is associated with increased respiratory morbidity in full-term newborns.

Table 14 - Incidence of respiratory morbidity in late preterm and term infant by mode of delivery.

	Cesarean section n (%)	Vaginal delivery n (%)	Total n (%)	Odds ratio (IC 95%) for cesarean section
Live births	4301 (17.00)	21017 (83)	25318	
Transient tachypnea	151 (3.50)	238 (1.10)	389 (1.50)	3.3 (2.6 - 3.9)
RDS	20 (0.47)	33 (0.16)	53 (0.21)	3.0 (1.6 - 5.3)
Pulmonary hypertension	17 (0.40)	17 (0.08)	34 (013)	4.9 (2.2 - 8.8)
Total	188 (4.40)	288 (1.4)	476 (1.9)	3.3 (2.7 - 4.0)

Extracted from: Levine EM, Ghai V, Barton JJ, Strom CM. Mode of Delivery and Risk of Respiratory Diseases in Newborns. Obstet Gynecol. 2001 Mar; 97 (3): 439-42.

Infection control

One of the key objectives is preventing infections in the healthy and full-term newborn and particularly in newborns requiring interventions and invasive practices, depending on the potential complications.

In many cases nosocomial infections are underestimated because children are often discharged before the onset of symptoms.

These situations are relevant and potentially more frequent at neonatal and intensive care units, and their frequency and characteristics may vary depending on the care units and their complexity, the prescription habits and the recurrence of invasive procedures, and they are particularly dependent on the characteristics and quality of care.

Prevention of infections implies a continuous process that covers from pregnancy to the care of the child at home, after discharge. This implies the prevention of prematurity, the prevention, diagnosis and timely treatment of infections during pregnancy. Adoption of correct hygiene measures by all the staff in touch with the newborn, as well as the mother and the people in contact with the baby. The early start of breastfeeding is clearly a protective factor against neonatal infections. These aspects must be worked out at the institutions and must be part of the advice provided by the mother at discharge. If any invasive procedures are required, they should be limited both in number and duration

Conditions and instructions at discharge

It is advisable to keep the mother and her child at the hospital for at least 48 hours; that will provide the staff a chance to monitor them to rule out any abnormal conditions, to evaluate the start and the technique used for breastfeeding, and to provide support and information to the mother and the family group.

The core issues that should be approached at discharge include:

- Feeding:

o Inform about the reflexes that stimulate a good lactation, positions for breastfeeding, significance of the regular emptying of the breasts, care of the nipples and prevention of breast problems

- Inform about the physiological weight loss,
- General hygiene and care of the umbilical cord
- Sleeping position and prevention of the Sudden Infant Death Syndrome: Put the newborn to sleep face up, do not dress the baby too warmly; do not smoke around the infant; avoid sharing the bed with the baby
- Teach how to recognize Signs of alarm: General signs, color of skin and mucosae, Respiratory, Cardiovascular, Gastrointestinal, Urinary, Neurological, Musculoskeletal signs,
- Give information about the best intergenesic interval and reproductive health counseling
- Instruct on the appropriate immunizations at birth and within the first week, as indicated in the national schedule
- Check the baby's and mother's identification.
- Provide guidance for registration of the child at the National Civil Registry.
- Give instructions for the first control visit 7 days after discharge, clearly indicating date and place (preferably coordinate contra referral)
- Assess any conditions entailing social risk prior to discharge
- Guide about screening tests and delivery of test results

In many cases it may help to develop and hand out training leaflets with the basic knowledge to be transmitted upon discharge.

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CHAPTER VI

Joint Care of Mother and Child after Birth

Objective *Rationalize resources and reduce missed opportunities Control the wellbeing of the puerperal woman and her newborn Detect and evaluate deviations from physiological limits in both*

Activity *Joint care of mother and newborn during the postpartum period Education of the puerperal woman Clinical controls of the woman and child Entering data in the Perinatal Clinical Record*

During postpartum hospitalization and until they are discharged home, mother and child receive joint care. The staff is trained to meet the needs of both simultaneously, through round-the-clock rooming-in and the provision of privacy and appropriate rest and feeding. The duration of joint hospitalization is extended as long as the hospital continues to be more beneficial than the newborn's home for the purpose of adaptation and the mother's immediate postpartum care.

Quite frequently, after being discharged from the Maternity Ward, mother and child are referred to separate health care professionals, at different facilities and on different dates.

Even when rearing a baby implies interactive biological linkages between mother and child, the implementation of common care protocols is not common practice. The objective of planning joint postnatal care is to rationalize the human resources of care givers, making the most of each opportunity to promote the health care of both mother and child, reducing missed opportunities. Avoiding separate visits by promoting joint care implies sparing the families much of their time and economic resources.

Records

The postnatal care of mother and child can be started using the data available in their Perinatal Clinical Record. That may be complemented with the information obtained from the neonatal unit in those cases where the newborn has required admission into a special neonatal care unit.

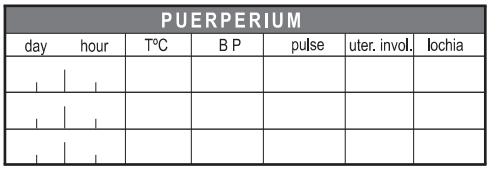

Figure 112. Fragment of the PCR. Postpartum controls

Affective support
At each encounter, the health care professional is expected to investigate:

- The mother's emotional wellbeing
- The assistance she obtains from her family and the rest of the community members to solve the everyday problems she has to face as a mother

If the family or the mother herself report that she has experienced emotional changes or that she is not behaving as usual, a referral to a mental health professional should be promoted for assessment and care.

Both mothers and families must always be treated with care, respect and dignity.
Their points of view, beliefs and values concerning her own care and her child's care must be contemplated, except when they may have a deleterious impact); any changes suggested should be discussed respectfully with the mother and her family, based on trustworthy and timely information. Mothers will always be expected to make their own decisions about their own care or any potential treatment required.

Good communication is essential. When deciding the information and care to be provided, the staff should choose the appropriate language and the mother's cultural practices, considering any special needs because of physical, cognitive or sensorial handicaps.

Staff skills
The staff in charge of mother and child must be knowledgeable, with proven competencies and experience showing they are capable of:

- Assessing both mother and child and recognizing signs of alarm
- Supporting the initiation and maintenance of breastfeeding
- Recognizing signs and symptoms of the mother's mental health
- Recognizing risks, signs and symptoms of domestic violence and child abuse
- Identifying the existing resources so that the mother can get counseling and support

Definition
Postpartum starts with the completion of the delivery of the placenta, and extends for six weeks. All the physiological changes caused by pregnancy will disappear during this period; only breast changes will remain and will become even more intense, to allow for successful breastfeeding.

Immediate postpartum: this covers the first 24 hours after childbirth, including the 2 hours following the delivery of the placenta. Its importance lies on the fact that this is the period in which there are more severe complications, especially bleeding-related disorders.

Controls of the mother and newborn

Mother	Newborn
First 24 hours	
Immediate postpartum: • Consciousness; alert and calm • Well-colored facies, skin and mucosae (except if there was pre-existing anemia) • Pulse rate at baseline, (60 and 100 bpm); full pulse. • Blood pressure within normal ranges • Body temperature should not exceed 37° C. Chills are normal after delivery of the placenta, but they rarely last more than 30 minutes • Retraction of uterus (Pinard's safety balloon); by now, the fundus does not exceed the umbilical scar; it feels firm at touch, and turns woody when stimulated. It is painless to palpation, but it tends to hurt when the baby suckles (afterpains). Common pain relievers and non-steroidal anti-inflammatory drugs are indicated if there is pain • In case of abundant vaginal bleeding with a well-contracted uterus, conduct a thorough examination of the birth canal to rule out lesions (tears) of the vagina and cervix • Describe the key signs of alert and keep a close monitoring of any potentially life-threatening conditions in the mother. (See chart) • Encourage the mother to start moving round. Obese mothers are at a higher risk of thromboembolism because of bed rest • Women that are not immunized against tetanus or rubella should be immunized before discharge • Non-immunized Rh negative mothers bearing an Rh positive newborn should be administered the appropriate dose of gamma globulin immediately, in accordance with local standards • Guide and facilitate access to family planning methods • Occasional occurrence of swollen hemorrhoids that improve partially with local ice and creams with topical anesthetics • Urinary retention is exceptional; if present, it should be treated with an intermittent urinary catheter Perineal cleaning: • Each time the woman wants to change the menstrual pad, she must clean the area with clean water and soap or an antiseptic agent. Washing should be done flushing the water always backward (from the vulva to the anus). Wipe with a clean cloth or gauze • Place a pad (gauze-cotton-gauze) or "night" protecting pads available in the market between skin and underwear • Discourage intravaginal lavages • Similar recommendations apply in the case of episiotomy, but stressing the importance of preserving the area dry as long as possible Care of the nipples: • Expose the areola and the nipple to the sun from ten to fifteen minutes a day, lubricating them only with colostrum or mother's milk	A healthy child: • Do not move away from mother. • Encourage physical closeness of the two. • Promote early breastfeeding if the mother wishes so. • If she is a primipara, reassure the mother that initially not all mothers feel strong enough, or willing to take care of their babies 24 hours a day, and that that changes within a few days. Accompany the mother, suggesting how to put the child to suckle, not touching her breasts, and respecting her natural modesty. • Brief her on the advantages of preserving exclusive breastfeeding, and tell her that it is normal for lactation to hurt initially, but that it will soon get better. • Do not administer any milk other than the mother's without due medical prescription and the mother's consent. • Do not allow the publicity of cow's milk formulas, or giving away free samples to mothers. • Is feeding and suckles well. • Rests between each breastfeeding and wakes up to feed; not excessively irritable. • Normal color for her ethnicity (check the presence of cyanosis or jaundice). • Moves the bowel and passes urine several times a day (wets diapers every 3 hours), • Respiratory rate between 30 and 60 breaths per minute. • Heart rate between 120 and 160 beats per minute. • Temperature not over 37° C (axillary or inguinal). • Keep the child warmly wrapped until there is evidence of heat control. • Mention the dose of Vitamin K already administered to the newborn and prescribe a second dose 7 days later if it was administered orally. • Instruct the mother to make sure the cord is always dry and clean.

Information at discharge

During the hospitalization for childbirth, both the mother and her family must receive information on postnatal care and the measures to preserve the health of mother and child. Upon discharge, precise instructions should be given on:

- How she can keep an on-going contact with the services available
- The new needs for family support and the community services available for support in parenting and
- Instructions to guide her when seeking care in the event of signs of alarm that may threaten the mother's health and/or the child's.

• Discharge is recommended 48 hours after childbirth if it was uneventful, and as long as the mother is ready to take care of her newborn. When an early discharge is required for whatever reason, ensure that home monitoring will be provided. • If necessary, implement telephone query systems with people qualified to answer such questions either at the health care center or the community. Remember that the first 24 hours tend to be the most life-threatening, both for the woman and her newborn.	• Remind the mother of the advantages of maintaining exclusive breastfeeding, Inform about the importance of regular washing of breasts, the cleanliness of the nipples and the advantages of wearing a bra to hold the breasts without pressure, to prevent any breast problems • Remind the mother to wash her hands and take good care of the umbilical cord • Preventing the Sudden Infant Death Syndrome: put the newborn to sleep face up; avoid excessive clothing, do not allow anyone to smoke in the area; discourage taking the baby to the parents' bed to sleep • Teach how to detect signs of alarm. • Prescribe the appropriate immunizations at birth and first week, following the national guidelines Check the identification of mother and child. • Give guidance on how to register the newborn at the National Citizens' Registry. • Clearly indicate date and site of the first control, 7 days after discharge (co-ordinate contra referral whenever possible) • Prior to discharge, assess any aspects suggesting high social risk • Provide guidance on the screening tests and retrieval of results • In many cases it may help to develop leaflets containing basic knowledge to hand out at discharge

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- Discharge is recommended 48 hours after childbirth if it was uneventful, and as long as the mother is ready to take care of her newborn. When an early discharge is required for whatever reason, ensure that home monitoring will be provided.
- If necessary, implement telephone query systems with people qualified to answer such questions either at the health care center or the community. Remember that the first 24 hours tend to be the most life-threatening, both for the woman and her newborn.

- Remind the mother of the advantages of maintaining exclusive breastfeeding, Inform about the importance of regular washing of breasts, the cleanliness of the nipples and the advantages of wearing a bra to hold the breasts without pressure, to prevent any breast problems
- Remind the mother to wash her hands and take good care of the umbilical cord
- Preventing the Sudden Infant Death Syndrome: put the newborn to sleep face up; avoid excessive clothing, do not allow anyone to smoke in the area; discourage taking the baby to the parents' bed to sleep
- Teach how to detect signs of alarm.
- Prescribe the appropriate immunizations at birth and first week, following the national guidelines

Check the identification of mother and child.

- Give guidance on how to register the newborn at the National Citizens' Registry.
- Clearly indicate date and site of the first control, 7 days after discharge (co-ordinate contra referral whenever possible)
- Prior to discharge, assess any aspects suggesting high social risk
- Provide guidance on the screening tests and retrieval of results
- In many cases it may help to develop leaflets containing basic knowledge to hand out at discharge

First joint visit between D7 and D10	
Mediate postpartum: from Day 2 to Day 10 after childbirth • Provide information on perineal hygiene or care of cesarean section. • Remind mothers that feeding the baby exclusively with mother's milk (day and night), with no additional supplements, has a fleeting and unpredictable contraceptive effect, and that even breastfeeding, there may be other contraceptive options available. • Vital signs (temperature, heart rate and blood pressure). Any changes in vital signs will warrant the search of an etiological agent – if doubts persist, refer to a higher complexity level to complete care. • Evaluation of the lochia (amount, appearance, composition and odor). As estimating the amount may be difficult, rule out the presence of anemia in mother. By now, the color should be red to pink. Brown, chocolate like lochia should suggest infection. Other than blood, they tend to contain small tissue fragments. Odor may be strong; foul odor should always suggest infection. • Control of uterus involution. Involution is extremely quick, approximately 2 centimeters a day, and it is assessed by palpating the fundus. At the 6th day of postpartum it will be between the navel and the upper rim of the pubis. At Day 10 it will be close to the pubis. • Inflamed and painful hemorrhoids may occur; if they do not improve with medical treatment, rule out hemorrhoid thrombosis, which may be easily solved with a minimal surgical drainage under local anesthesia. In other occasions pain may be the expression of an anal fissure, which usually resolves after some weeks. • Although urine incontinence may be commonly seen, it usually resolves on its own within a few days or weeks. • Milk ejection. Colostrum is finally replaced by milk	• Check that the baby is wetting diapers regularly and passing meconium, that suction is loud, vigorous and sustained, and that the mouth is moist. • Examine the baby without bothering it, to obtain the information required to detect new conditions that may warrant therapy. • Look for elements suggesting a higher risk of hip dysplasia (asymmetry of the limbs or folds on the anterior aspect of the thigh, Maneuvers: Barlow and Ortolani) • No double weighing is required; it is not even necessary to weigh the newborn every day. • In case of jaundice, rule out any elements of risk. • Promote hand hygiene and the use of gel alcohol. • Inform on the risk of contagion of respiratory viral diseases and how to prevent them. • If formula has been indicated, explain how to fix it and the measures of hygiene required assuring cleanliness during the procedure. • Find out about the social support available to the mother or to parents.

Second visit between D15 and D30	
Late postpartum: From Day 11 to Day 42 postpartum • Reinforce counseling on contraception and intergenesic spacing, trying to maintain breastfeeding. • Monitor the course of breastfeeding. • Monitor the involution of the uterus and the recovery of the pre-pregnancy status • Look for minor symptoms of depression. Seek professional care if those signs of depression persist beyond Day 14. • Prevent re-infection with sexually transmitted diseases, especially if they had been detected and treated during the current pregnancy. • Pay attention to situations of helplessness and domestic violence. • 25 days after childbirth there may be a scanty vaginal bleeding, generally due to a normal proliferation of the endometrium; this does not require any specific workup or therapy • Sexual intercourse is frequently resumed by now, when the lochia resolve around 30 to 40 days after childbirth. In some cases, this will be the woman's last visit, so it is highly recommendable to conduct a comprehensive clinical and gynecological examination. Analyze jointly with the parents when to resume work or education, checking the advocacy of rights in the new maternity setting.	• Follow immunization in accordance with official scheme. • In case of epidemic, insist on hand hygiene, the use of gel alcohol and the risk of viral respiratory diseases. • Assess growth and feeding. Consider the possibility of administering supplementary iron and vitamin D. • Repeat the physical exam, • Repeat the information on the risk of sudden death. Recommendations: The newborn should sleep face up, in a crib, in the mother's bed the first 6 months. Do not ban the use of pacifiers Place the baby's feet touching the crib footer. (to prevent the baby from sliding under the blankets) Avoid: Tobacco smoking at home, sharing the bed with parents who sleep holding the baby in a couch (especially when associated to alcohol consumption or psychotropics, or exhaustion). • Dress the child with front-buttoned clothes

Late postpartum

This period extends beyond Day 42, but no longer than one year. Its relevance is due to the fact that there are some morbid and even life-threatening conditions that may occur during this period.

- The baby follows a person's look and smiles at others as from weeks 6-8. Check congenital deafness screening, if available.

Chart 31. Problems commonly seen in mothers

SIGNS AND SYMPTOMS	ACTIONS
Postpartum depression	Seek care if symptoms persist longer than 14 days
Soar perineum, foul odor of vaginal exudates, painful intercourse	Rule out infection or poor healing of episiotomy. Prescribe local cooling and pain relievers; if ineffective, consider local or oral non-steroidal anti-inflammatory agents
Painful intercourse	Check wound. Prescribe water -based lubricants
Headache after epidural or spinal anesthesia	Liquid pain-relievers and rest – avoid pillows
Persisting fatigue	Investigate other symptoms (especially anemia). Highlight the need of iron and exercise
Back pain	Treat like general population
Constipation	Recommend fiber-rich diet and plenty of fluids. A mild laxative may help
Hemorrhoids	Refer if they are severe, edematous or prolapsed
Fecal incontinence	Teach exercises to strengthen pelvic floor
Urinary tract incontinence	Teach pelvic floor exercises. Refer patient if inc
Urinary retention (the first 6 hours after childbirth)	Luke-warm shower. If ineffective, consider placing a bladder tube

Chart 32 Problems commonly seen in newborns

SIGNS AND SYMPTOMS	ACTIONS
Jaundice	Seek care at the emergency room
Oral candidiasis (thrush)	Topical antifungal therapy.
Diaper rash	Recommend more frequent changes of diapers. If it gets very bothersome and persistent, use antifungal agents.
No passing of meconium in 1 v, 24hrs	Seek care immediately- EMERGENCY
Constipation in a non-breastfed	Seek care
Diarrhea	Increase feeding frequency. If the newborn is on formula, check cleanliness of bottle preparation and seek care immediately.
Inconsolable crying	Seek urgent care
"Colics"	Recommend holding the crying baby up and seeking the support of other parents if they feel overwhelmed.

Chart 33 Problems commonly seen during breastfeeding

SIGNS AND SYMPTOMS	ACCIONES
Sore nipples or swollen breasts – Mastitis	Consider potential Candida infection. Recommend breastfeeding on demand, breast massages, manual milking, pain relief, Seek care if signs and symptoms persist for hours, and consider the use of ATBs if there is clear evidence of infection
Senos ingurgitados Mastitis	Recomend feeding on demand, breast massage, hand expression of milk, analgesia. Seek care if symptoms persist for several hours; consider antibiotic therapy if there are elements clearly indicating infection.
Inverted nipples	Be more supportive, reassuring the mother

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CHAPTER VII
FAMILY PLANNING

Objective *To contribute to exercising the right to plan pregnancies*
Activity *To provide counseling on the main contraceptive methods.*

Family planning has been regularly incorporated to health services since the sixties. Almost 30 years had to elapse until – towards the end of the 20th Century and as a result of the world summits organized by the United Nations – family planning started to be considered a human right in the context of sexual and reproductive health. In one of its sections The Plan of Action of the International Conference on Population and Development held in Cairo in 1994 states:

…"Reproductive health-care programmes should provide the widest range of services without any form of coercion. All couples have the basic right to decide freely and responsibly the number and spacing of their children and to have the information, education and means to do so."

The Counseling Process
Information and counseling on contraceptive methods is set in the framework of the family counseling and planning process. During this process, the professional counsellor provides each woman and each man with the necessary knowledge so that they can freely opt for the method they will use, if they decide to do so.

Counseling should take into account the different stages of the reproductive life cycle (adolescence, youth, perimenopause) and the degree of sexual activity. In order to choose a method, information should be provided on the safety, efficacy, use, convenience, side effects and economic accessibility, in a framework of respect to the various lifestyles and values, as well as subjected to the couple's acceptance.

The healthcare team's main objective at this stage is to provide support to the person or the couple, empowering them to decide on the most suitable time to seek pregnancy, to define the number of children they will have or how to prevent pregnancy.

Counseling and Sex Education
The counseling process is essential and it cannot be disregarded even when there is sex education. Sex education should begin before puberty so that when a girl has her first menstrual period she will already be familiar with her body and the physiology of conception. The aim is that by the time the girl-adolescent-woman finds herself in a position where she must decide whether to entertain intercourse, she can do so without the fear associated with ignorance, knowing how to protect herself against STIs and an unwanted pregnancy, with enough autonomy and confidence to permit her to negotiate the appropriate moment and conditions. The information provided to boys or young men should not only be the same that the girls get, but it should be transmitted using a gender perspective, so they can assume the responsibility for their actions and eventually be prepared for responsible parenthood. Unfortunately sex education in the Americas is a

pending subject in the agendas of most countries. Despite the fact that sex education is not under the direct responsibility of the health sector, health teams should not miss the chances to discuss this issue when users come forward seeking care or advice.

Assessment of the users before recommending a contraceptive method: Before proposing any contraceptive method, the woman should be correctly assessed; this should include tests and eventually examinations according to the following classification:

Class A. Mandatory tests that are essential for the safe use of the contraceptive method.
Class B. Tests which, although not essential, may contribute to the safe and effective use of the method; these will depend on the center's capabilities.
Class C. Tests that do not contribute to the use of the method, but that should be performed regularly to provide comprehensive health care to women.

Chart 34. Summary of the examinations to be performed according to the contraceptive method recommended

Specific situation	Combined	Progestin-only	IUD	Barriers	Female sterilization	Vasectomy
Breast examination by provider	**C**	**C**	**C**	**C**	**C**	**n/a**
Pelvic/genital examination	**C**	**C**	**A**	**C**	**C**	**A**
Cervical cancer screening	**C**	**C**	**C**	**C**	**C**	**n/a**
Hemoglobin test	**C**	**C**	**B**	**C**	**B**	**C**
Routine laboratory tests	**C**	**C**	**C**	**C**	**C**	**C**
STI risk assessment	**C**	**C**	**A**	**C****	**C**	**C**
STI/HIV screening	**C**	**C**	**B**	**C****	**C**	**C**
Blood pressure screening	*	*	**C**	**C**	**A**	**C*****

* Blood pressure control is always recommended, but if such measurements are not possible, that should not keep the person from using these contraceptive methods.

** Nonoxiol-9 containing condoms should not be used by people with a high risk of HIV infection.

*** Only for procedures requiring local anesthesia.

Classification of contraceptive methods
There are two types of contraceptive methods: reversible and irreversible.
Reversible methods have the widest application and acceptance among women and as the name indicates, once discontinued, fertility is restored. Conversely, irreversible methods lead to a permanent restriction of the subject's capacity to conceive.

Description of the contraceptive methods

A. Reversible Methods

1. Behavioral (or fertility awareness) methods are based on the observation of the signs and symptoms naturally occurring during the fertile and infertile phases of the menstrual cycle. By being aware of her fertile days a woman can prevent pregnancy by using another contraceptive method those days or abstaining from sexual intercourse.

There are various behavioral methods, but we will limit our discussion to four of them, the most popular and the easiest to apply.

If maximum contraceptive safety is intended, behavioral methods should only be used by women with regular cycles and the awareness and discipline required.

The advantage of these methods is that they are free of charge.
As a whole, the disadvantage of behavioral methods is that they provide no protection against STIs and HIV/AIDS.
Failures: On average the failure rate for all behavioral methods is 25%

- **Calendar (rhythm) method (Ogino-Knaus)** is the most widely used behavioral method. The authors of this method demonstrated that in a 28-day cycle the fertile period occurs around day 14. The method is based on abstaining from sexual intercourse during ovulation. As ovulation may vary even with regular cycles, abstinence is recommended five days before and up to five days after the estimated date of ovulation. It should also be noted that an egg lives approximately 30 hours, whereas sperm preserves its fertilizing ability for up to 3 days

Periodical abstinence has a high failure rate that can be improved if the woman takes her basal body temperature or checks the consistency of her cervical mucus.

Disadvantages: Only advisable for women with regular cycles not shorter than 26 days; its application requires a high degree of training, motivation and discipline.

- **The Billings method or cervical mucus method** consists of recognizing the periovulatory days based on the woman's cervical mucus. At the beginning of the cycle she will perceive scarce yellow-white secretions (dry days), and as ovulation approaches the secretions become clearer and stretchy (wet days). After ovulation secretions become scanty, resembling the discharge observed early in the cycle. Women should avoid unprotected sex since the day they notice increased secretions and up to 5 days after the peak day (ovulation)

Disadvantages: Its use requires high levels of motivation and discipline. Sexual intercourse during the days prior to ovulation alters the degree of vaginal moisture. Various vaginal treatments (ovules, creams, gels and irrigation) or STIs also modify vaginal moisture.

- **The Spinnbarkeit method** is based on the detection of ovulation through the stringy quality of cervical mucus. It consists in measuring the elasticity of a drop of cervical secretion by placing it between the thumb and the index finger. If the drop stretches 7 cm or more without breaking the woman is considered to be fertile. She should avoid sexual intercourse while secretions continue to be stretchy

Disadvantage: Requires high motivation and has the inconvenience of having to check the consistency of cervical secretions every day.

- T**he basal body temperature or symptothermal** method consists in taking and recording the sublingual temperature daily each morning as soon as the woman wakes up and before she gets out of bed. When she records a rise of about 0.2 to 0.4º C it is estimated that ovulation has occured. The moment of maximum fertility is during the 72 hours that follow the basal temperature rise

Disadvantages: The main drawback is that there is a 48-hour delay in the diagnosis of ovulation, so pregnancy can occur if she had unprotected sex before identifying the temperature rise is identified. It cannot be used if a woman has fever. It requires basic training for measuring and recording temperature.

2. Lactational Amenorrhea Method (LAM). The relation between the duration of breastfeeding and the duration of amenorrhea has been demonstrated. The longer breastfeeding lasts, the longer the amenorrhea will last.

The average duration of amenorrhea in mothers who are not breastfeeding is 55 to 60 days (ranging from 20 to 120 days). Exclusive breastfeeding is associated with longer periods of amenorrhea and infertility, compared to mothers who are not fully breastfeeding.

The lactational amenorrhea method (LAM) consists of using breastfeeding as a temporary contraceptive method.

Failure rate: less than 2%.

Failures are minimal provided that:
- There is exclusive breastfeeding and on demand
- Monthly bleeding has not resumed
- Not reliable after the 6th month after childbirth

Disadvantages: It does not protect the neonate born to HIV positive mothers from vertical transmission of HIV. Together with the behavioral methods, it shares the disadvantage of not providing protection against STIs or HIV/AIDS and the advantage of having no economic cost and not affecting the user's metabolism.

3. Barrier methods. There are various barrier methods, the most widely used of which are the male condoms. There are also female condoms, diaphragms, cervical caps and spermicides.Women with medical conditions that make pregnancy an unacceptable risk y should be informed that barrier methods may not be the best option if they are not used consistently and correctly, due to the high failure rate.

- **Male condom.** Together with the female condom, these are the only contraceptive methods that also protect against sexually transmitted infections and HIV/AIDS (double protection). Its use should therefore be promoted even in women and men who use other contraceptive methods. Likewise, if there is a risk of STI/HIV infection during pregnancy, its use throughout this period should also be promoted.

Although this is essentially a male contraceptive method, providers should encourage women to exercise their sexual and reproductive rights so that through "negotiation" processes they may persuade their partners to use condoms.

Advice for users:

- Precuations prior to use: Users should be explained how to verify the elasticity of the contents of the package (air and mobility), that the pack is untampered and to check the expiration date (if the package only has manufacture date, a validity of up to 5 years is accepted)

- Precautions during use. Do not use teeth to open the package. Before sexual contact, place the condom on the erect penis. On doing so, leave a small portion free on the tip of the penis and then unroll. Withdraw the penis from the vagina while it is still erect, holding the rim of the condom in place. Check that the condom did not break. Use a new condom for each sex act

Recommend the use of emergency contraceptive pills if the condom breaks or if it stays in the vagina.

Failures: Under ideal conditions, failure rates reach 3% and in real world conditions they rise up to 15%.

Advantages: They protect against STIs/HIV/AIDS. The lack any other major effects on women's or men's health. They are cheap and easily accessible, and they may contribute to delaying premature ejaculation.

Disadvantages: Require motivation for consistent use. Allergic subjects may develop hypersensitivity to latex or the lubricants they contain. Polyurethane or lambskin condoms are available for such cases of latex allergy; however, these (natural) condoms are considerably less effective for protecting against STIs – HIV/AIDS than latex condoms.

- The female condom is a thin, soft and loose plastic sheath that is placed into a woman's vagina, covering it entirely. It has two flexible rings, one at the closed end, which is used to insert the device into the vagina, and an outer ring that remains outside the vagina and covers the external genitalia

Recommendations for users:
It can be inserted up to 8 hours before sexual intercourse.
To insert it, squeeze the ring on the closed end of the condom and insert it into the vagina as far as it will go (this end will cover the cervix). Make sure that this end goes beyond the projection of the pubic bone and that it fits in straightly.
The open end remains outside the vagina as described above.
After sex, press the outer ring and twist it to prevent any sperm from leaking when the

condom is removed, pulling it out gently. Female condoms should not be reused.
Failures: Under ideal conditions, failure rates are less than 5% and under real conditions of use failure rates are 21%.

Advantages: They protect against STIs/HIV/AIDS. Their use depends exclusively on the women's will and they have no other major effects on their health or that of men.
Disadvangages: It is more expensive than the male condom, it is not too discreet (noisy). It may be difficult to place and remove.

- **The diaphagm** is a latex or silicone cap that covers the cervix. It can be placed in the vagina up to 6 hours before sexual intercourse and should be left in the vagina no longer than 24 hours after having sex. Its use should be associated with spermicides to increase effectiveness. After usage, it should be cleaned and stored in a box specially designed for this purpose.

Failures: Up to 6% failure rates are observed under ideal conditions, and under real conditions of use, those rates go of up to 16%.

Advantages: It provides partial protection against some STIs. Its use depends exclusively on the will of the woman; it may be used during menses; it is discreet. It has no other major effects on the health of women or men.

Disadvantages: It is more expensive than condoms and its use requires prior medical assessment; it does not protect against HIV/AIDS; it may cause latex allergy; some women may find it difficult to place it. Its continual use for more than 24 hours may increase the risk of toxic shock.

Diaphragms cannot be used with oil-based lubricants or medications.

- **Vaginal sponges** are sponges impregnated with spermicides that are inserted into the vagina before sex. Like the diaphragm, a sponge should be placed in the vagina up to 6 hours before sexual intercourse and should not be left in the vagina for more than 24 hours after sex.

Failures: Rates vary depending on whether the woman is nulliparous or multiparous. In nulliparous women and under ideal conditions of use, a failure rate of up to 9% is observed, and the figure may go up to 16% under real conditions of use. In the multipara, and under ideal conditions of use, a failure rate of up to 20% is observed and in real conditions of use, up to 42%.
This method is not recommended for the multipara.

Advantages: Its use depends exclusively on the woman's will; it is supplied in one single size and does not require medical prescription; it has no major effects on women's or on men's health.

Disadvantages: It does not protect against HIV/AIDS; it may cause allergy; some women find it difficult to place and/or to remove. It may not be used during the menses. Its continual use for more than 24 hours may increase the risk of toxic shock.

4. Emergency contraception

Emergency contraceptives include hormonal contraceptive methods.

Emergency hormonal contraceptives, as the name indicates, were designed for special situations. As they are less effective than the regularly used methods, they are exclusively recommended for emergency situations. Emergency situations are those where any unprotected sex occurred with no wish to conceive, cases of sexual violence, or when there were problems with the normal contraceptive method.

There are combined contraceptives (estrogen-progestin) and progestin-only pills. Whichever method is chosen, users must be aware that there is sufficient evidence to support that they will not disrupt an existing pregnancy.

Recommendations for users:

Contraceptive effectiveness is associated with the time that elapsed between unprotected sex and the moment the emergency contraceptive was taken. The sooner it is taken after unprotected sex, the more effective it is, so that women should be encouraged to take the contraceptive as soon as possible. Maximum effectiveness is up to 72 hours after sex, even though users should be told that a considerable degree of effectiveness persists up to 5 days after sex.

- **Combined contraceptives "Yuzpe regimen".** Two doses, each containing 100 micrograms of ethinyl-estradiol + 500 micrograms of levonorgestrel, are taken 12 hours apart, starting within 72 hours of unprotected sex. As an alternative, in those places that do not have specific emergency preparations, 4 pills of a combined traditional contraceptive, at similar or higher doses than those of Microgynon may be used

- **Levonorgestrel-only contraceptives.** The two pills contained in the pack should be taken together. Or, alternatively, they can be taken in the classical manner (a first pill as soon as possible and the second dose 12 hours later)

Emergency contraceptives have multiple mechanisms of action. They may interfere with the follicular development, with cervical discharge, sperm migration, corpus luteum activity and fertilization.

Contraindications:

No contraindications known so far.

Failures:

Failures vary depending on the time elapsed between unprotected sex and the moment the pill was taken. The WHO thus reported failure rates of scarcely 0.5% when the method was used during the first 12 hours and of 4.1% when it was used between 61 and 72 hours after sex. When analyzing the overall failure rates (regardless of the moment the pill was taken), these are at 15 to 25%.

Advantages:

Emergency contraceptives are not expensive, they are easy to take and no serious medical or teratogenic adverse effects are known.

Disadvantages:

They do not protect against STIs/HIV/AIDS.

They may produce nausea and vomiting, especially with the Yuzpe regimen. If vomiting continues, the vaginal route of administration can be considered as an alternative. Other undesirable side effects are headaches, dizziness, breast tenderness and bleeding.

5. Hormonal contraceptives

There is a large variety of hormonal contraceptives, most of which combine estrogens and progestin, although some are progestin-only contraceptives.

Depending of the route of administration, these are classified into: oral contraceptives, injections, transdermal, vaginal and implants.

Combined Oral Contraceptives

How to use:

In all schemes, both with 21 and 28 pills, start the first pack when the monthly bleeding begins and as from then take one pill every day, preferably at the same time every day, to create a habit; avoid missing any pills.

With the 21-pill scheme, women should wait one week after the last pill from one pack and then take the first pill from the next pack, starting on day 8 after the last pill.

With the 28-pill scheme, women take the pills continuously and no pauses are made between one pack and the next.

The following recommendations are made for making up missed pills:

1. 1 pill: Suggest taking the pill as soon as possible and the following pill at the usual time (it may be necessary to take both pills at the same time). No special precautions are required if the method is followed correctly.
2. 2 to 4 pills in the first week: Suggest taking the last pill that was missed, discard those that were missed before, continue treatment and suggest using barrier contraception methods.
3. 2 to 4 pills half-way through the pack or towards the end of the pack: Suggest using the contraceptive as in the previous situation, but protection with a further method is no longer necessary.
4. If 5 or more pills were missed: Proceed as described in the second situation. (Continue taking the remaining pills and use barrier methods)

A barrier method should be proposed in the following situations:

- If pills were missed
- Within the first 15 days after starting to use an oral contraceptive
- In the event of digestive disorders (vomiting, diarrhea)
- Use of medication that affects liver metabolism
- Irregular bleeding
- Possibility of STIs/RTIs

Contraindications

Chart 35

Absolute contraindications		Relative contraindications	
History of thromboembolism	History of thrombophlebitis	Smoking	Kidney disease
Atherosclerosis	Breast cancer	Women over 40 years	Heart diseases
Endometrial cancer	Liver diseases	Hypertension	Diabetes
Sickle-cell anemia	Pregnancy	Hyperlipidemia	
Metrorrhage without diagnosis			

Failures: Under ideal conditions of use, failure rates are 0.9 %; under real conditions of use, they increase to 8%.

Advantages
They regulate the menstrual cycle in women who require it.
They improve dysmenorrhea and pelvic pain (associated with ovulation).
They reduce chronic anemia.

Disadvantages
The do not prevent STIs/RTIs, HIV/AIDS, nor sexually transmitted hepatitis.
They should not be used during breastfeeding.
They require relying on memory and awareness.
The may have side effects (nausea, vomiting, weight gain, edema, breast tenderness, depression, amenorrhea, bleeding, intolerance to carbohydrates, asthma, hyperlipidemia, intensification of migraine, heart diseases, kidney disease or epilepsy, when pre-existing.
There is a 3- to 4-fold increased risk of venous thrombosis compared to women who do not use hormonal methods.
They slightly increase the risk of breast cancer.

Combined injectable contraceptives

Combined injectable contraceptives are composed of a natural estrogen and a progestin, and they act by inhibiting ovulation.

The most widely used combined injectable contraceptives (CIC) include the following combinations:

1) 25 mg medroxyprogesterone acetate plus 5mg estradiol cypionate (Cyclofem).
2) 50 mg norethisterone enantate plus 5mg estradiol valerate (Mesigyna).

Advantages
As estrogens contained in CIC are natural, they have a more physiological action and secondary effects are not as strong as those produced by synthetic estrogens contained in combined oral contraceptives (COC). Additionally, the parenteral route of administration avoids the hormonal passage through the liver.

The CIC are a relatively new method compared to COC. The available studies are short-term studies and the results show milder secondary effects on the cardiovascular system, metabolism, coagulation and liver function, compared to COCs.

Further studies are required to obtain long-term results. In most situations, however, and save a few exceptions, the evidence available on COCs can be applied to CICs.

Both products are highly effective. The failure rate in twelve months of use is between 0.1 and 0.4%. Return of fertility after CICs are stopped ranges around three months in average.
CICs have beneficial effects on cycle control, dysmenorrhea and bone metabolism. No significant changes are produced on blood pressure or on coagulation factors.

Side effects
During the first months of use, irregular monthly bleedings may occur. Some users may report transient weight gain which does not exceed 2 kg, headaches, dizziness or breast tenderness.

According to the WHO, the CICs included in category 4 should not be used in the following situations:

1. Pregnancy or suspected pregnancy
2. Woman is breastfeeding during the first six weeks of puerperium
3. Multiple risks with various associated factors: coronary artery disease, older age, smoking, high blood pressure and diabetes (Category 3-4)
4. High blood pressure > or = 160/110
5. High blood pressure with vascular disease
6. Smokes more than 15 cigarettes a day and is over 35 years old
7. Migraine-like headaches with focal neurological symptoms
8. History or presence of deep venous thrombosis or pulmonary embolism
9. History or presence of ischemic heart disease, acute myocardial infarction, stroke, or complicated valve disease
10. Longstanding diabetes (for more than 20 years) or with complicated vascular disease (Category 3-4)
11. Has breast cancer
12. Severe cirrhosis
13. Active hepatitis
14. Liver tumors
15. Major surgery requiring prolonged immobilization

How to use:
CICs are administered by deep intramuscular injection every month, with a margin of plus/minus three days.

Only the first injection is timed in connection with menses, being preferably administered within the first days of its onset. Subsequent injections are administered once a month on the same date, regardless of the monthly bleeding.
Two weeks after administration there may be vaginal bleeding caused by the CIC, which is considered normal. Afterwards, monthly bleeding will occur once every month. CICs should not be discontinued if there is spotting, irregular bleeding or amenorrhea. They should only be discontinued if the symptoms are very intense and if it is confirmed that

they are side effects related to method use, and also in the event of any of the WHO category 4 conditions related to the different CICs.

It is not advisable to use CICs during breastfeeding, especially during the first six months. If the woman is not breastfeeding, the first injection can be administered the third week after giving birth. In the case of abortion, the injection can be given immediately during the postabortion period.

Contraceptive patches
They contain ethynylestradiol and norelgestromin. Their mechanism of action is similar to that of combined hormonal contraceptives.

How to use
The patch is applied on the first day of the cycle and is changed every week during three weeks. No patch is applied on the fourth week. On the fifth week, a new series of three patches is started. A delay of up to 48 hours in changing the patch is allowed. Suggest applying the patches on dry skin on the back, buttocks or arms, or wherever, but far from the breasts and genitalia.

Patches have the same advantages, disadvantages, contraindications and failures as combined oral contraceptives. They have the advantage of not producing digestive disorders. The specific disadvantages of this method are its reduced effectiveness in women who weigh over 90 kilos, allergy to the adhesive on the application site, and the chance that it might come off.

Contraceptive vaginal rings
These are flexible and transparent rings of about 5 centimeters in diameter which contain ethynylestradiol. Their mechanism of action is similar to that of combined oral contraceptives.

How to use
A vaginal ring is kept in place for 21 weeks every month and then removed for the fourth week.

Vaginal rings have the same contraindications, advantages, disadvantages and failures as other combined oral contraceptives. Due to their special characteristics they may produce vaginitis, white vaginal discharge and vaginal discomfort. Expulsion of the ring is an infrequent complication. It may be contraindicated in women with third-grade vaginal prolapse or vaginal synechia.

Progestin-only contraceptives
Progestin-only pills are available in formulations based on lynestrenol, norethindrone, medroxyprogesterone acetate and levonorgestrel. As they do not contain estrogens they are specially indicated for all those situations or conditions where estrogens are contraindicated (e.g. breastfeeding or women with autoimmune conditions).

They are available as oral pills, subdermal implants (Norplant) or depot injections (Depoprovera, etc.)

How to use

The pills are taken one each day throughout the cycle, at regular intervals between one pill and the next. Women should be advised not to take the dose earlier or later than 2 hours, for the purpose of maintaining effectiveness and avoiding undesirable effects. The contraceptive pill is normally started on the first day of the monthly bleeding. Women may also start 6 weeks after giving birth if they are still breastfeeding.

Injectable contraceptives are used following different injection schemes, depending on the formulation that is used. Formulations based on medroxyprogesterone acetate are administered every three months. The first injection is given on the first day of the monthly bleeding and is repeated every 3 months; the dose may be administered 72 hours early or latre. The following chart summarizes the various options for starting treatment with injectable contraceptives..

Chart 36: Options for administering the first injection

With menstrual cycles	With amenorrhea	Breastfeeding
Within the first 7 days after start of monthly bleeding; does not require additional backup contraceptive measures.	At any moment if a woman is certain she is not pregnant; should abstain from sex or use a backup method for the next 7 days.	If the woman gave birth at least 6 months before, follow procedure as described under women with amenorrhea.
Can be given as from day 8 if certain she is not pregnant; should abstain from sex or use a backup method for the next 7 days after the injection.		If more than 6 months have passed and she is having menstrual cycles, follow procedure as described under women with menstrual cycles.

Subdermal implants should be applied surgically by a specifically trained provider only if certain that the woman is not pregnant; for this reason it is advisable to apply within the first seven days of the cycle.

The implant should be removed after five years of application.

Contraindications

The only absolute contraindications for using progestin-only contraceptives are if the woman has breast cancer or is pregnant.

Relative contraindications are undiagnosed vaginal bleeding, liver disease, heart disease, clotting disorders. Special care should be given when using medroxyprogesterone acetate injections in young women due to the loss of bone mass.

Failures: In the case of pills and under ideal conditions of use, failure rates are less than 1%, and under normal conditions of use, they may increase to 15%. Injections and implants used under ideal conditions have failure rates of less than 1%, and under normal conditions of use, 8%.

Advantages

They may be used during breastfeeding in women who do not tolerate estrogens.

They do not increase the risk of thrombosis or stroke.

They reduce chronic anemia.

Disadvantages
They do not protect against STIs/RTIs, HIV/AIDS, or sexually transmitted hepatitis.
Taking the pills requires relying on memory and awareness.
Undesirable side effects may be headaches, weight gain, reduced production of milk, monthly bleeding changes, reduced bone density and functional ovarian cysts.

6. Intrauterine devices
There are two types of intrauterine devices available in many countries of the region: copper-bearing devices and devices with a hormone (levonorgestrel) releasing system. Both are T-shaped polyethylene devices. They are ideal methods for those women who wish to have long-term reversible contraception.

Mechanism of action
Intrauterine devices have numerous mechanisms of action, but the main one is preventing fertilization (inactivates sperm and affects the egg's transport rate).

Contraindications
Women with pelvic infection, endometriosis, submucosal myomata, uterine hypoplasia or malformations.

Advantages
Copper-bearing intrauterine devices are inexpensive and provide long-term effective use (10 years). An advantage of all devices is that the contraceptive effect is rapidly reversible and that they may be used during breastfeeding. There is some reserve as to the use of hormone-releasing systems during breastfeeding; these devices have the great advantage that they reduce the amount of both monthly and irregular bleedings.

Disadvantages
Hormone-releasing intrauterine devices have the disadvantage that they do not last as long (5 years) and are considerably more expensive than the copper-bearing devices.
None of the intrauterine devices protect against STIs – HIV/AIDS.
The copper T-device may cause heavy monthly bleeding or bleeding between monthly periods.

Failures: Under ideal conditions, copper-bearing intrauterine devices have failure rates of about 0.5% and under typical conditions of use, failure rates of up to 5%.
Hormone-releasing intrauterine devices, both under ideal and real conditions, have failure rates of scarcely 0.1%, which makes them highly safe.

Risks
Risks associated with insertion are uterine perforation (0.5 to 1.5 per thousand). Expulsion rates vary from 2 to 10% during the first year in use. The risk of infection is inversely proportionate to the time required for insertion. Although evidence is controversial, there appears to be a higher risk of ectopic pregnancies in women who use intrauterine devices.

Insertion
Insertion is usually made during menses, because this guarantees the certainty that the woman is not pregnant and facilitates the procedure.
They can also be inserted when the woman is not bleeding, within the first 12 days of the cycle, to avoid placing it when the woman may be pregnant. If the absence of pregnancy is uncertain, a test with beta-subunit chorionic gonadotrophin hormone should be performed to rule it out.

Insertion of the intrauterine device in women who have not given birth is not contraindicated.

The intrauterine device may be inserted in special situations, during the so-called post-obstetric events (abortion, childbirth, cesarean section).

Chart 37. Insertion under special situations.

Insertion after childbirth				Other situations
Post-placenta	Immediately after childbirth	After childbirth	During cesarean section	Post-abortion
Within 10 minutes once the plancenta has been expelled	Within the first week following childbirth, as from 48 hours	After the 4th week following childbirth	After endo-uterine inspection and cleaning, prior to hysterorrhaphy.	Immediately after eliminating ovular remains and if there is no sign of infection

Antibiotics
The use of antibiotics shall only be indicated when the insertion technique was difficult or if the sterility of the device may have been affected. In that case, 48 hours of Amoxycilin or Ampycilin are sufficient.

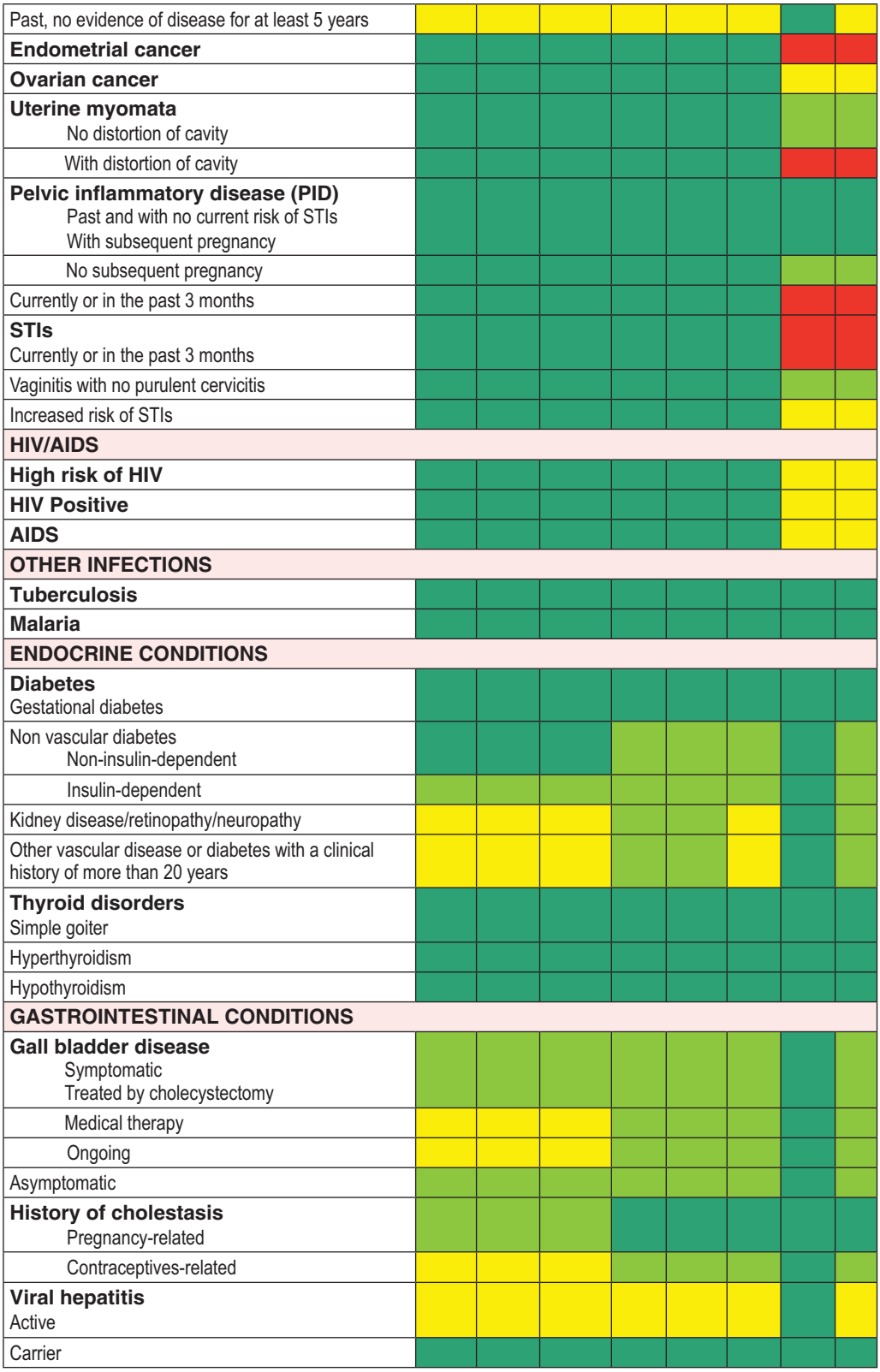
Analgesics
The use of antispasmodic analgesics may be justified within the first 24 hours following insertion.

Warning
The woman should seek care if the device is expelled, if pain does not subside with regular analgesics, if there is offensive odor, if bleeding increases in duration and volume or in the event of irregular bleeding between monthly periods.

Table 15: Summary of eligibility criteria for hormonal methods and intrauterine devices.

	Combined			Progestin-only			IUD	
Condition	Oral	Patches	Intra vaginal	Oral	Implants	injectables	Cu	LNG
PERSONAL FEATURES AND REPRODUCTIVE HISTORY								
Age From menarche to age 19								
20 to 44								
45 years-old and older								
Parity Nullipara								
1 or more birhs								
Natural breastfeeding < 6 weeks postpartum								
≥ 6 weeks to < 6 weeks postpartum								
≥ 6 months postpartum								
Postpartum (breastfeeding or not) < 48 hours								
48 hours to < 4 weeks								
≥ 4 weeks								
Postabortion 1st trimester								
2nd trimester								
Immediately after septic abortion								
Past ectopic pregnancy								
History of pelvic surgery								
Smoking Age < 35 years								
Age ≥ 35 years < 15 cigarettes/day								
≥ 15 cigarettes/day								
Obesity ≥ 30 Kg/m2 body mass index (BMI)								
CARDIOVASCULAR DISEASES								
Multiple risk factors for coronary artery disease (diabetes, HTA, etc.).								
Hypertension Woman has history of hypertension, not controlled								
Woman has history of hypertension, adequately controlled								
Systolic blood pressure 140 to 159 and diastolic blood pressure 90 to 99 mm Hg								
Systolic blood pressure ≥160 and diastolic blood pressure ≥ 100 mm Hg								
Vascular disease								

Deep venous thrombosis (DVT) and pulmonary embolism (PE) History of DVT/PE								
Current DVT/PE								
Family history of DVT/PE (first-degree relatives)								
Major surgery with prolonged immobilization								
Major surgery without prolonged immobilization								
Minor surgery without immobilization								
Superficial venous thrombosis Varicose veins								
Superficial thrombophlebitis								
Ischemic heart disease, history of or current disease								
Stroke								
Known hyperlipidemias								
Valvular heart disease Uncomplicated								
Complicated								
NEUROLOGICAL CONDITIONS								
Headaches Nonmigrainous								
Migraine Without neurological focal symptoms (aura) Age < 35 years								
Age ≥ 35 years								
With neurological focal symptoms (aura)								
Epilepsy								
REPRODUCTIVE TRACT INFECTIONS AND DISEASES								
Vaginal bleeding patterns Irregular pattern, without heavy bleeding								
Regular and irregular patterns with heavy bleedings								
Unexplained vaginal bleeding								
Endometriosis								
Benign ovarian tumors								
Severe dysmenorrhea								
Gestational trophoblastic disease Benign								
Malignant								
Cervical ectropion								
Cervical intraepithelial neoplasia								
Cervical cancer (awaiting treatment)								
Breast disease Undiagnosed mass								
Benign disease								
Family history of breast cancer								
Currently has cancer								


Past, no evidence of disease for at least 5 years
Endometrial cancer
Ovarian cancer
Uterine myomata
No distortion of cavity
With distortion of cavity
Pelvic inflammatory disease (PID)
Past and with no current risk of STIs
With subsequent pregnancy
No subsequent pregnancy
Currently or in the past 3 months
STIs
Currently or in the past 3 months
Vaginitis with no purulent cervicitis
Increased risk of STIs
HIV/AIDS
High risk of HIV
HIV Positive
AIDS
OTHER INFECTIONS
Tuberculosis
Malaria
ENDOCRINE CONDITIONS
Diabetes
Gestational diabetes
Non vascular diabetes
Non-insulin-dependent
Insulin-dependent
Kidney disease/retinopathy/neuropathy
Other vascular disease or diabetes with a clinical history of more than 20 years
Thyroid disorders
Simple goiter
Hyperthyroidism
Hypothyroidism
GASTROINTESTINAL CONDITIONS
Gall bladder disease
Symptomatic
Treated by cholecystectomy
Medical therapy
Ongoing
Asymptomatic
History of cholestasis
Pregnancy-related
Contraceptives-related
Viral hepatitis
Active
Carrier

Cirrhosis Mild (compensated)								
Severe (decompensated)								
Liver tumors Benign (adenoma)								
Liver tumors								
ANEMIAS								
Thalassemia								
Sickle-cell disease								
Iron-deficiency anemia								
DRUG INTERACTIONS								
Drugs that affect liver function Certain antibiotics (rifampin, griseofulvin, etc.).								
Other antibiotics								
Certain anticonvulsants (phenytoin, carbamazepine, barbiturates, etc.).								

Use the method in any circumstances

Generally used method

Use of method not recommended unless other more appropriate methods are not available or not acceptable

Do not use the method

Permanent (irreversible) methods

Both female and male irreversible methods share the same classification regarding eligibility criteria. The table below defines the four criteria as defined by the WHO.

Chart 38. Categories of irreversible methods.

A	**Accept** There are no medical reasons to deny sterilization to someone with this condition.
C	Caution The method is normally provided in a routine setting, but with extra preparation and precautions.
R	**Delay** The use of the procedure should be delayed until the condition is evaluated and/or corrected. Alternatively, temporary contraceptive methods should be provided.
E	**Special** The procedure should be undertaken in a setting with an experienced surgeon and staff, equipment needed to provide general anesthesia, and other backup medical support. This also requires the capacity to decide on the most appropriate procedure and anesthesia support. Alternative, temporary contraceptive methods should be provided; refer the patient if necessary.

As most of eligible conditions coincide with the charateristics described under A and C, only those conditions that, to a certain extent should be considered as exceptions, will be summarized for the cases of surgical sterilization (D and S).

1. Tubal ligation

This is a permanent contraceptive method which consists in the ligating, cutting and/or cauterization of the Fallopian tubes, or by applying rings or other devices on them. This procedure should be performed by experienced staff.

The decision to have a tubal ligation should be the result of a woman's free choice, even in those situations when a new pregnancy implies a life-threatening risk. For this reason, the information provided should be as clear as possible, taking into account the woman's intellectual level and sociocultural background.

Tubal ligation is usually performed by either of three kinds of procedures. The first two are usually used to specifically perform tubal ligation, whereas the third is performed as a secondary indication:

- Minilaparotomy
- Laparoscopy
- In the course of a Cesarean section, or during some other surgical procedure

When to perform sterilization

After thorough counseling any woman is in a position to request surgical sterilization. Not having any children or not being married are not reasons for not performing surgical sterilization. If a woman is married she can decide on her own will and she does not require her husband's permission.

There is sufficient evidence to support that the main cause of regret among women who have undergone surgical sterilization is related to the early age at which the procedure was performed.

If no medical conditions prevent a woman from undergoing female sterilization and if pregnancy has been ruled out, tubal ligation can be performed at any moment.

It is recommended to perform the procedure within seven days after the start of her monthly bleeding in women who do not use contraceptive methods.

Advantages

Once performed, there is no need to worry about contraception again. It is entirely the woman's decision. There are usually no undesirable side effects and there is no longer a need to remember things.

If there is no medical reason to prevent it and if it is certain that a woman is not pregnant, the sterilization procedure can be performed at any time. Women who are having monthly bleeding and who do not use contraceptive methods should be advised to undergo the procedure within seven days after the start of the menses.

Disadvantages

It does not protect against sexually transmitted infections or HIV/AIDS.

The procedure is irreversible. It requires trained staff and involves anesthesia and surgical procedures.

Risks

Performing surgical and anesthetic procedures (even with local anesthesia) entails the risk of complications. Although the risk of these procedures is extremely low, women must be warned that they do exist.

Failure

This is one of the most effective methods and it is estimated that there is less than 1 pregnancy per 100 women – to be more precise 5 every 1000 procedures. The risk of pregnancy decreases considerably with time.

Chart 39. Eligibility conditions for classes D and S for female sterilization

Conditions that should delay the procedure (D)		Conditions that require special (S) considerations
Pregnancy	Malignant trophoblastic disease	Uterine rupture or perforation
Postpartum of 7 to 41 days	Cervical, ovarian or endometrial cancer	Blood pressure ≥ 160/1 00 mmHg
Severe pre-eclampsia /eclapmsia	Current Pelvic Inflammatory Disease or in the past three months	Vascular disease
Prolongued rupture of membrane	Current STI	Endometriosis
Sepsis or fever during childbirth, puerperium or postabortion	Current gallbladder disease	Pelvic TBC
Severe hemorrhage before or after childbirth or abortion	Active viral hepatitis	Diabetes with kidney, eye or nerve disease
Severe postpartum or postabortion trauma of genital tract (cervical or vaginal tear)	Hb < 7 g/dl	Severe cirrhosis (decompensated)
Acute hematometra	Abdominal wall infection	Hyperthyroidism
Current Deep Venous Thrombosis or Pulmonary Thromboembolism	Acute respiratory diseases	Coagulation disorders
Major surgery with prolonged immobilization	Systemic infection	Chronic respiratory diseases
Current ischemic heart disease		Fixed uterus
Unexplained vaginal bleeding		Abdominal wall or umbilical hernia

2. Ligation of the vas deferens (vasectomy)

It is a contraceptive method of contraceptive that consists of cutting, liaggating and/ or cauterizing the vas deferens at the level of the scrotum to impede the passage of sperms.

It is a surgical procedure that should be performed by a qualified staff and it can be done using different techniques with local or general anethesia.

The choice of a vasectomy should be made freely and the necessary information and should be given with clarity taking into consideration his intellect level and other socio-cultural factors.

When to perform sterilization:

After a complete check up and verification of no medical contradictions, any moment is a good one for the procedure.

Advantages:

Once it is done there is no need to use other methods of contraception.

It is totally the man's decision.

Disadvantages
It does not protect against sexually transmitted infections or HIV/AIDS.
It is irreversible. It requires experienced staff and involves anesthetic and surgical procedures.

Risks
Complications and risks are rare. A man may experience scrotal or testicular pain that lasts for months or even a few years, bruising or local infections.

Failure rates
If semen analysis is not performed, up to 3% failure rates may be observed during the first year. Where men have their semen examined, failure rates are 2 every 1000 vasectomies.

To decrease pregnancy risk, men should be urged to use condoms during the first three months following vasectomy.

Eligibility criteria
There are no medical conditions that imply an absolute restriction to prevent a man from having a vasectomy. Some conditions and circumstances imply taking certain precautions.

Chart 40. Eligibility conditions, classes D and S for vasectomy

Conditions that should delay the procedure (D)	Conditions that require special (S) considerations
Local infections (scrotal, orchitis, epididimitis, balanitis)	Inguinal hernia
Active STI	Coagulation disorders
Systemic infection or gastroenteritis	AIDS
Filariasis, elephantiasis	
Intrascrotal mass	

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CHAPTER VIII
Abortion

Objective: *Reduce abortion-related morbimortality.*
Activity: *Diagnosis and care of abortion throughout its various periods.*

Given its complexity and sensitivity, abortion demands a comprehensive approach by the health care services and professionals. Its multiple dimensions involve a number of aspects, ranging from the specifically clinical issues, the woman's personal and psychological characteristics, as well as her socioeconomic, legal and ethical environment.

Abortion complications are among the leading causes of maternal death in the Latin American region. Although some deaths result from a number of issues that derive in a poor quality of care at health care centers, the hazardous conditions under which abortion tends to be performed continues to be the main component of abortion-related mortality.
One of the main health-related strategies to prevent unsafe abortion consists of focusing women's care on the basis of four main pillars:

- Promote community care
- Promote access to Health Services
- Educate professionals on scientific evidence-based knowledge
- Provide high quality clinical care and family planning services

Definitions

Abortion: it is defined as the expulsion or the extraction of the product of conception from the mother's womb, with a weight equal or lower than five hundred grams or when the interruption of pregnancy occurs before the 22th week of pregnancy.

Spontaneous Abortion: it occurs without any circumstances that may artificially interfere with the course of pregnancy.

Induced abortion: Termination of pregnancy is due to a deliberate intervention with that aim.

Unsafe abortion: This is a procedure performed by unskilled people to terminate an unwanted pregnancy, and/or a procedure performed in settings that do not meet a minimum standard of care.

Prevelance and incidence

Spontaneous abortion occurs in 15 to 20% of all known pregnancies. Additionally, it is estimated that 46 million pregnancies end up as induced abortion worldwide annually, and approximately 20 millions are unsafe. Likewise, 13% of the maternal deaths are attributed to complications derived of unsafe abortions. Ninety-five per cent of them occur in developing countries. With regards to age, two out of three of them involve women aged from 15 to 30 years.

The incidence of unsafe abortion in the Latin America and Caribbean Region by 2000 was estimated in 29 per 1,000 women from 15 to 44 years.
In South America, one of every 5 maternal deaths is due to unsafe abortion, while in Central America and the Caribbean the ratios are 1:10 and 1:8, respectively. (Figure 113)

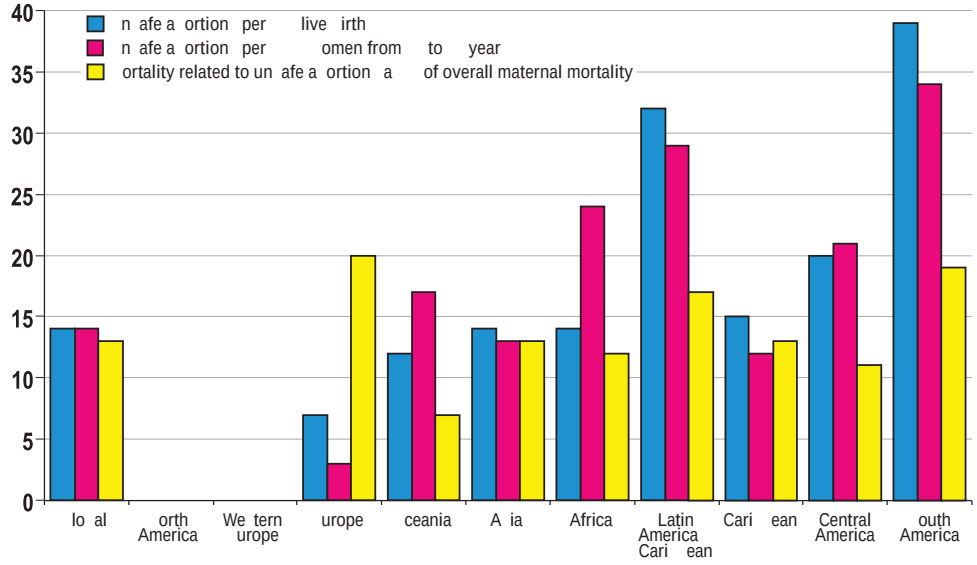


Figure 113. Estimations of the annual incidence of unsafe abortion and associated maternal mortality, by regions and sub-regions globally, circa year 2000.

Graph developed on the basis of data obtained from the WHO study; Unsafe abortion: Global and regional estimates of the incidence of unsafe abortion and associated mortality in 2000. Fourth edition, Geneva, 2004.
NOTE: In the North American and Western European regions estimates are insignificant.

Spontaneous abortion
Spontaneous abortion is the most frequent complication in pregnancy. 85% of the cases occurs before the 12th week of gestation.

Etiology
It is estimated that 50% of all the eggs fertilized are lost within the first 14 days of pregnancy; they do not cause any symptoms, they occur after a brief delay or at the date of the menses.

Known causes
They are classified as egg-related or non egg-related.
Egg-related causes are the most frequent and more than half of the early abortions occur as a result of an abnormal development of the embryo secondary to inherited factors or acquired chromosomal defects. Chromosomal abnormalities exceed 10% of the cases. The main factors predisposing to chromosomal abnormalities are: mother's age > 35 years; viral conditions acquired in the period immediately prior to or during gestation and parents with chromosomal abnormalities.

Non egg-related causes are due to maternal and paternal factors. Organic causes are highlighted among the most outstanding maternal factors:
General and local infectious diseases (3-5%). In chronic infections the organisms can go through the placenta and affect the fetus, as eventually occurs with syphilis, tuberculosis, toxoplasmosis, listeriosis, Chagas disease, malaria and brucellosis. Local infections include genital infections produced by Mycoplasma hominis, Ureoplasma urealyticum, Chlamydia Trachomatis and to a lesser extent, by Neisseria gonorrhoeae.

Local pelvic conditions: malformations, tumors and uterine and cervical disorders (hypoplasia, synechias, myomata, cervical incompetence, tears, etc.).

Trauma causes
Accidental or intentional trauma (violence) may be a cause of abortion.

Paternal causes
Primary sperm abnormalities or abnormalities secondary to chromosomal changes, infections, endocrine metabolic, toxic, among others.

Functional causes
They account for 10 to 15% of the cases. The disorder predominates in the organ functions and it affects the normal development of pregnancy. This includes metabolic conditions such as diabetes; endocrine conditions such as hypo and hyperthyroidism, hyperandrogenism and endocrine disorders of the ovaries, trophoblast and placenta.

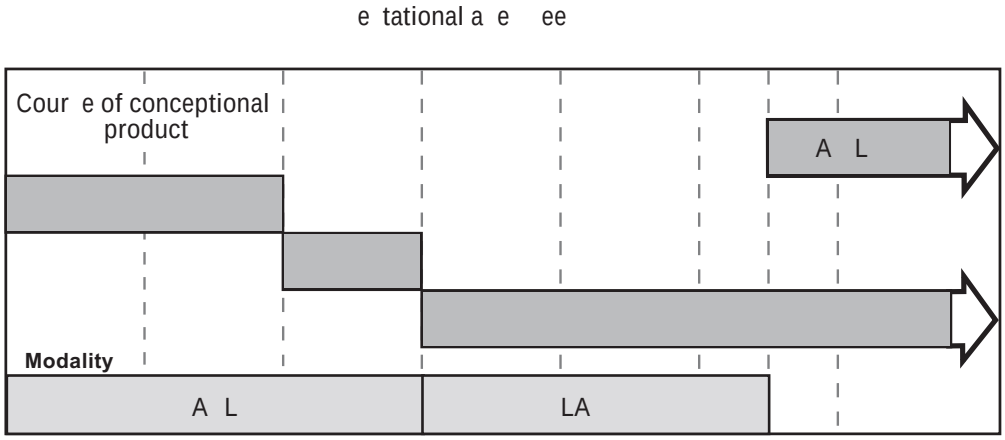
In the latter case, there is no evidence confirming that abortion may be due to the low level of progesterone; it is probably the consequence of a chorial or gonadal endocrine abortion.

Immunological causes
The most frequent are autoimmune (anti-phospholipid antibodies syndrome, weakly positive antinuclear antibodies and thrombophilias).

Poisoning
Caused by lead, mercury, arsenic, phosphates, benzols, anesthesic gases and alcohol and drug consumption.

Other causes
Surgical procedures (the risk is greater in the gynecological and abdominal cases with peritonitis), radiations, severe malnutrition, hypovitaminosis, chronic disease in the mother and psychosomatic disorders.

Chart 41. Spontaneous abortion by gestational age, development of the conceptional product and its modality



Stages in the course of abortion

Threatened abortion
In this condition, the conceptional product is inside the uterine cavity. The diagnosis is made by the presence of painful uterine contractions and/or metrorrhage and on the genital examination the cervical canal is closed.

Imminent, inevitable abortion or abortion in progress
Uterine bleeding is heavy and uninterrupted; the increased intensity of uterine contractions cause the opening and dilation of the cervix; the cervical canal is patent. There is loss of amniotic fluid as a clear watery discharge or mixed with blood and/or egg components. In other occasions, the egg gets detached and protrudes through the cervix.

Complete and incomplete abortion
When the egg is expelled from the uterine cavity, abortion may present as one of two modalities: total or complete and partial or incomplete.

Complete abortion
The entire egg is expelled at once. Uterine contractions stop, pain disappears, the size of the uterus shrinks; genital bleeding is reduced, and cervical changes are abated.

Incomplete abortion
Exit is partial; the egg is expelled, but the placenta and egg membranes are retained. Persistence of painful uterine contractions and bleeding; the uterus is softened and the cervix is dilated.

Complicated abortion
The two most significant complications of incomplete abortions are hemorrhage with acute anemia and infection. In spontaneous abortion the most frequent infections occur as a result of the upstream invasion of organisms existing in the lower genital tract.

Likewise, the uterus may get infected as a result of the use of contaminated material or following procedures performed in poor conditions of asepsia. The severity of the picture covers a broad range from endomyometritis to sepsis. The most serious complication is Mondor's syndrome, caused by Clostridium perfringens.

Missed abortion

The death of the conceptional product is not followed by its expulsion. This modality is also called "demised or retained egg". Uterine contractions fail to expel the egg (missed abortion). The structural changes of the embryo and the gestational sac become apparent after 24 hours (lysis, deformation, flattening of the embryo and the sac and at more advanced stages there may be maceration or mummification). Egg infection is more frequent when the egg is in contact with the outside.

Habitual abortion

The repetition of three or more consecutive spontaneous abortions or five or more non consecutive abortions constitutes the entity called Habitual Abortion.

Clinical Diagnosis

Approximately 25% of the spontaneous abortions present with signs and symptoms that can be evidenced.

- Interrogation - abortion or threatened abortion must be suspected in women of childbearing age with a delayed menstrual period or confirmed pregnancy, presenting with genital bleeding during the first half of pregnancy, colicky pain and eventually loss of egg remains
- Abdominal and genital examination: their aim is to determine the size of the uterus (to decide the evacuation route in case of need), rule out peritoneal irritation (present in cases of perforation of the uterus, linked to procedures or in complicated ectopic pregnancies); abdominal-pelvic masses (caused by adnexal infectious complications, ectopic pregnancy, gestational trophoblastic disease, or co-existing malignant conditions)

Laboratory Diagnosis

The diagnosis of abortion is predominantly clinical. The laboratory testing should not delay the start of therapy and it is reserved for highly complex situations or when the concern for the woman and family lead to accelerating the diagnostic steps.

- Ultrasound - when ultrasound is available, it can determine whether pregnancy is intrauterine, if there is embryonic vitality and/or if there are any detachments (retrochorial hematomas), or whether the egg has been entirely (complete abortion) or partially expelled (incomplete abortion). The presence or absence of adnexal masses and liquid collections in Douglas' cul de sac
- Serial quantitative beta subunit of the choriogonadotrophic hormone (Beta-HCG) when there are doubts about the embryo's vitality, in very early pregnancies (less than 6 weeks), the rise of the titres of Beta-HCG in serial assays separated 48 to 72 hours will confirm vitality

Differential Diagnosis

The hemorrhages observed in the first half of pregnancy that rank second in frequency after abortion are:

- Ectopic pregnancy
- Gestational trophoblastic disease (hydatidiform mole)
- Co-existing gynecological conditions (polyps, malignant or premalignant cervical lesions)
- Coagulation disorders

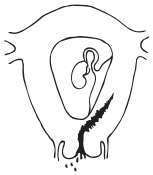
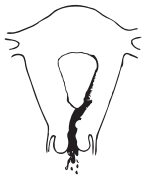
Chart 42. Clinical and ultrasound findings of spontaneous abortion and main differential diagnoses.

	CLINICAL	ULTRASOUND
ECTOPIC PREGNANCY	**Pain** **Dark and scarce bleeding – blood show** **Size of uterus < amenorrhea** **Para-uterine mass**	**Non specific para-uterine mass** **No gestational sac** **Gestational pseudosac**
HYDATIDI-FORM MOLE	**Red bleeding, sometimes with vesicles** **Uterine size > amenorrhea** **Ovarian cysts**	**Uterus: typical image with vesicles** **Ovaries: Uni or bilateral luthein cysts**
ABORTION	**Pain** **Bleeding initially scarce and dark, then abundant and bright red.** **No adnexal masses**	**Uterus occupied by the sac or by egg remains and/or clots. It is empty only in incomplete abortions**

Clinical and evolution diagnosis of spontaneous abortion

Abortion may go through different stages; it may start as threatened abortion that resolves spontaneously or with some therapeutic procedure, or it may evolve to the stage of imminent abortion, to end up as a complete abortion.

Chart 43. Clinical diagnosis of the stages of spontaneous abortion

A / A	hreatened a ortion	mminent a ortion	Completed a ortion ncomplete	Complete
				
etrorrha e ainful uterine contraction	D	R I		M
Cervi chan e			O E	
etachment and e pul ion	A		E R	T
ltra ound	D S L	E	E	I

Threatened abortion

Diagnosis – in this condition the gestational sac and/or the embryo are inside the uterus. The diagnosis is determined by the presence of painful uterine contractions and/or metrorrhage. The genital examination shows that the cervix remains closed.

Management – physical, psychological and sexual rest until the symptoms resolve. Contractions usually disappear first, followed by pain and finally bleeding. In this period, the cause has to be defined and treated (for example, evidence of luteal insufficiency may lead to prescription of progestagens).

Abortion in progress

Diagnosis – metrorrhage is usually abundant and uninterrupted; the increased intensity of uterine contractions dilates the cervix and the canal becomes patent. There may be leakage of amniotic fluid, and at times the sac protrudes through the outer os of the cervix.

Management: will vary depending on the presence or absence of hemodynamic impairment:

1. Mild or moderate hemorrhage with no hemodynamic impact
   - pain should be relieved with pain relievers and/or sedatives:
     Diclophenac 100 mg orally, or
     Ketoprofen 100 mg orally, or
     Acetaminophen 500 to 1000 mg orally, or
     Ibuprofen 400 to 800 mg orally.
     If pain is intense, a combination of opioid and non opioid pain relievers:
     Acetaminophen/Codein (300/30) mg orally
     The most commonly used anxiolytic is Diazepam 10 mg orally.
   - wait until the spontaneous evacuation is completed,
   - if there are remains, complement with aspiration evacuation.

2. Heavy hemorrhage and/or hemodynamic impairment,
   - insert a peripheral line in a large vein, infuse Ringer Lactate Solution at a rate of 40 drops per minute,
   - oxygen supplied with free flow mask,
   - analgesia if needed, as summarized in case of mild hemorrhage. In the event of evacuation, local or general anesthesia need to be available.
   - If there are no resources for uterine evacuation or safe blood available, the woman should be referred to a more complex level of care; during transfer, the woman must be monitored by a professional trained in resuscitation maneuvers.

Complete and Incomplete Abortion

As defined above, the expulsion of the egg outside the uterine cavity may present as one of two modalities (complete and incomplete abortion).

Diagnosis – when the egg is entirely expelled, contractions stop, pain disappears, the uterus shrinks, metrorrhage is reduced and the cervix changes typical of pregnancy resolve; the abortion is then said to be complete.

Conversely, if expulsion is partial, with retention of egg remains, contractions and pain persist, bleeding continues, the uterus dos not shrink so much and the cervix is patent or partially patent, we are facing an incomplete abortion.

Management will vary depending on abortion completeness

1. Complete Abortion

   When there is evidence of a completed abortion, the woman may not require any further therapy and she may be discharged from hospital (see post procedure care).

   Confirmation of a complete abortion is ultrasonographic.

2. Incomplete abortion

   If the evacuation was incomplete and there are no signs of infection, evacuation must be complemented with the evacuation with aspiration or surgical curettage.

   Before the procedure, the health team must give a clear and reassuring explanation on the procedure.
   - If it hurts, provide sedation and/or analgesia as described in the case of mild hemorrhage.
   - Insert a venous line to infuse Ringer Lactate Solution at 20 drops per minute.
   - The procedure should be performed with paracervical analgesia; general anesthesia may be used if the human resources and the indispensable material are available.

There is no evidence supporting the systematic use of prophylactic antibiotics in uterine evacuation procedures

Evacuation Methods

Most trained professionals can perform an evacuation up to the 12th completed week of pregnancy.

Up to the 12th completed weeks, the methods of choice for evacuation are manual or electrical vacuum aspiration; these methods tend to be safer, since they cause fewer perforations of the uterus, among other complications. In settings where suction methods are not available, the classical dilation and curettage will be used.

If the evacuation procedure needs to be started with no previous cervical dilation, it is advisable to use local anesthetics (lidocaine) to obtain a paracervical blockade. General anesthesia may be necessary in special cases; this requires human and material resources beyond those available at the first level of care.

Beyond the 12th completed weeks if there is no dilation and no contractions, it is better to start the evacuation procedure using medical methods, to obtain dilation of the cervix and expulsion of the fetus, since at this gestational age the evacuation procedures expose the woman at a greater risk (perforation, hemorrhage). In that respect, it is recommended to use:

- Osmotic dilators (their high cost and delayed onset of action are their main drawbacks)
- Prostaglandins – the use of Misoprostol (a prostaglandin E1 analog) through the vaginal route at 800 mcg distributed in the vaginal fundus and 400 mcg orally every 3 or 4 hours (maximum 4 dosages)

After the fetus is expelled, complement with aspiration evacuation or through curettage. Curettage is not as safe; it is more painful and slower than suction evacuation. Aspiration accounts for barely one third of the complications brought about by curettage.

It is advisable always to submit the egg remains removed for pathology tests

Post-Procedure Care

The first two hours after the procedure, make sure the elements below are checked: consciousness, the presence of pain, color of skin and mucosa, respiratory rate, blood pressure, heart rate, body temperature, abdomen and the significance and characteristics of vaginal discharges.

If all the parameters are normal and there is confirmation that the woman:

- has a negative syphilis screening
- received update boosters against tetanus, rubella and/or hepatitis B, etc.
- received guidance on family planning or was provided post-event contraception. Immediate postabortal insertion of the IUD is user-friendly and safe, with expulsion rates similar to those observed when the IUD is inserted after an interval
- prophylaxis with anti-D immunoglobulin (if the woman is Rh negative and she is not immunized) as discussed in the chapter on prenatal care

If all the steps recently described are met, the woman will be ready to be discharged from hospital, so the steps below must be indicated:

- home monitoring aimed at ruling complications early (temperature, color, number and odor of the vaginal discharges, persistence of pain, disorders of the digestive tract)
- Steps to follow if any changes are found in the parameters suggested for control or take note about any worrisome element
- Resuming sexual activity when the discharges resolve
- And coordinate a follow-up visit between post abortion days 7 and 10 to evaluate the course and complete the actions that could not been completed before discharge

Post Evacuation Complications

Immediate and Mediate Complications

- Hemorrhage, usually associated with uterine atonia (increasingly common as gestational age increases), it may also be due to missed abortion or lesions (perforations) during the evacuation process
- Infection - usually characterized by fever, chills, foul-smelling vaginal secretions,

abdominal or pelvic pain or mobilization of the uterus, a protracted metrorrhage or increased white blood cell count.
- Perforation of the uterus is a relatively frequent complication in the processes of uterine evacuation, especially when curettage is used. The range of manifestations of this complication goes from an asymptomatic perforation that will only require oxytocic agents as a treatment to the clearly overt peritoneal irritation syndrome or hemodynamic shock

Late Complications
- Infertility is a rare complication and it tends to be more frequently linked to curettage evacuation.

Special situations
Infected abortion, from the clinical standpoint it is characterized by recurrence of pain and fever, usually in peaks. It may associate with genital bleeding and/or foul smelling discharge.

The uterus is enlarged and softened, and painful on compression.
In these cases, the woman should be started on an intense course of broad spectrum antibiotics some hours prior to the procedures to evacuate egg remains. The professional in charge must assess the severity of the picture to determine the level of complexity required for that woman's management.

Missed abortion – in this condition the death of the embryo or the fetus is diagnosed, there are no uterine contractions or cervix dilation. In these cases the spontaneous expulsion of the intrauterine contents is less risky than accelerating expulsion, since the evacuation maneuvers with a closed and rigid cervix favor the occurrence of lesions of the cervix, uterus and incomplete evacuation.

The woman and her family should be warned about these risks. Evacuation is recommended when the woman's clinical monitoring cannot be ensured. At all gestational ages the procedure implies dilating the cervix and then evacuating the uterus, as explained in the section on evacuation methods (page 260).

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