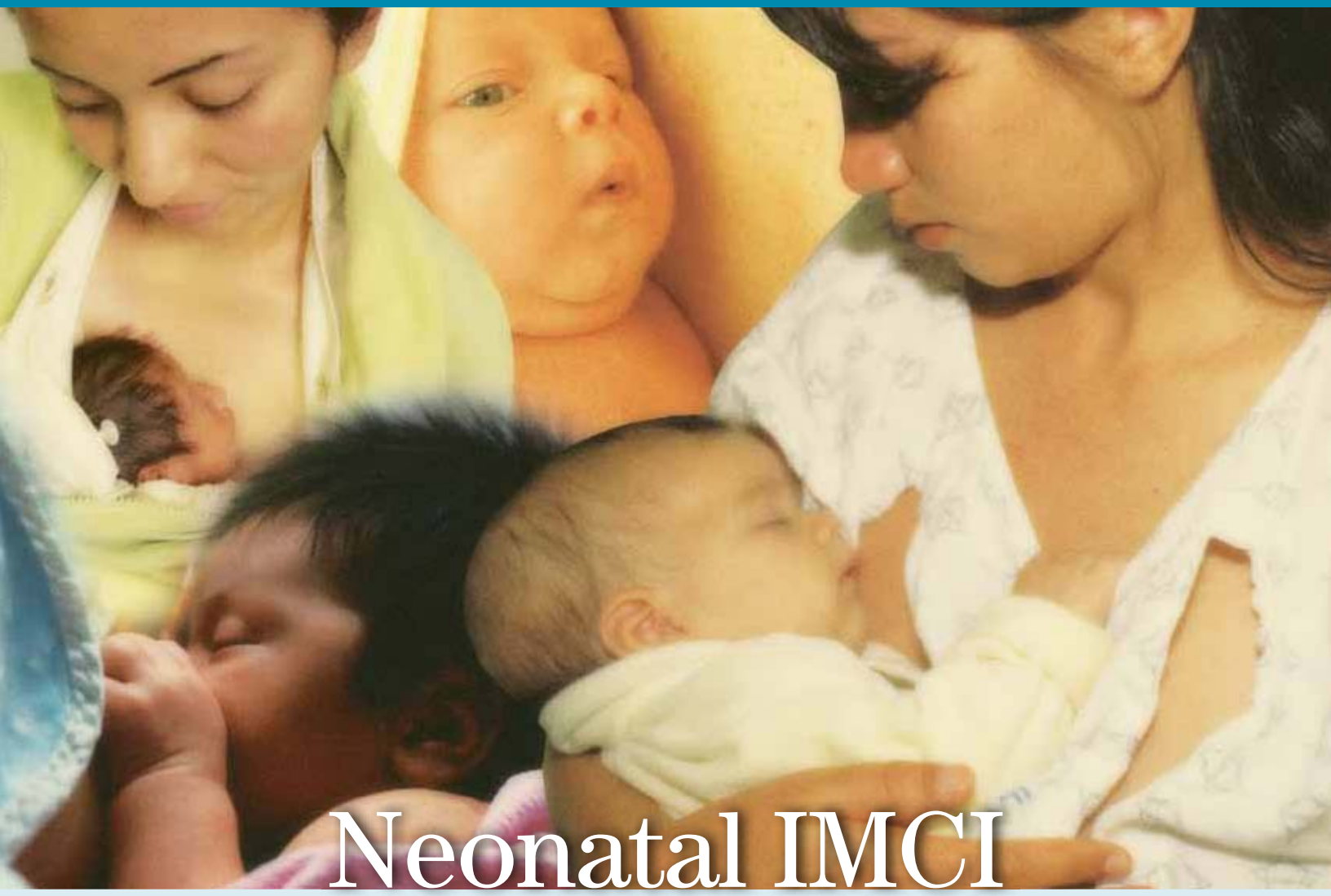

Neonatal IMCI Evidence-based Interventions

IN THE CONTEXT OF THE CARE CONTINUUM FOR MOTHERS, NEWBORNS AND INFANTS

Pan American Health Organization
Regional Office of the World Health Organization

Texas Children's Hospital®

Neonatal IMCI
Evidence-based Interventions

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Pan American Health Organization

Regional Office of the World Health Organization

Family and Community Health Area
Healthy Life Course Project

Washington DC, 2011

In 2000, the neonatal component began to be incorporated in the IMCI. Generic materials were developed, and adaptations were made in more than 12 of the region's countries.

Contents

Photo: Micahel Bisceglie

Acronyms

BMI	Body Mass Index
BMT	Betamethasone
CC	Cervical cancer
CDC	Centers for Disease Control (Atlanta, USA).
CLAP/WR	Latin American Center for Perinatology/Women and Reproductive Health
DMT	Dexamethasone
GA	Gestational Age
HIV	Human immunodeficiency virus
HPV	Human papillomavirus
IM	Intramuscular
IMCI	Integrated Management of Childhood Illness
IOM	Institute of Medicine
IUGR	Intrauterine growth retardation/restriction
IV	Intravenous
LAC	Latin America and the Caribbean
LBW	Low birthweight
LGA	Large for gestational age
SGA	Small for gestational age
PAHO	Pan American Health Organization
PCR	Perinatal clinical record, developed by CLAP/WR
PPROM	Preterm premature rupture of membranes
PROM	Premature rupture of membranes
RDS	Respiratory distress syndrome
ROP	Retinopathy of prematurity
RPR	Rapid plasma reagin
STI	Sexually transmitted infection
VDRL test	Venereal Disease Research Laboratory test
WHO	World Health Organization
ZDV	Zidovudine

Neonatal mortality is the basic indicator used to measure the development of newborns and the quality of care that they receive in a particular geographical area or set of health care facilities.

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Photo: Micahel Bisceglie

It has been pointed out that mothers who do not get prenatal check-ups early and periodically, or whose check-ups are deficient, are at greater risk of perinatal, maternal, and neonatal morbidity and mortality.

Foreword

In 2005, *The Lancet* published a series of articles on neonatal survival and health, calling the attention of the international community to the inadmissible death of millions of newborns despite the availability of effective and low-cost interventions. In Latin America and the Caribbean, neonatal mortality accounts for 58% of the deaths of children under five, and over 70% of deaths among those less than 1 year old. Seventeen percent of the region's 11.2 million annual births take place without trained staff, and mortality is highest in the most disadvantaged areas, creating a real problem of equity in the region and in individual countries. Infant mortality in indigenous and rural populations is nearly twice what it is in Hispanicized and urban populations. Populations in the poorest percentiles have less access to health services, fewer opportunities for prenatal check-up, and less access to drugs and state-of-the-art treatment. The result is higher mortality.

Given this scenario, effective, evidence-based interventions should be mustered to reduce mortality in the first 28 weeks of life, focusing on the family and the community, with emphasis on the poorest and most disadvantaged. This should take place in the context of primary health care that targets the communities' principal health problems by providing the promotion, prevention, treatment, and rehabilitation that they call for.

Such a process – unfolding with a life cycle orientation in the context of a continuum of care for mothers, newborns, and children, and with knowledge of the countries' potentials and constraints – can help the countries more rapidly reduce mortality in children under 5 to meet the United Nations Millennium Development Goals for 2015.

The Pan American Health Organization (PAHO), along with bilateral agencies, scientific associations, nongovernmental organizations, and other partners such as the Global Partnership, has taken this situation to heart. On the occasion of World Health Day in 2005, these organizations met in Washington D.C. to mark the emergence of an Interagency Strategic Consensus. That consensus has spawned the Neonatal Alliance, an entity that promotes newborn health in Latin America and the Caribbean in the context of the care continuum, promoting interagency initiatives, policies, and evidence-based programs that target vulnerable populations.

It was on the basis of the document prepared by the Strategic Consensus that PAHO submitted a resolution on neonatal health to its Directing Council in September 2006, at the 58th session of the Regional Committee. The resolution was adopted by all of the region's Ministers of Health in 2008 as a Strategy and Plan of Action to address newborn health, which the countries draw on in obtaining National Neonatal Health Plans that meet their local needs."

PAHO promoted and spread this work through the Integrated Management of Childhood Illness (IMCI) initiative and its neonatal IMCI component. IMCI is the result of efforts undertaken in 2000 by a group of professionals in the Region of the Americas. It has been adapted and used as a national strategy in more than 14 of the Region's countries.

Since science evolves rapidly, and far more rapidly in the neonatal field than in others, many evidence-based interventions that have now proven to reduce morbidity and mortality at low cost were not included in the first neonatal IMCI documents.

Therefore, the efforts of different institutions that collaborate with PAHO were brought together in the form of a group of experts in neonatology with broad IMCI experience. The group met to develop a generic document that presents all the evidence-based, cost-effective interventions that can be conducted at different care levels.

Photo: Micahel Bisceglie

IMCI – Integrated management of Childhood Illness

As a part of packages tailored to their national situations and to the level of care provided in their health systems, the region's countries can use these interventions, which have been scientifically shown to diminish maternal and neonatal morbidity and mortality, and which are conceived in the framework of the life cycle, the family and the community.

Our challenge is to ensure that these effective interventions, carried out in the framework of public health strategies, and focusing on priority areas and vulnerable populations, in fact contribute to reducing neonatal mortality, and hence infant mortality and mortality in children under 5 in the Region of the Americas.

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Family and Community Health
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Washington, D.C.

Preface

In September 2000, the United Nations Millennium Development Goals set clear standards for progress in the health and well-being of populations across the globe. Three of the eight goals established targeted significant challenges to global health: to combat HIV/AIDS and malaria; to reduce child mortality, and specifically decrease by two-thirds the mortality rate among children under 5; and to improve women's health by lowering the maternal mortality rate worldwide by three-quarters by 2015.

At Texas Children's Hospital and Baylor College of Medicine, we are participating in efforts to achieve the Millennium Development Goals and all endeavors that seek to effectively, comprehensively improve the health of a number of populations throughout the globe. We demonstrate our dedication to these goals through our wide range of programs targeting in global child health.

We are fortunate to have multi-lateral partnerships that over the past 15 years have allowed us to create the Baylor International Pediatric AIDS Initiative (BIPAI) at Texas Children's Hospital (www.bayloraids.org). In partnership with governments, international agencies, and private foundations, the BIPAI Children's Clinical Centers of Excellence Network has catalyzed the treatment of children with HIV/AIDS and the training of health professionals in Eastern Europe and across sub-Saharan Africa. We are proud that this Network now provides care and treatment to more than 100,000 children and is responsible for the ongoing training of health professionals in more than 13 countries.

Of the many lessons we have learned from our work in HIV/AIDS are two fundamental principles that guide all of our work internationally: 1) Initiatives must be evidence-based and ultimately target improvements in care and treatment; 2) Interventions must build local capacity and promote sustainable results at the local level.

Recognizing that evidence-based care for mothers and newborns has immense potential to close the care and treatment gap that leads to almost 4 million newborn deaths annually and accounts for 37% of all deaths in children under 5, Texas Children's saw an opportunity to collaborate in ways similar to BIPAI and achieve better outcomes for children in their first days of life.

In partnership with the Pan American Health Organization/World Health Organization, Texas Children's Hospital launched the WHO Collaborating Centre for Perinatal-Neonatal Health in August 2008. The goals of this partnership are simple:

1) **Create locally sustainable and highly-effective** operational interventions that translate clinical best practices into action, and have a **measurable positive impact** on maternal and child health

2) **Create globally replicable models** for maternal and child interventions aimed at advancing child health and reducing child mortality worldwide

The overarching philosophy of the WHO Collaborating Centre for Perinatal-Neonatal Health is to put knowledge into action. Much of the knowledge necessary for clinically-effective, evidence-based work in maternal and child health already exists. The challenge lies in assuring that the knowledge is adapted to be locally relevant and that it is used by the providers of care in the local communities.

With this in mind, Texas Children's works within three areas of focus as a WHO Collaborating Centre: capacity building across the health professional continuum through education and training; the development of tools and products targeting the improvement and dissemination of best practices; and broad-based quality improvement initiatives.

In this context, Texas Children's supports and encourages the broader dissemination of evidence-based guidelines for newborn care. And, we specifically support the distribution of these guidelines for newborn care in documents in English and Spanish throughout the Western Hemisphere and to other WHO regions. In the future, we look toward providing these crucial documents in more languages and disseminating them to areas in which the content is needed most.

We hope this document will prove useful at the point of patient care and in policy setting, and, we express our sincere gratitude to the Pan American Health Organization/World Health Organization for their partnership. It is through these types of meaningful, solutions-focused collaborations that we can resolve the most critical challenges facing the health of vulnerable populations.

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Introduction

The majority of infant and child health indicators in the Region of the Americas have improved substantially in most of the countries. However, neonatal health has been neglected by health authorities. Thus, there has been great emphasis on reducing postneonatal mortality and very little on reducing neonatal mortality. As a result, over 70% of infant mortality today is neonatal mortality.

In 2000, the neonatal component began to be incorporated in the Integrated Management of Childhood Illness (IMCI). Generic materials were developed, and adaptations were made in more than 12 of the region's countries.

The materials have been updated continually in their different adaptations as knowledge advances. The advances are evident in The Lancet's publication of material on neonatal health (1), which includes new scientific evidence demonstrating that many of the cost-effective interventions that can reduce neonatal morbidity and mortality remain unimplemented or are implemented poorly.

There is much discussion today on the importance of the quality of neonatal care, and on its short-, medium- and long-term consequences. Quality care means not only providing optimal care for every newborn, but also changing health workers' attitudes and practices so that they take advantage of modern evidence-based medical practices that have a direct impact on neonatal outcomes.

QUALITY OF CARE IN NEONATOLOGY

Neonatal mortality is the basic indicator used to measure the development of newborns and the quality of care that they receive in a particular geographical area or set of health care facilities.

Infant and neonatal mortality rates vary in the different countries as a function of economic level, health conditions, and the quality of medical care. Neonatal mortality differs from postneonatal mortality in that it is less dependent on environmental and health conditions, and more dependent on organizational quality and the quality of perinatal and neonatal care, as well as on the high-technology medical treatment that occasional cases require.

The principal factors responsible for reducing neonatal mortality in those countries with low neonatal mortality rates – in addition to socioeconomic improvement and parental education – are good pregnancy monitoring and skilled childbirth assistance, the regionalization of perinatal care, the provision of timely neonatal intensive care, and good immediate care of newborns, including, when necessary, proper and immediate resuscitation.

High quality care in neonatology means proper care for every healthy newborn and more specialized care for those who need it, with quality protocols, an enabling environment, and tools for measuring short- and medium-term neonatal outcomes as well as satisfaction on the part of parents and care providers (2).

Neonatal management protocols are more easily adapted if they are:

- based on procedures of low complexity;
- compatible with existing standards, easy to follow, and ideally not dependent on the acquisition of new knowledge or skills (3);
- up-to-date and based on scientific evidence (4).

Projects targeting hospital staff and physicians working in the community, with a focus on quality and improvement, have been effective in enhancing preventive services for newborns while in the hospital. These preventive services include: immunization with hepatitis B vaccine, support/promotion of breastfeeding, risk assessment for hyperbilirubinemia, metabolic and auditory screening, attention to newborns' sleeping position, preventive respiratory support, nasal CPAP, hand hygiene, aseptic procedures in handling the umbilical cord parenteral feeding, and planning for outpatient follow-up, among others things (5).

Neonatal monitoring and the comparative evaluation of data have provided a solid basis for lasting improvement of care. This type of evaluation has methodological limitations, and its findings vary, reflecting a complex mix of factors that often make practical application difficult. Discrepancies tend to arise in comparing research, evidence, information from monitoring, standards, and practices (6, 7).

Systematic review of the literature is a way of keeping up to date with developments in daily clinical practice. Traditional practices of health professionals – such as reading educational materials, or attending conferences, courses, and workshops – cannot replace them. These activities have but minimal impact on care quality. Another factor is that, if clinicians fail to make practical use of scientific evidence on policies and protocols, it is not solely because they are unfamiliar with recommendations or disagree with them. The more important impediment lies in local obstacles to implementing the recommendations.

EVIDENCE-BASED MEDICINE (EBM)

According to the definition proposed by Sackett in 1996 (8), "EBM consists of the conscious, explicit and judicious use of the best tests available when making decisions on comprehensive care for each patient." The focus is on the patient, not merely on the disease or process that is present. Thus, from the time of precise diagnosis to the selection of the best therapeutic option, the patient's rights, principles, and preferences must be identified and taken into consideration.

Textbook information can be questionable as time passes. The quantity of publications and information sources is enormous, and our time, knowledge, and ways of locating, reading, interpreting, and assimilating what is published are less than sufficient. The principal value of EBM is as a tool to quantify and identify the most valid data or studies, to clarify the best way of understanding and using the evidence, and to facilitate translating it into practice.

EVIDENCE-BASED MEDICINE IN PERINATOLOGY AND NEONATOLOGY

Much perinatal and neonatal medical evidence today has been subjected to major, systematic review, and provides data for practical application. Systematic reviews provide information on original work by selecting work, evaluating it critically, and summarizing it, following an explicit, formal, and rigorous methodology. Systematic reviews and meta-analyses are generically known as synthesis resources. The Cochrane Library offers systematic reviews of the Cochrane groups, and PubMed Clinical Queries makes it possible to locate systematic reviews in the MEDLINE database. Other sources that can be consulted are the WHO Reproductive Health Library and the publications of the Latin American Center for Perinatology (CLAP/WR).

The interventions presented in this document were selected on the basis of current scientific evidence and on an evaluation of their utility and potential for reducing neonatal morbidity. They can be included in packages designed for the levels of care that different health systems offer.

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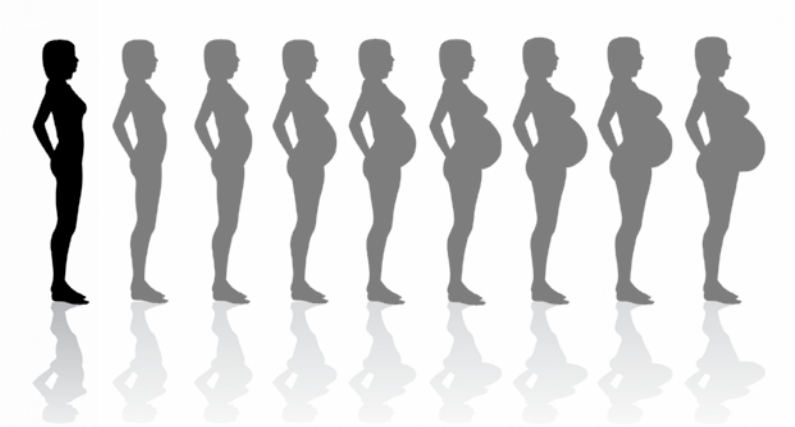
I. Prepregnancy interventions



Preconceptional care is recognized as a critical component in the care of women of childbearing age. It is defined as a set of interventions designed to identify and reduce risk factors. The relevant risk factors are a function of demographic and medical variables that relate directly or indirectly to causes of malformations or to poor perinatal outcomes (9-14).

Preconception counseling optimizes perinatal outcomes by detecting pathologies, medications, habits, and behaviors that could be hazardous for the future mother or fetus. This counseling is important because:

- Most of the relevant risk factors are present before conception.
- The countries have high rates of adolescent and unwanted pregnancies.
- Some interventions are more effective if carried out before pregnancy.
- Some interventions are not feasible during pregnancy.

At the same time, it is important to encourage healthy lifestyles in couples by offering **health promotion**. This means giving them the tools they need to improve their health and have greater control over it. The idea of health promotion was conceived in 1990 by the World Health Organization (WHO), which defined it as encompassing all of a population's activities, as well as its health services, health authorities, and other social and productive sectors, insofar as all of these bear on improving individual and collective health.

1. Using body mass index (BMI) to monitor nutritional status prior to pregnancy

Antecedentes

Various anthropometric indicators of nutritional status have been used in the last few years. Body mass index prior to pregnancy has recently been considered a good indicator and tool for diagnosing, monitoring, and following up on women's nutritional status from the preconception period through the pregnancy. The Institute of Medicine (IOM) of the American Academy of Sciences has now adopted BMI as a tool, and WHO recommends its broad use for nutritional evaluation of nonpregnant adults in the context of prepregnancy nutritional assessment (15).

Any deviation from adequate nutritional status should be rectified before conception, through nutritional support measures to lower weight (by promoting dietary changes and physical activity).

Calculation Weight (kg)/height(m)^2

Interpretation Underweight: BMI < 18.5

Normal: BMI 18.5–24.9

Overweight: BMI 25.0–29.9

Obese: BMI ≥ 30.0

Evidence A body mass index of < 18.5 is associated with malnutrition. Before pregnancy, it is a predictor of low birthweight (LBW) and intrauterine growth retardation (IUGR).

Recent evidence points to prepregnancy BMI as an independent predictor of many adverse effects for the pregnant woman and fetus in both the short and long term. The greatest risk factor, which increases the incidence of congenital malformations (CMFs) by as much as a factor of 6 over a period of a decade, is a threefold increase in the prevalence of preconceptional diabetes preceded by increased obesity *(20–23)*.

2. Folic acid (FA) and multivitamin (MV) supplementation

Background Folic acid is one of the most important B-complex vitamins before and during the pregnancy, for studies have shown that adequate intake diminishes the risk that a baby will suffer from neural tube defects (NTDs). The neural tube is the structure from which the brain and spinal cord develop during the first 3 months of gestation. If it does not mature and close properly (28 days after conception) certain defects such as spina bifida, encephalocele and anencephaly can appear. Anencephaly is incompatible with life, and the symptoms associated with spina bifida include infantile paralysis, lack of sphincter control, and learning disabilities.

Women at high risk for NTDs and other congenital malformations (CMFs) are those with a family history of NTDs, those who are taking antiepileptics or methotrexate, those with diabetes, obese women with a BMI ≥ 0 kg/m^2, and mothers with sickle cell anemia or thalassemia. Women with poor compliance with medical instructions (for FA and/or MV supplementation) and low consumption of FA-rich foods, and those consuming teratogenics (alcohol, tobacco), require counseling on healthy lifestyles, FA-rich diets, and 4 mg of FA daily plus a MV supplement in order to prevent NTDs and other CMFs.

Administration To prevent neural tube defects (NTDs) (in children without prior problems), as well as other congenital malformations (CMFs), in cases of mothers not at risk for NTDs and other CMFs, administer:

- From three months before pregnancy to three months after birth, or as long as breastfeeding.
- [TN: Those two bulleted instructions are either contradictory or need some further explanation]
- It is generally administered in combination with ferrous sulfate.

Dose Folic acid, 400 µg/day (0.4 mg/day) orally.

In women at high risk for NTDs (malnutrition, obesity, history of previous children with malformations), dosage should be increased to 4-5 mg a day orally. Multivitamins should also be administered during the period the medication is taken.

To prevent occurrence and recurrence (in children with previous problems) where mothers are at HIGH risk for NTDs and other CMFs:

Administer 4-5 mg/day of folic acid plus multivitamins from at least 3 months before pregnancy until 3 months after birth. Between the 3rd month of the pregnancy and the 3rd postpartum month (or as long as breastfeeding), administer 0.4-1 mg of folic acid daily plus multivitamins orally.

Evidence The administration of folic acid alone reduces the incidence of neural tube defects by 72% (42%-87%). Intake of FA for a year or more before conception significantly reduces the risk of spontaneous preterm birth by 70% between weeks 20 and 28 and by 50% between weeks 28 and 32.

Periconceptional administration of multivitamins reduces the risk of preterm birth before the 34th week by 71% (statistically significant), and in non-obese women it reduces births of babies who are small for their gestational age by 46%.

Recent studies show periconceptional multivitamins plus folic acid significantly (46%) reducing not only NTDs but also other CMFs: cleft lip and palate, cardiac defects, defects of the limbs and urinary tract, and hydrocephalus. The multivitamin mix in question includes: A, 4000 IU; B1, 1.6 mg; B2, 1.8 mg; nicotinamide, 19 mg; B6, 2.6 mg; calcium pantothenate, 10 mg; biotin, 0.2 mg; B12, 4.0 mcg; C, 100 mg; D, 500 IU; E, 15 mg; folic acid, 0.8 mg. Also included are the minerals calcium, 125 mg; phosphorus, 125 mg; magnesium, 100 mg; and iron, 60 mg, as well as three trace elements: copper, 1 mg; manganese, 1 mg; and zinc, 7.5 mg.

Other benefits reported for children from periconceptional administration of multivitamins are significantly reduced risk of cerebral tumor (27%), neuroblastoma (47%), and leukemia (39%).

A random double-blind study (n = 31,290 pregnant women) compared the administration of multiple micronutrients (MMNs) – iron; AF; vitamins A, D, E, C, B1, B6, and B12; niacin, zinc, copper, selenium, and iodine – with giving only FA + iron (FAFe) during pregnancy. For 34% of the women, administration began in the first trimester, while 43% began the regimen in the second trimester. All continued until the third postpartum month. The MMN group was found to have reduced early infant mortality (< 3 months of age) by 18%, RR 0.82 (95%, CI 0.70-0.95) (24-41).

3. Preventing and treating anemia with iron

Background

The prevalence of anemia in preschool children and adolescent girls remains high in the developing countries. WHO has estimated the prevalence of anemia in preschool children in the region of Latin America and the Caribbean (LAC) to be 39.5%, and the prevalence among nonpregnant women to be 23.5%. Assuming that the average absorption of medicinal iron is 10%, the daily requirements of elemental iron would be 10 mg for children, men, and postmenopausal women; 20 mg for nonpregnant women; and 30 mg for pregnant women.

Diagnosis

Hb < 12 g/dL (adjust as a function of altitude).

Treatment

Hb < 7 g/dL: 120 mg of elemental iron/day orally.

Hb 7-12 g/dL: 60 mg of elemental iron/day orally.

Administer between meals or at bedtime to avoid alkalinizing the food and to take advantage of the high nighttime levels of gastric acidity.

A rise of 2 g/dL or more of the Hb, and/or a hematocrit that has normalized after 2-3 months of iron therapy with iron, is a good response to treatment, but treatment should continue for another 3-6 months to replace iron reserves in the bone marrow. Iron-rich foods should also be recommended: red meats (liver is the greatest source), eggs (yolks), fish, vegetables (lentils and beans), poultry, raisins, and whole-grain bread.

Vitamin C (citrus juice, tomato juice) facilitates iron absorption, while coffee, tea, soft drinks, milk, calcium, magnesium, quinolones, tetracyclines, and antacids impede it. The best iron supplement is ferrous sulfate.

Evidence

Iron deficiency anemia in adolescent girls is associated with an elevated risk of anemia during pregnancy. It has also been associated with alterations in cognitive functions and memory, reduced school performance, and immunosuppression with increased infection rates *(42-51)*.

4. Micronutrients and reproductive health in women

Background

Proper nutritional status in women before, during, and after pregnancy is an important element of

reproductive health. It helps maintain health, reduces the risk of adverse outcomes during pregnancy, and reduces the prevalence of birth defects and chronic disease in the children after they are born. Pregnancy creates a special metabolic demand for high-quality nutrients. A good selection of food can provide most of the recommended levels of nutrients. Beyond food intake, however, good nutrition depends on a woman's economic environment, social and cultural conditions, and personal habits.

Diagnosis Diagnosis is based on ascertaining the woman's food consumption, eating habits, and socioeconomic status. BMI is useful in determining nutritional status.

Treatment Appropriate balanced diet plus multivitamin supplements.

Evidence Nutritional imbalances can produce detrimental effects in pregnant woman (hypertension, anemia, complications during delivery) and can cause harm to the fetus (congenital malformations, premature delivery, intrauterine growth restriction). It can also be detrimental to the composition of the mother's milk *(52-55)*.

5. Detecting and treating sexually transmitted infections (STIs) before pregnancy

Background Most STIs affect both men and women, but the health problems involved can be more serious in women. STI in a pregnant woman can create severe health problems for both mother and baby.

Diagnosis Chlamydia (*Chlamydia tracomatis*), gonorrhea (*Neisseria gonorrhoeae*), herpes virus, HIV/AIDS, syphilis, human papillomavirus (HPV).

Evidence In women, chlamydia and gonorrhea can induce pelvic inflammatory disease, which can lead to infertility or problems with a pregnancy. In men, gonorrhea can cause epididymitis and infertility. HIV kills or damages the cells of the organism's immune system, leading to severe infections and death. It is transmitted during pregnancy, labor, and breastfeeding. Vaccination for HPV can diminish cancer of the cervix, vulva, vagina, and anus. In men, HPV can cause cancer of the anus and of the penis *(56-66)*.

6. Deparasitization in areas of high prevalence

Background In areas of endemic intestinal helminthiasis, routine deparasitization considerably reduces the prevalence of anemia in women and its possible complications.

Diagnosis Stool test (ascaris, oxyurids, uncinaria, Trichuris).

Treatment Albendazole, 400 mg orally, single dose, or

Mebendazole, 100 mg twice a day orally for 3 days, or Mebendazole 500 mg orally, single dose.

Evidence Deparasitization of women of childbearing age reduces anemia and its complications and is associated with lower risk of anemia during pregnancy *(67-68)*.

7. Detecting and treating chronic diseases (cardiovascular, nutritional, endocrine)

Background The prevalence of overweight in women between the ages of 15 and 49 in some Latin America and Caribbean countries is 25.1%, and the prevalence of obesity averages 8.5%. Obesity is a risk factor for several chronic noncommunicable diseases such as diabetes, hypertension, cancer, hypothyroidism, and lupus, which not only are detrimental to the health of women of childbearing age, but can lead to fetal death.

Diagnosis Overweight: BMI 25.0–29.9

Obesity: BMI $\geq$ 30 kg/m^2

Evidence Psychiatric and emotional disturbances, poor school performance and dropout, prolonged treatments, cardiovascular disease *(69-79)*.

8. Detecting, preventing, and managing domestic violence

Background Violence against women by their partners or ex-partners is widespread in the world, occurring in all social groups regardless of economic status, cultural level, or any other variable. Although it continues to be difficult to quantify, since not all cases are known to people other than the couple, it is assumed that many women to suffer or have suffered from this type of violence. Studies conducted in developing countries point to abuse rates of around 20%.

Diagnosis Repeated injuries, low self-esteem, depression, personality disturbances, poor school performance, neglect of personal hygiene.

Evidence Violence diminishes motivation and morale, causes physical and psychological damage, depression, and post-traumatic stress. *(80-89).*

9. Detecting, preventing, and managing alcohol and tobacco consumption

Background Consumption of alcohol at a very early age is a reliable predictor of future problems related to alcohol consumption, while drinking in adolescents is associated with high-risk sexual behavior and is predictive of early motherhood and a smoking habit.

Diagnosis Antisocial personality, depression, smoking, poor school performance.

Evidence Studies suggest that several genes that code parts of receptors for the neurotransmitter gamma-aminobutyric acid (GABA) are involved in the development of alcohol or nicotine dependency. Other studies have identified further genes that may be associated with alcohol or nicotine dependency. Findings to date indicate that both common and drug-specific genetic influences play a role in the development of alcohol and nicotine dependency.

Findings of delayed reproductive functions in alcoholic women are compatible with the occurrence of alcohol-related reproductive dysfunctions *(90-95).*

10. Detecting, preventing, and managing depression

Background Depression ranks as the fourth most important disease in young people's estimated disease burden. It is a common problem, with prevalence figures as high as 8%. Strong associations link depression, suicide, and smoking in adolescents.

Diagnosis Poor school performance, social dysfunctions, abuse of psychotropics, attempted suicide, poor family relations, and scant use of health services.

Evidence Depressive symptoms are common in adolescents, and their course is difficult to predict. Most adolescents with minimal symptoms maintain their state and seem to be at low risk, but adolescents with moderate or serious symptoms of depression should be monitored and reassessed – above all if pregnancy is a possibility.

Several risk factors for developing depressive symptoms during pregnancy have been identified. Strong associations have been established with: maternal anxiety, stress due to major life events (death in the family, divorce), personal history of depression, and lack of support from one's intimate partner. There is moderate association with: lack of social support, domestic violence, and unwanted pregnancy *(96-103).*

11. Detecting and preventing cervical cancer

Background Cervical cancer (CC) is one of the most common cancers in women at the world level. A number of strategies have been recommended to limit the spread of human papillomavirus (HPV) 16 and 18, which is one of the principal risk factors for cervical cancer, causing 70% of all cervical cancers in the world. The strategies include promoting lifestyles and behaviors that minimize risk, promoting the use of condoms in sexual relations, reducing the number of sexual partners, and implementing strategies for lower-risk sexual activities.

Diagnosis Cytology and colposcopy are highly sensitive as detectors of CC, but their specificity is quite low. Screening tests for HPV are both highly sensitive and highly specific. Combining HPV testing with colposcopy produces a sensitivity of 97.2% and raises negative predictive value to 92.3%.

Prevention Vaccination against human papillomavirus (HPV) is advised for all adolescents 11-12 years of age, and for women ages 13-26 not previously vaccinated. Minimum age for vaccination is 9 years.

Dose 1 upon detection.

Dose 2 two months after dose 1.

Dose 3 six months after the first.

Boosters are not recommended. The vaccine can be administered with other vaccines.

Evidence Early detection of CC by screening all women of childbearing age, as well as vaccination for human papillomavirus, reduces the number of women requiring colposcopy, biopsy, and treatment of precancerous cervical injuries *(104-114)*.

12. Complete immunization series

Background Childhood vaccination recommendations have increased over the years. Many care providers, patients, and families have concerns about the safety and efficacy of vaccines. Health systems and pediatricians currently face numerous challenges in improving immunization rates among children and adolescents. The strategies that can be used include fostering coverage by counseling parents with clear information about the risks and benefits of vaccines, and taking advantage of routine checkups as an opportunity for immunization.

Prevention Complete the vaccination series following the country's ministry of health standards.

Evidence Immunization to prevent communicable diseases has been one of the most effective interventions for diminishing morbidity and mortality in the countries of the Region of the Americas. Women of childbearing age should complete the entire vaccination series before their next pregnancy to diminish the risk of intrauterine infection, which is most often fatal to the fetus *(115-122)*.

13. Detecting and treating periodontal disease

Background Caries is a disease of the hard tissue of the teeth. It is caused by an imbalance over time in the interactions between cariogenic bacteria in the dental plaque and fermentable carbohydrates (principally sugars). It is also a well-established fact that many health conditions have oral manifestations.

Diagnosis Dental checkups (semi-annual).

Prevention Regular tooth brushing with toothpaste that contains fluoride in concentrations of 1000 ppm or greater.

Evidence Periodontal disease is associated with adverse health conditions such as rheumatic fever, bacterial endocarditis, and systemic diseases, and can affect eating and food selection. Oral and facial pain from the teeth, temporomandibular joint disorders, and oral infections affect social interactions and daily behavior. The consequences of oral disorders can be significant for our society's young people, not only physically and socially, but also economically *(123-131)*.

14. Preventing pregnancy in adolescents

Background Teenage pregnancy is a major public health challenge in both the developed and developing countries. Numerous preventive strategies have been used by countries around the world to address this problem, including health education, developing other abilities (sports, languages, etc.), and improving access to contraceptives.

Prevention

Two affordable options have been proposed for those who wish to reduce negative health outcomes associated with adolescent pregnancy. The first consists of expanding the range of life choices for the young female population, in an attempt to improve their social and economic circumstances. The second is to ensure that their intentions to get pregnant are understood, so as to provide the appropriate services and obtain the best possible outcome for mother and child.

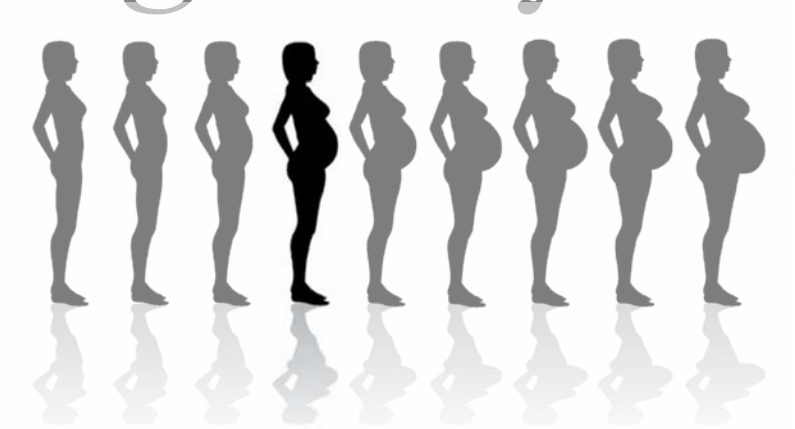
Educational interventions that include service providers and parents, as well as programs on the use of contraceptives, have been effective in diminishing unwanted pregnancy among adolescents.

Evidence

Adverse outcomes have been identified in mothers, principally those under 15 (high rates of caesarean section, puerperal infection, and intrapartum complications), as well as in fetuses (preterm birth, low birthweight, and neonates who are small for their gestational age) *(132-138).*

According to the new WHO model, five check-ups are sufficient for pregnant women without complications, that is, for 75-80% of pregnant women.

II. Interventions during pregnancy



Maternal mortality is one of the major health problems in many Latin America and the Caribbean countries, and has major impact on the lives of children and their families. It is very closely linked to health determinants such as poverty, access to health services, education, and cultural barriers, and with maternal factors such as parity, adolescent pregnancy, short birth interval, and families' and communities' ignorance of warning signs.

Pregnancy usually proceeds without complications, or with minor complications that do not merit intervention. However, a percentage merit certain interventions to ensure the continued health and safety of fetus and mother through the pregnancy, e.g., prenatal check-ups and interventions in order to prevent maternal complications that could cause fetal, maternal, or neonatal death.

The interventions proposed are based on scientific evidence and real cost, and have been shown to reduce maternal, fetal, and neonatal mortality. They can be implemented at any level of complexity of health services. Complexity of implementation and high economic cost are less likely to be barriers than is acceptance by the care providers who work with pregnant women.

1. Prenatal check-up

Background

It has been pointed out that mothers who do not get prenatal check-ups early and periodically, or whose check-ups are deficient, are at greater risk of perinatal, maternal, and neonatal morbidity and mortality.

Frequency

According to the new WHO model, five check-ups are sufficient for pregnant women without complications, that is, for 75-80% of pregnant women. The activities included in the basic component fall into three general areas:

Ascertaining socioeconomic status, and detecting pathologies that increase the possibility of specific adverse outcomes;

Carrying out proven therapeutic interventions; and

Educating pregnant women to recognize danger signs and emergencies during pregnancy, and teaching them how to deal with them.

Evidence

Prenatal check-ups provide an opportunity to increase access to safe delivery in an environment that provides care for obstetric emergencies as well as skilled institutional neonatal care. With prenatal check-ups, fewer complications have been reported during pregnancy and childbirth: less preeclampsia, urinary tract infection, postpartum anemia, and maternal mortality, as well as lower incidence of LBW *(139-151).*

2. Preventing fetal death

Background

Fetal death, defined as occurring when any infant at birth has shown no sign of life during the perinatal period. accounts for at least 60% of all perinatal deaths and 75% of all potentially preventable miscarriages. The causes of fetal death include birth defects, isoimmunization, toxemia, syphilis, hemorrhage before delivery, maternal illness or trauma, and unexplained causes.

Risk factors

Maternal factors: multiparity, advanced age, obesity, periodontal disease, smoking. Social factors: education, racial group, access to quality care.

Prevention

Adequate access to obstetric care, particularly during labor and delivery, and better screening for and treatment of syphilis and malaria in endemic areas, can dramatically reduce fetal mortality in developing countries *(152-170).*

3. Preventing preterm birth

Background

A preterm birth is one that occurs during the first 37 weeks of gestation. Percentages of premature births vary from country to country, but are generally between 6% and 9% in the less developed countries, and above 9% in the more developed countries.

The rate of preterm birth (< 37 weeks of GA) in 2008 was 10% at the world level, 12% in Africa, 11% in North America, 8% in Latin America and the Caribbean, and 6% in Europe. In Central America specifically, it was between 9% and 10%. Preterm birth rates are increasing throughout the world due to the rising number of late-preterm births (34 to 36 weeks of gestation).

According to WHO, preterm newborns account for more neonatal mortality than do low birthweight babies: for nearly 75% of perinatal mortality and 50% of long-term neurological sequelae. Preterm babies are subject to acute complications as well as long-term problems of various kinds that generally entail high economic costs. They include respiratory, gastrointestinal, immunological, central nervous system, hearing, vision, cognitive, and social/emotional problems.

In approximately one half of preterm births, the cause is unknown. Three types of risk factors that can contribute to spontaneous preterm birth have been identified:

Social stress and race: Poverty, low educational level, being single or adolescent, and lack of adequate prenatal check-ups increase the probability of preterm birth and low birthweight. In the United States, adjusting for other risk factors, blacks are twice as likely as whites to experience preterm birth, and their recurrence rate is four times as great.

Infection and inflammation: Chorioamnionitis is the most obvious example of an infection that triggers labor and preterm delivery. There is microbiological evidence that infection may account for up to 25%-30% of preterm births, with rates of bacterial colonization as high as 79% in babies born at 23 weeks, and 11% among those born at 31-34 weeks of gestation. In most labors and preterm deliveries, there are no clinical manifestations of intrauterine infection, even when there is histological evidence of inflammation in the decidua, fetal membranes, and umbilical cord. For example, *mycoplasma* and *ureaplasma* are microorganisms frequently cultivated from fetuses, but pregnant women at risk of preterm delivery due to vaginal colonization by them seldom receive erythromycin treatment. New mechanisms of chronic infection and inflammatory response have been identified in urinary tract infections. Bacteria and fungi tend to form communities or biofilms within a self-developed polymer matrix. The CDC estimates that

these biofilms play a role in up to 65% of human bacterial infections, such as in periodontitis, urinary tract infection, endocarditis, and other chronic infections.

Genetic factors. A history of preterm births significantly increases a mother's risk of future preterm births, just as a history of post-term birth increases the risk of future post-term births.

Risk factors

Many maternal and fetal characteristics have been associated with preterm birth, including demographic characteristics and nutritional status of the mother (BMI < 18.5), a history of premature birth, syphilis, birth defects, certain psychological characteristics, detrimental habits (tobacco, alcohol, drugs), infections, uterine contractions, and cervical size, as well as genetic and biological markers.

Preterm births can be spontaneous or a result of medical indications. Spontaneous preterm births occur as a result of preterm labor or preterm premature rupture of membranes (< 37 weeks of GA), the latter accounting for 25%-30% of preterm births. Medically indicated preterm births (25%-30% of the total) occur because of health problems in the mother or fetus: preeclampsia, placenta previa, or limited fetal growth. In 40%-50% of cases, the etiology of the preterm birth is unknown. Babies born prematurely when spontaneous preterm labor begins without apparent maternal pathology more frequently show deficient intrauterine growth.

Medically indicated preterm births share with spontaneous preterm births several ***maternal risk factors*** that increase the probability of preterm birth. Prepregnancy BMI and weight gain during pregnancy below the levels recommended by the Institute of medicine (IOM) increase risk by a factor of 14, while levels above those recommended increase risk by a factor of 3. Urinary tract infections – whether asymptomatic (asymptomatic bacteriuria) or symptomatic – and African-American ethnic identify both double the risk of preterm birth. Multiple gestation increases risk by a factor of 6, a history of preterm birth by a factor of 4, and vaginal bleeding (placenta previa, abruption, and unexplained persistent bleeding) by a factor of 3.

The ***risk of a recurrence of preterm birth*** rises with the number of previous preterm births, and rises in an inverse relation with the gestational age of previous preterm babies. Chronic hypertension increases risk by a factor of 7, and preeclampsia by a factor of 13. Asthma, heart disease, pre-gestational and gestational diabetes mellitus, hyperthyroidism, and systemic lupus erythematosus also increase risk. Other maternal risk factors are periodontal disease, non-existent or inadequate prenatal check-ups, age < 18 or > 35, exhausting work, high stress level, anemia, tobacco, cervical injuries or uterine anomalies, and use of technology for reproductive assistance. ***Fetal risk factors:*** red blood cell isoimmunization, twin-to-twin transfusion, and congenital malformations.

Prevention

Preventing preterm births should be a national public health priority, with programs of evidence-based multidisciplinary interventions, education for health care professionals and users on prevention, a strong national system of vital statistics, careful research on risk factors, and access to quality prepregnancy and perinatal health care.

Promote healthy lifestyles, prevent and treat the risk factors associated with preterm birth, both spontaneous and indicated, from pre-pregnancy through pregnancy, childbirth and the neonatal period.

The problem of preterm birth and the mothers involved should be treated at three levels: primary (preventing and reducing risk in the population), secondary (identifying and treating women who are at greater risk), and tertiary (providing treatment to reduce morbidity and mortality after preterm delivery begins). In the last 30 years, morbidity and mortality among premature babies has been reduced by improving tertiary obstetric and neonatal intervention. Little has been done through primary and secondary intervention to reduce the spontaneous preterm birth rate.

A combination of approaches can help reverse the rising rates of preterm birth: emphasizing perinatal quality initiatives, increasing evidence-based interventions, using tools that improve predictions regarding labor, encouraging the spread of effective community programs, promoting commitment to

more equitable conditions, enhancing preconception health promotion, developing effective continuing education programs for health workers, and producing health education materials with content that is culturally acceptable to patients.

Evidence-based interventions

- *Treat risk factors and prevent pathologies starting before conception:* poor nutrition (malnutrition or obesity as measured by BMI and evaluated according to WHO standards, along with weight increase during pregnancy that is below or above IOM recommendations).
- *Treat and prevent pathologies during pregnancy.*
- *Space births.* Achieve a birth interval between 2 and 5 years. One meta-analysis of outcomes comparing birth intervals of under 6 months with intervals of 18-23 months found a 40% increase in preterm births, a 61% increase in incidence of LBW, and 26% more neonates with intrauterine growth retardation when the interval was smaller. Preterm births increased by 20% when the birth interval was greater than 60 months. In countries with high birth rates, promoting the spacing of births could reduce deaths by one third and infant mortality by 10%.
- *Achieve the weight gain recommended by the IOM during pregnancy, as measured by BMI.* With any preconceptional BMI, a low (0.12-0.22 kg/week) or very low (<0.12 kg/week) weight increase during pregnancy increases the risk of preterm birth (< 32 weeks of gestational age) by a factor of 14 in women with low BMIs, and by as much as a factor of 5 in the obese. Given any preconceptional BMI and high weight gain during pregnancy (>0.79 kg/week), the risk of preterm birth rises by a factor of 4, while a BMI indicating great obesity increases the risk by a factor of 8.
- *Administer periconceptional folic acid.* This prevents preterm birth and neural tube defects. A regimen of folic acid plus multivitamins prevents preterm birth before 34 weeks of GA, as well as various malformations besides NTD.
- *Monitor infection.* Conduct HIV tests of all pregnant woman. Check for syphilis in the first and third trimester of pregnancy, or before delivery or discharge from the care facility. Conducting RPR before discharge for all women with a history of miscarriage, fetal death, or newborns infected with syphilis diminishes miscarriages, preterm births and perinatal mortality.
- *Detect and treat asymptomatic urinary tract infections in pregnant women.* This reduces the incidence of low birthweight and preterm birth by one third.
- *Treat periodontal disease in pregnant women.* This reduces preterm birth by 45-65%.
- *Progesterone* for women with a history of spontaneous preterm birth significantly reduces the incidence of < 37-week and < 34-week births. In women with short cervical canals (< 15 mm), progesterone has been shown to diminish preterm births < 34 weeks of GA, as well as neonatal sepsis.
- *Erythromycin or another antibiotic* (ampicillin, benzylpenicillin, or clindamycin) in cases of premature rupture of membranes at under 37 weeks of gestational age significantly reduces births within 48 hours, maternal and neonatal infections during the first seven days, and the need for oxygen and surfactant.
- *Nifedipine* as an inhibitor of uterine contraction significantly reduces births within 7 days of treatment, as well as reducing adverse effects and neonatal morbidity (RDS, cerebral hemorrhage, and necrotizing enterocolitis) in newborns of GA< 34 weeks.
- *Corticoids (dexamethasone or betamethasone)* before birth significantly reduce neonatal mortality, RDS, cerebral hemorrhage, necrotizing enterocolitis, sepsis, admissions to intensive care, and mechanical ventilation.
- *Calcium* for pregnant women at high risk of preeclampsia significantly diminishes preterm birth, low birthweight and neonatal mortality.

- *Aspirin* for pregnant women at risk for preeclampsia significantly diminishes preterm birth, the incidence of newborns who are small for their gestational age, and perinatal mortality.
- *Avoid elective births (vaginal or by caesarean section) before 39 weeks of gestation*. There is sufficient evidence that serious neonatal and infant morbidity and mortality are lower when gestational age is optimal (39-41 weeks) and when birthweight is optimal (3,500-4,250 grams), while morbidity and mortality increase when births are scheduled before 39 weeks of gestation in pregnancies without complications.

Evidence

Premature births are responsible for 75% of perinatal mortality and more than half of long-term morbidity. Those premature babies who survive are at high risk of developing problems of neurological development as well as gastrointestinal and respiratory complications *(171-198)*.

4. Managing premature rupture of membranes

Background

Premature rupture of membranes is the rupture of the amniotic membranes before labor has begun. When the fetus has not reached term (< 37 weeks of GA), the rupture is called preterm premature rupture of membranes (PPROM).

Diagnosis

Discharge of amniotic fluid with a characteristic odor. When the rupture is not recent, a vaginal compress can be placed on the vulva, and the appearance and odor of the compress examined in an hour. A sterilized speculum can also be used for vaginal examination. The fluid can be seen flowing from the cervix or accumulating in the posterior fornix. Ask the woman to cough, which can produce a spurt of fluid.

Treatment

In preterm premature rupture of membranes (PPROM):

In the absence of labor (< 37 weeks of GA), chorioamnionitis, preeclampsia, fetal stress, or any other contraindication to continuing the pregnancy:

- Give erythromycin, 250 mg orally every 6 hours for 7 days or until the birth.
- Refer to a hospital where preterm newborns receive adequate care.
- If GA > 26 weeks or GA < 36 weeks, administer prenatal corticoids.

In the presence of labor, with gestation < 37 weeks, administer the antibiotic as soon as possible after the preterm labor begins, and until delivery, in order to reduce the risk of transmitting group B streptococcus to the fetus (the cause of up to of 50% of early sepsis in Latin America and the Caribbean):

- Penicillin G, initial dose 5 million units IV, followed by 2.5 million units IV every 4 hours orally; or
- Ampicillin, initial dose 2g IV, followed by 1g IV every 4 hours; or
- In women allergic to penicillin, clindamycin, 900 mg IV every 8 hours until delivery.

To maximize the antibiotic's prophylactic efficacy, the first dose should be administered at least 2 hours before the birth.

Prophylactic antibiotic treatment for streptococcus B is unnecessary for women with preterm premature rupture of membranes unless labor is in progress.

If there are signs of infection (fever, malodorous vaginal secretion):

Treat it as amnionitis, beginning antibiotics and continuing until delivery: ampicillin, 2g IV every 6 hours + gentamicin, 5 mg/kg bodyweight IV every 24 hours.

- Refer to hospital.

Evidence

The administration of antibiotics in PPROM reduces the risk of RDS, early neonatal infection, and neonatal mortality *(199-208)*.

5. Using the CLAP/WR perinatal clinical record (PCR) and perinatal card

Background

The PCR is an instrument designed by CLAP/WR, and published in 1983 to contribute to decision-making on the individual clinical management of pregnant women during prenatal check-ups, childbirth, and puerperium, and management of the neonate from birth to time of discharge.

The perinatal card makes it possible to integrate the health team's actions during pregnancy, childbirth, and puerperium, preventing the problem of lack of data, and helping to improve care quality.

Frequency

At prenatal check-up, delivery, puerperium, and the neonatal stage.

Evidence

Processing the data from the PCR enhances perinatal care providers' capacity for self-evaluation, makes personnel aware of the importance of documenting actions and observations thoroughly, and gives perinatal care facilities a fast and easily used tool for operational research *(209-210)*.

6. Weight gain during pregnancy

Background

One of the most important factors affecting weight gain during pregnancy and its impact on the health of mother and infant is weight at the beginning of pregnancy. The best available measure of prepregnancy weight is body mass index (BMI), which has been incorporated in the new guidelines developed by the World Health Organization.

Epidemiological and experimental studies have shown that environmental influences early in life can "program" susceptibility to future disease, and that these effects can be transmitted to subsequent generations through nongenetic (epigenetic) mechanisms, with profound implications for human health. A mother's (but not father's) birthweight and weight and height at 20 months of age are positively associated with birthweight in the following generation.

Recent research has found that newborns who are small for their gestational age (SGA) or who have low birthweight (LBW) are at greater risk of central obesity, insulin resistance, metabolic syndrome, type 2 diabetes, hypertension, and coronary disease in the future. The association is accentuated by rapid weight gain in childhood. High birthweight has also been associated with later obesity and its consequences.

Interpretation

The table on the following page shows the new recommendations for total weight gain during pregnancy, as well as recommended gains by trimester, as a function of prepregnancy weight:

BMI[a] before pregnancy		Recommended weight gain in pregnant women*		
Category	BMI (Kg/m²)	Over entire pregnancy, pounds (kilograms)	Trimesters 2 & 3, average: pounds/week. (range)	Over entire pregnancy in multiple pregnancies (pounds)
Low Weight	< 18.5	28 – 40	1 (1.0 – 1.3)	
Normal Weight	18.5 – < 25	25 – 35	1 (0.8 – 1.0)	37 – 45
Overweight	25.0 – 30.0	15 – 25	0,6 (0.5 – 0.7)	31 – 50
Obese (all categories)	≥ 30.0	11 – 20	0.5 (0.4 – 0.6)	25 – 42

Source: **IOM (Institute of Medicine), 2009.** Weight Gain During Pregnancy: Reexamining the Guidelines. Washington, DC: The National Academies Press. IOM, *www.iom.edu.*

* Calculation assumes a weight gain of 0.5-2 kg (1.1-4.4 lbs.) in the first trimester of pregnancy, based on Siega Riz et al., 1994; A, 1995; Carmichel et al., 1997.

[a] BMI: Body mass index; WHO classification of BMI (weight in kg / square of height in m). Obesity (BMI): class I, 30 - < 35; class II, 35 - < 40; class III, ≥ 40 kg/m².

Evidence

Achieving the recommended weight gain means more children with optimal birthweights (3500-4250 g) and fewer premature births, fewer newborns who are small for their gestational age (SGA) or large for their gestational age (LGA), and fewer with low birthweight (LBW) or suboptimal weight (2500-3500 g).

Neonatal and infant mortality is lower when gestational age at birth is 39-41 weeks and weight is between 3500 g and 4250 g.

Prepregnancy BMI and weight gain in pregnancy above or below the IOM recommendations are risk factors associated with unfavorable short- and long-term maternal, perinatal, neonatal, childhood and adult outcomes. The short-term outcomes include *perinatal and neonatal death, preterm birth,* newborns who are small or large for their gestational age, CMFs (of the neural tube and others), dystocia in delivery, hypertension, etc. Long-term outcomes include changes in adiposity and lean mass, with cardiac and metabolic consequences.

Low preconception BMI and weight gain during pregnancy below what is recommended by the IOM are each associated with greater risk of newborn with SGA newborn LBW and preterm birth, and the risk is multiplied when both are present. Similarly, preconception BMI and weight gain during pregnancy above the levels recommended by the IOM are associated with LGA and macrosomia among newborns.

Pregnant women who are obese or overweight should be instructed about the statistically significant increase in risk of complications such as maternal mortality, hypertension and gestational diabetes, preeclampsia, serious depressive disorders and less production of milk, heart and pulmonary diseases and obstructive sleep apnea, caesarean section, and venous thromboembolism, as well as risks for the fetus and newborn such as congenital malformations, macrosomia, LGA, obstetric trauma, miscarriage, and perinatal and neonatal mortality.

Obesity in pregnant women is associated directly or indirectly with a 52% increase in maternal mortality when BMI > 25, and with an increase of 27% when BMI ≥ 30.

There is strong evidence for an association between weight gain during pregnancy and the following outcomes: preterm birth, low birthweight, macrosomia, and newborns who are large or small for their gestational age. There also is evidence of increased adverse outcomes during labor and delivery *(211-236).*

7. Reducing unnecessary (medically not indicated) caesarean section

Background

Births by caesarean section have increased progressively throughout the world. In the United States between 1996 and 2007, the incidence rose 65% (from 20.7% of deliveries to 32%). One of the reasons for the increase in preterm birth is the prevalence of medically unnecessary caesareans. Late preterm births (34-36 weeks of GA) account for approximately 75% of all preterm births, and the risk of death or complications in the neonatal period for these infants is 6 times as high as it is for full-term babies, while their risk during the first year of life is 3 times higher.

In a study in Utah (n= 343,322 late preterm births), late preterm SGA infants were 44 times as likely to die during the prenatal period, and 22 times as likely during the first year of life, as newborns of adequate gestational age.

A WHO study in Latin America in 120 of 410 randomly selected institutions in 24 geographical regions of 8 countries (n= 97,095 births) found the median rate of caesarean section to be 33%, with the highest rates (51-57%) in private hospitals. Of these deliveries, 49% were elective caesareans, 46% intrapartum operations, and 5% emergency caesareans in the absence of labor. In some countries, caesarean sections in private hospitals account for as much as 82% of births. The most frequent indication cited for caesarean section overall was previous caesarean 31% (16% in cases without complications in the current pregnancy and 15% with complications); in 26% of cases, the indication was cephalopelvic disproportion; in 20%, dystocia or arrested labor; in 11%, fetal stress, problematic breech presentation, or other reasons; and in 11%, preeclampsia/eclampsia.

Interventions

Reducing caesarean section

Interventions that involve health workers in monitoring and feedback mechanisms, quality improvements, and multifaceted strategies proved effective in reducing rates at statistically significant levels (reductions of 20-30%). Identifying barriers to change was the most effective approach to reducing caesarean section.

Some interventions have demonstrated that they can diminish the rate of caesarean section, particularly those in which health workers analyze and modify their practices. This requires identifying the barriers to change that need to be addressed.

- ***Avoid elective vaginal and caesarean section births before the full 39 weeks of GA.*** Optimal gestational age at birth is 39-41 weeks, and optimal weight 3500-4250 g.
- Provide written guidelines with evidence-based indications for caesarean section in all facilities 24 hours a day, and make them available to all care staff.
- Establish and implement clinical standards.
- Hold weekly and monthly conferences to discuss the indications for caesarean section, in which a trained team provides analysis and feedback on successful interventions.
- Conduct periodic reviews of the records of 100 cases of labor and delivery, in order to evaluate the quality of care. Provide feedback through a final meeting, as well as a written summary of conclusions and recommendations.
- Promote vaginal birth for women who have had a caesarean.
- Hold conferences for feedback.
- Conduct monthly audits to review outcomes.
- Ensure ongoing community-based care, with emphasis on continuity provided by a team rather than relying on a single resource (midwives).

Interventions in labor that diminish the risk of caesarean section

- Continuous support during labor.
- Induction of labor in pregnancies without complications and more than 41 weeks of gestation.

- Partogram with monitoring of progress every 4 hours in full-term single pregnancies with spontaneous labor.
- Availability of obstetricians trained in vaginal birth procedures.
- Participation of consulting obstetricians in decisions to conduct caesarean section.

Evidence

Comparison of newborns delivered by elective caesarean at weeks 37 and 38 with those born at 39 weeks of GA shows that those born before 39 weeks are at statistically significant greater risk of neonatal death and morbidity (resuscitation, sepsis, RDS, and need for respiratory support (assisted ventilation), Apgar ≤ 6 at 5 minutes, admission to ICU > 5 days). These problems occur in 1 out of 5 neonates born at 37 weeks of gestation, 1 out of 8 born at 38 weeks, and 1 of 10 born at 39 weeks.

Comparison of children born by elective caesarean with those where vaginal birth is attempted shows that, at a gestational age of 36 weeks, respiratory distress syndrome (RDS) or hyaline membrane disease is 7 to 19 times more frequent among those delivered by elective caesarean, while it is between 6 and 32 times as frequent in cases of elective caesarean as it is in cases of full-term vaginal birth (37-38 weeks of GA).

The increase in preterm births in Latin America is due principally to unnecessary caesarean section, in part as a result of excessive medicalization and improper use of ultrasound *(237-249)*.

8. Immunization with tetanus toxoid, taking previous vaccination status into account

Background:

In 1989, the World Health Assembly adopted the goal of eliminating the transmission of neonatal tetanus by 1995. This target was later moved to 2005. Neonatal tetanus occurs throughout the world, but is most frequent in developing countries where maternity services are limited and tetanus vaccination coverage is low among women of childbearing age and pregnant women, and where unsafe practices are used in handling the newborn's umbilical stump.

Infectious agent

The tetanus bacillus (*Clostridium tetani*) is a gram-positive rod-shaped anaerobic microorganism and produces an endotoxin that affects the fetus.

Transmission

Infection is due to poor hygiene during delivery, when the umbilical cord is cut in unsanitary conditions, or when the umbilical stump is handled incorrectly (salves, dressings, plasters).

Incubation

The incubation period is 6 days, as an average, with a range of 3 to 28 days.

Immunity

In mothers, and in children from 6 weeks of age on, considerable immunity can be achieved with three doses of tetanus toxoid adsorbed, administered at at least 4-week intervals (0.5 mL per dose, IM). Three doses of tetanus toxoid provide at least 5 years of immunity, while 5 doses provide lifetime immunity. Pregnant women are revaccinated only if the last dose was 10 years or more ago.

Control

The principal strategy of the program to eliminate neonatal tetanus is to immunize women of childbearing age with tetanus toxoid. This prevents both mothers and neonates from contracting the disease. If a mother has not been immunized completely, she should receive tetanus toxoid during pregnancy in order to complete the five doses.

Evidence

In populations where the incidence of tetanus is high, it can reduce neonatal mortality by 35-58% and reduce the incidence of neonatal tetanus by 88-100% *(250-258)*.

9. Preventing influenza by vaccination

Background

The Advisory Committee for Immunization Practices of the Centers for Disease Control and Prevention (CDC) recommends ordinary flu vaccination for all women who are or will be pregnant during the flu season. During seasonal flu epidemics, during previous pandemics, and with the current 2009 type A flu (H1N1) pandemic, pregnancy puts otherwise healthy women at greater risk for serious complications from influenza, including death.

Safety

The influenza vaccine for the seasonal virus or pandemic influenza, which is made from inactivated

viruses, can be administered safely and effectively during any trimester of pregnancy. No study to date has demonstrated major risk of maternal complications or adverse fetal outcomes associated with inactivated flu vaccine. Nor is there scientific evidence that vaccines with thiomersal produce adverse outcomes in children of women who received influenza vaccines during pregnancy.

When there is evidence that H1N1 is in circulation, the recommendation is to administer 75 mg twice daily for 5 days, beginning within 48 hours of onset of symptoms (fever, cough, sore throat, joint or muscular pains), without waiting for laboratory confirmation of influenza A H1N1-2009.

If the pregnant woman is at high risk for morbidity, hospitalization, and death from influenza A H1N1, it is important to vaccinate her as soon as inactivated H1N1-2009 influenza A and seasonal influenza vaccine is available, whatever trimester of pregnancy she is in.

Evidence

Clinical trials and data from the CDC show relatively high mortality in pregnant women from H1N1-2009 infection. The current recommendations call for initiating antiviral therapy in pregnant women as soon as possible, even before waiting for test findings confirming H1N1-2009.

Mortality in children from seasonal influenza in previous years was most frequent in the < 6-month age group, for which a vaccine is still not available. In the children of women vaccinated for influenza, 63% effectiveness has been achieved up to sixth months old, with a reduction of 29% in febrile respiratory illnesses in children, along with a 36% reduction in mothers *(259-274)*.

10. Syphilis screening and case management

Background

Syphilis before delivery is a health problem in the developing countries, and the developed countries are seeing a trend of reappearance. All pregnant women should receive adequate prenatal care, including a compulsory syphilis test: the VDRL test or rapid plasma reagin (RPR). Infection by syphilis should be borne in mind where the mother's history or clinical signs in the fetus are suggestive, especially in cases of hepatosplenomegaly or fetal dropsy.

Infectious agent

Treponema pallidum

Transmission

The infection is transmitted from mother to child during fetal development or at birth. Almost half of all babies infected with syphilis in utero die shortly before or after birth.

Control

The principal strategy for eliminating congenital syphilis is compulsory case detection and management during pregnancy. Every pregnant woman should have two RPR examinations, VDRL tests, or fast treponemal tests in the first and third trimesters, but if this does not occur in the third trimester, it should be done before delivery or before discharge.

Treatment

Penicillin continues to be effective as a treatment for syphilis in pregnancy that prevents congenital syphilis. It consists of a single dose of benzathine penicillin, 2.4 million units IM, after ascertaining that the woman is not allergic to penicillin. If allergic, the patient should be desensitized and treated with penicillin if the physician is qualified to do so. Otherwise, she should be referred to a higher level of care.

If treatment is early in the pregnancy, it effectively prevents infection of the fetus. Even in women with long-standing syphilis, whose treatment would consist of three weekly doses of penicillin, a single dose of the drug will prevent fetal infection. The outcomes of these women's pregnancies are comparable to those of women without syphilis.

Counseling and voluntary HIV screening should be offered to all women with positive findings of syphilis.

Evidence

Reduction in fetal mortality, miscarriage, and perinatal mortality as a function of prevalence *(275-292)*.

11. Detecting and treating symptomatic and asymptomatic bacteriuria

Background Urinary tract infections are a common complication during pregnancy. Asymptomatic bacteriuria occurs in 2%-10% of pregnancies. If it is not treated, over 30% of the mothers can develop pyelonephritis, and a series of complications affecting both mother and fetus can be triggered. A daily intake of 100 mg of ascorbic acid can reduce the incidence of bacteriuria.

Diagnosis Detection with reactive strips.

Urine culture (> 100,000 colonies/mL).

Treatment The antibiotic of choice is nitrofurantoin, 100 mg taken orally twice daily with food; other options if available: Cephalexin 500 mg taken orally twice daily; or cefadroxil 500 mg twice daily. Duration of treatment should be 7-10 days.

Persistent asymptomatic bacteriuria or asymptomatic bacteriuria that develops symptomatology, recurrent urinary tract infection (UTI) (i.e., three infections in the last 12 months or two in the last 6 months), and recurrent UTIs or concomitant renal lithiasis should be treated orally for 10-14 days with one of the following: nitrofurantoin, 100 mg 4 times daily; cephalexin, 1g every 6-8 hours; or cefadroxil, 1g twice daily. This should be followed by prophylaxis during the rest of the pregnancy in the form of 100 mg of nitrofurantoin, 125 mg of cephalexin, or 250 mg of cefaclor at bedtime.

Evidence Bacteriuria during pregnancy is strongly associated with premature birth, LBW, sepsis, and shock. Affected mothers may develop pyelonephritis, hypertension, or preeclampsia, and maternal and/or fetal death is a possibility *(293-308)*.

12. Preventing and treating anemia with iron during pregnancy

Background Anemia is a lack of red blood cells or a reduction of their capacity to carry oxygen or iron. Some enzymes from tissues that require iron can be necessary for the functioning of nerve and muscle cells. The fetus depends on the blood of the mother, and anemia can lead to deficient fetal growth, premature birth, and low birthweight. The causes are associated with deficient iron intake, folate deficiency, hemorrhage (vaginal or caused by parasites) and, in some areas, malaria.

Diagnosis Hb < 11 g/dL.

Treatment 120 mg of elemental iron daily, taken orally, for severe anemia (severe pallor or Hb < 7 g/dL) and 60 mg of elemental iron daily for moderate anemia (moderate pallor or Hb 7 - < 12 g/dL) or from week 12 of the pregnancy, throughout, and during the first three months postpartum.

Evidence Iron deficiency anemia in pregnant women causes maternal and perinatal mortality. It is also highly correlated with prematurity and LBW. Studies indicate that iron supplements during pregnancy improve perinatal outcomes *(309-318)*.

13. Preventing preeclampsia and eclampsia with calcium (in populations with diets low in calcium)

Background Gestational hypertension is a very frequent complication, present in around 10% of pregnancies, and it affects perinatal outcome. In the Region of the Americas, it accounts for 25% of all maternal deaths. Through a series of mechanisms, calcium supplements can prevent hypertension and help prevent premature labor.

High risk of preeclampsia:

- Age of mother ≥ 40 years.
- History of previous preeclampsia, antiphospholipid antibodies, hypertension, renal disease, preexisting diabetes, BMI > 29 kg/m2, mother or sisters with history of preeclampsia.

- Current pregnancy: multiple pregnancy, birth interval ≥ 10 years, systolic blood pressure (SBP) ≥ 130 mmHg, or diastolic blood pressure (DBP) ≥ 80 mmHg. A DBP of 110 mm Hg or 100 mm Hg during the first 20 weeks of gestation has greater predictive value for preeclampsia when the pregnant woman has chronic hypertension. Periodontal disease and urinary tract infection are also risk factors.

Moderate risk of preeclampsia:

- Primipara, mild gestational hypertension (without proteinuria), multiple pregnancy, adolescent age, family history of severe preeclampsia.

Low risk for preeclampsia:

- Women who are without any pathology, do not take drugs or vitamins, and do not have the risk factors described above.

Diagnosis

One of the following indicators of risk:

- Severe headache.
- Blurred vision, loss of consciousness, and/or convulsions.
- Systolic blood pressure > 140 mm/Hg and/or diastolic > 90 mm/Hg.
- Significant proteinuria.
- Less than 3 portions of dairy products consumed daily.
- BMI < 18.5 or > 25.0 in the first trimester.

Treatment

For pregnant women at moderate or high risk for preeclampsia, 1.5 g/day, and if the patient's calcium intake is low, 2 g/day of elemental calcium orally, begun before 24 weeks of gestation – ideally before 20 weeks have passed – and continuing until birth.

Evidence

There is strong evidence that calcium supplementation benefits both women who are exposed to a high risk of gestational hypertension, and those belonging to communities with low calcium intake. Fewer children are born weighing < 2500 g to women treated with calcium *(319-336).*

14. Preventing preeclampsia and eclampsia with aspirin

Background

Preeclampsia is associated with deficient production of the vasodilator prostacyclin, and with excessive production of thromboxane, which is a vasoconstrictor and stimulates the aggregation of blood platelets. Antiplatelet agents such as aspirin in low doses can prevent or delay the appearance of preeclampsia.

Diagnosis

One of the following signs:

- Severe headache.
- Blurred vision, loss of consciousness, and/or convulsions.
- Systolic blood pressure > 140 mm/Hg and/or diastolic > 90 mm/Hg.
- Less than 3 portions of dairy products consumed daily.
- BMI < 18.5 or > 25.0 in the first trimester.

Treatment

Acetylsalicylic (aspirin): for pregnant women at moderate risk for preeclampsia, 75-100 mg/day; for those at high risk, up to 100-150 mg/day orally at bedtime, beginning in week 12 or 13 of gestation and continuing until birth.

Evidence

This treatment reduces preeclampsia in high-risk groups by 17%, and up to 36% if the dose taken is over 75 mg of aspirin/day. It is associated with an 8% reduction in preterm births, a 14% reduction in perinatal death, and a 10% reduction in IUGR *(337-346).*

15. Detecting and treating sexually transmitted infections

Background Pregnant women with STIs such as chlamydia or gonorrhea at the end of the pregnancy can transmit it to the baby, which can cause problems at birth (ophthalmia neonatorum). Children of mothers who have active genital herpes infections during or near the time of delivery can be infected. This can be serious, and sometimes fatal, to the newborn. Vertical transmission of HIV/AIDS can be reduced considerably by the appropriate measures.

Diagnosis Chlamydia (*Chlamydia tracomatis*), gonorrhea (*Neisseria gonorrhoeae*), vaginosis, herpes virus, HIV/AIDS, hepatitis B, syphilis (*Treponema pallidum*).

Evidence Diseases like chlamydia, gonorrhea, syphilis, trichomoniasis, and bacterial vaginosis can be treated and cured with antibiotics during pregnancy. There is no cure for viral STIs such as genital herpes and HIV, but antiviral drugs can reduce symptoms in pregnant women. If a woman has active sores from genital herpes, HIV, or hepatitis B at the time of the delivery, a caesarean can be performed to protect the newborn against the infection, and treatment can be provided for mother and newborn. Women whose hepatitis B screening was negative can receive hepatitis B vaccine while pregnant *(347-363).*

16. Antiretrovirals and other measures to reduce the risk of vertical transmission of HIV

Background Antiretroviral drugs (ARVs) reduce viral replication and can cut down mother-to-child transmission of HIV by diminishing the pregnant woman's plasma viral load. Alternatively, they can be used for postexposure prophylaxis in the newborn. In the absence of intervention, HIV infection is transmitted from mother to child in as many as 48% of cases.

Treatment Zidovudine: *During pregnancy:* 100 mg orally 5 times a day, beginning between weeks 14 and 34, and continuing throughout pregnancy. During an elective caesarean section: 2 mg/kg IV followed by continuous infusion of 1 mg/kg/hour until delivery. *After elective caesarean section:* 2 mg/kg of syrup to the newborn every 6 hours for 6 weeks, beginning 8-12 hours after the delivery.

Evidence The use of antiretrovirals significantly reduces vertical transmission of HIV from mother to child, as do other interventions such as elective caesarean and formula in place of mother's milk for all babies exposed *(364-369).*

17. Detecting and treating diabetes

Background Hyperglycemia and inadequate weight gain during pregnancy are associated with adverse outcomes for fetuses and neonates, increasing the possibility of neonatal hypoglycemia, macrosomia, and birth defects. Gestational diabetes can occur even when there are no symptoms or risk factors. For this reason, pregnant women are often advised to eat a healthy diet and avoid a sedentary lifestyle. Gestational diabetes usually disappears after birth. However, women who have had gestational diabetes run a greater risk of developing diabetes many years later.

Diagnosis A family history of diabetes

Fasting blood glucose greater than 105 mg/dL

Overweight: BMI 25.0–29.9

Obesity: BMI ≥ 30.0

Evidence Diabetes during pregnancy is associated with fetal death, with macrosomia at birth, and with trauma, respiratory problems, hypoglycemia, hyperbilirubinemia, and metabolic problems. There is strong evidence of an association between birth defects and poor control of blood glucose levels during pregnancy *(370-389).*

18. Deparasitization in areas of high prevalence using albendazole

Background In areas of endemic intestinal helminthiasis, routine therapy with albendazole considerably reduces the prevalence of anemia in pregnant women, as well as its possible complications.

Diagnosis Stool examination (for ascaris, oxyurids, uncinaria, trichuris).

Treatment Albendazole, 400 mg orally, single dose, in both the 2nd and 3rd quarters

Evidence Deparasitization during pregnancy reduces maternal anemia and its complications, as well as low birthweight, and there is no evidence that albendazole has teratogenic effects on the fetus *(390-395)*.

19. Detecting and treating group B streptococcus

Background Group B streptococcus (Streptococcus agalactiae) is a gram-positive bacterium that lives in the vaginal or rectal areas of between 10% and 35% of healthy adult women. A woman with group B streptococcus in her vagina or rectum is said to be "colonized" by the organism. For every 100 women giving birth who are colonized with group B streptococcus, 1-2 infants are infected with it at the time of delivery, and can become ill or die from sepsis.

Diagnosis Rectal and vaginal culture between weeks 35 and 37 of gestation.

Prophylaxis All women with one or more of the following risk factors should receive intrapartum prophylaxis: delivery at < 37 weeks of gestation, intrapartum temperature > 38º C, or rupture of membranes ≥ 8 hours ago.

Treatment Penicillin G: 5 million units IV (initial dose), then 2.5 million units IV every 4 hours up to delivery; or ampicillin, 2g IV (initial dose), then 1g IV every 6 hours for 48 hours. If the woman is allergic to penicillin, give cefazolin 2g IV (initial dose), then 1g IV every 8 hours up to delivery.

Evidence Prophylactic therapy begun at least 4 hours before delivery reduces the incidence of early infection by 86-89%, and cuts neonatal mortality due to group B streptococcus *(396-408)*.

20. Nifedipine during preterm labor

Background Premature birth is one of the greatest causes of morbidity and mortality in the developing countries, representing between 11% and 21% of all births. Different tocolytics have been used to prevent it. The use of magnesium sulfate as a tocolytic has been shown not to affect the risk of birth within 48 hours of treatment, while those exposed to it are at greater risk of fetal, neonatal, and postneonatal death. It has recently been demonstrated that nifedipine is an effective, safe, and low-cost tocolytic drug to prevent preterm birth.

Diagnosis Signs of labor before 37 weeks of gestation.

Treatment *Initial dose:* Oral nifedipine, 10 mg. If uterine activity continues, administer 10 mg every 20 minutes orally 2 more times more, for a total of 3 doses. *Maintenance dose:* Nifedipine, 10-20 mg orally every 4-8 hours, depending on how the pregnant woman responds, for 2-3 days. *If the pregnant woman's blood pressure is below 110/70 mm of Hg,* do not use nifedipine.

Evidence Nifedipine has proven more effective and safer than other tocolytics to address the risk of preterm delivery, and is very beneficial given orally. It prevents RDS, intraventricular hemorrhage, and jaundice *(409-417)*.

21. Prenatal corticosteroids (betamethasone, dexamethasone) to foster lung maturation

Background Premature birth is statistically the major factor in neonatal and infant mortality. Respiratory distress syndrome (hyaline membrane disease) is a severe complication of prematurity, and is the principal cause of neaonatal morbidity and mortality in the countries. In order to encourage lung maturation in births taking place up to 35 weeks of gestation, steroids have been used with very good results.

Diagnosis Signs of labor or threat of preterm delivery (PTD) between weeks 26 and 36 weeks of gestation. Act if there are suspicions or signs of PTD. Do not wait to confirm the diagnosis, and *always treat, unless birth is imminent (within 60 minutes).*

Treatment Betamethasone: 12 mg IM every 24 hours for 2 days

Dexamethasone: 6 mg IM every 12 hours for 4 days

Evidence The administration of betamethasone or dexamethasone before birth has been shown to significantly diminish RDS by 36%-50%, and neonatal mortality by 37%-40%, without side effects for surviving babies. Neonates whose gestational age is 32 weeks and whose mothers have completed a prenatal course of steroids experience an 82% drop in mortality with the treatment. It also diminishes the risk of intraventricular hemorrhage by 40%-70%, as well as patent *ductus arteriosis*, and the evidence suggests that it can also protect against neurological sequelae. A single dose provides more benefit than multiple doses. Multiple doses at intervals of 14 days do not improve preterm birth outcomes, and are associated with reduced weight, height and cephalic circumference at birth.

A recent meta-analysis of 44 of 1412 initially selected studies found that the impact of prenatal steroids in reducing mortality is greater in middle-income countries than in higher-income ones. Neonatal mortality was significantly (p=0.008) reduced – between 53% and 65% in middle-income countries, and between 31% and 35% in high-income countries – while morbidity fell by 37%-51% in preterm babies with less than 36 weeks of gestation. Treatment between weeks 31 and 36 of gestation reduced neonatal mortality by over 30% in babies born before 30 weeks. The effect was small, and after 36 weeks there is no evidence that it reduces neonatal mortality *(418-441).*

22. Detecting, preventing, and treating Rh isoimmunization

Background Rh isoimmunization is an autoimmune disease that originates in the perinatal period and is characterized by fetal hemolytic anemia as a result of incompatibility between the mother's and fetus's blood types. This occurs when an RH-negative woman is carrying an Rh-positive fetus and has proven capable of forming antibodies in response to the fetus's Rh factor antigen. Initial sensitization can occur not only because of pregnancy, but in cases of miscarriage, ectopic pregnancy, amniocentesis, etc. The severity of the condition increases with subsequent pregnancies, and each succeeding baby is more likely to be affected.

Diagnosis Diagnosis of this intrauterine disease is based on an indirect Coombs test in Rh-negative women to ascertain whether the Rh factor is present at the beginning of the pregnancy. The test tells whether a woman already has Rh antibodies. Periodic titration of antibodies during the pregnancy makes it possible to monitor their level.

Amniocentesis to assess the amount of bilirubin in the amniotic fluid should be conducted in cases where the indirect Coombs titres increase throughout the pregnancy, or when sonography shows that ascites or fetal hepatosplenomegaly has made an appearance.

In special cases, cordocentesis is needed to provide blood directly from the umbilical cord in order to evaluate the degree of fetal anemia.

Diagnosis in the neonate is confirmed by a direct Coombs test, which actually shows the presence of the antibodies.

Currently, Doppler ultrasound measurement of the peak systolic velocity of blood in the fetus's cerebral artery is a quite sensitive and specific non-invasive tool to draw on in managing isoimmunization during pregnancy.

Prophylaxis In all cases of nonsensitized Rh-negative women who have had an RH-positive child, administer a 300-microgram IM or IV dose of anti-D gammaglobulin within 72 hours after delivery.

All nonsensitized pregnant women who are Rh-negative should routinely be given two 120-microgram IM or IV doses of gammaglobulin anti-D at 28 and 34 weeks of gestation.

After a miscarriage, spontaneous or induced abortion, or ectopic pregnancy during the first 12 weeks of gestation, nonsensitized Rh-negative women should be given a minimum of 120 micrograms of anti-D gammaglobulin IM or IV. If more than 12 weeks of gestation have passed, 300 micrograms should be administered.

After invasive procedures such as amniocentesis or cordocentesis in a nonsensitized Rh-negative pregnant woman, administer 300 micrograms of anti-D gammaglobulin IM or IV.

Evidence The consequences of Rh isoimmunization for the fetus include ascites, edema, hydrops, and intrauterine death, while consequences for the newborn include anemia, edema, severe jaundice, kernicterus, pleural effusion, cardiac insufficiency, and death *(442–456).*

23. Detecting and treating periodontal disease

Background Poor oral health during pregnancy has been linked to greater perinatal and neonatal morbidity.

Diagnosis Dental check-up (twice during pregnancy).

Evidence Periodontal disease in pregnancy is associated with preeclampsia, and in newborns it is associated with prematurity, LBW, and IUGR *(457–468).*

24. Detecting, preventing, and managing domestic violence and abuse, and depression

Background Direct violence against a pregnant woman and her fetus by her partner usually goes unrecognized by health professionals, or it is suspected but not dealt with, because of the multiple repercussions involved. This type of violence occurs in all social, economic, educational, and professional strata. In any form (intimidation, aggression, abuse, etc.) it requires careful evaluation and quick, efficient intervention in order to protect both mother and fetus from trauma, miscarriage, and death.

Diagnosis Repeated injury, vaginal bleeding, a threat of abortion, low self-esteem, depression, personality alterations, neglect of personal hygiene.

Evidence Violence diminishes motivation and morale, produces physical and psychological injury, depression, and post-traumatic stress, and provokes preterm delivery, as well as fetal and/or maternal death. One out of 7 women (14%) may develop depression during pregnancy or after delivery, the incidence being greater in women under 30 *(468–479).*

25. Detecting and preventing exposure to tobacco

Background Consumption of or exposure to tobacco during gestation is known to increase the probability of miscarriage, perinatal mortality, and smaller weight gain in newborns. Inhalation of tobacco smoke with the gamut of toxic substances that it contains has an enormous effect on the conditions under which the fetus develops during the gestation.

Nicotine induces acute hypoxemia (lack of oxygen) by reducing blood flow in the placenta, but the effect is transitory in the fetus's blood. Carbon monoxide, on the other hand, produces chronic hypoxia in the fetus, since it increases the level of carboxyhemoglobin (COHb) in the blood of both mother and fetus, thus reducing oxygen transport and its release in the fetus's tissues and organs, producing hypoxia and affecting the fetus's development.

Prevention There is no consensus on the minimum quantity of tobacco consumption that can create problems in the newborn. Thus, all tobacco consumption should be avoided throughout pregnancy.

Evidence Smoking by the mother, as well as exposure to tobacco smoke, is strongly associated with low birthweight,

intrauterine growth restriction and sudden infant death syndrome. It has also been shown to lead to higher probabilities of miscarriage, premature birth, and more numerous complications during pregnancy and childbirth *(480–493)*.

26. Detecting and preventing exposure to alcohol

Background

Alcohol consumption during pregnancy is a serious public health problem, and a cause of birth defects and retarded development – a pattern known as fetal alcohol syndrome (FAS). FAS reflects congenital damage from alcohol and causes mental retardation, facial anomalies, and deficient growth. Affected newborns go on to develop cognitive deficiencies, learning and memory disorders, problem-solving difficulties, and attention deficit, as well as mental health problems and difficulties with social interaction. However, some children, while lacking the characteristic facial defects and not suffering from deficient growth, do suffer from an alcohol-related neurological development disorder.

Prevention

There is no consensus on the minimum quantity of alcohol consumption that can cause problems in the newborn. Thus, all alcohol consumption should be avoided throughout pregnancy.

Evidence

Alcohol consumption by a mother during pregnancy can cause severe birth defects, of which fetal alcohol syndrome (FAS) is the most devastating *(494–505)*.

27. Detecting and preventing exposure to recreational or illicit drugs

Background

Recreational drugss that, when introduced into the organism, alter physical and psychological balance and can produce dependency or stimulate the nervous system, modify one or more aspects of its functioning, or change an individual's normal behavior.

Maternal drug use has various effects on the fetus. It can alter organogenesis and morphogenesis, fetal growth, lead to various malformations, cause developmental alterations, and produce a broad range of neurological pathologies. All drugs pass from the mother's bloodstream to the fetus through the placenta. Illicit substances that induce drug dependency and addiction in the mother also cause dependency in the fetus. At birth, the baby's dependency on the substance continues, but since the drug is no longer available, the infant's central nervous system becomes hyperstimulated, and withdrawal symptoms appear.

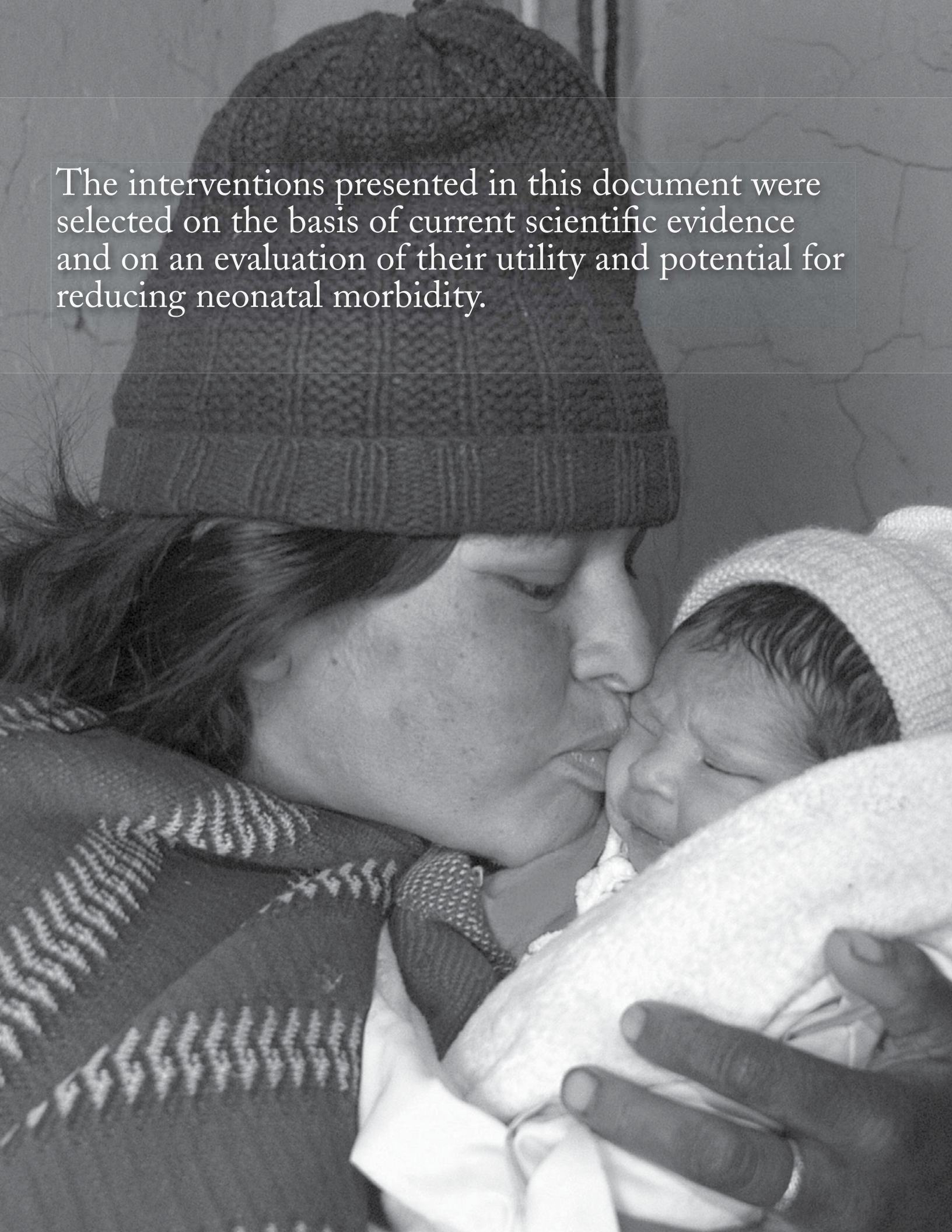
Diagnosis

Threatened miscarriage or premature birth, low self-esteem, depression, personality alterations, neglect of personal hygiene, or references to consuming toxic substances.

Evidence

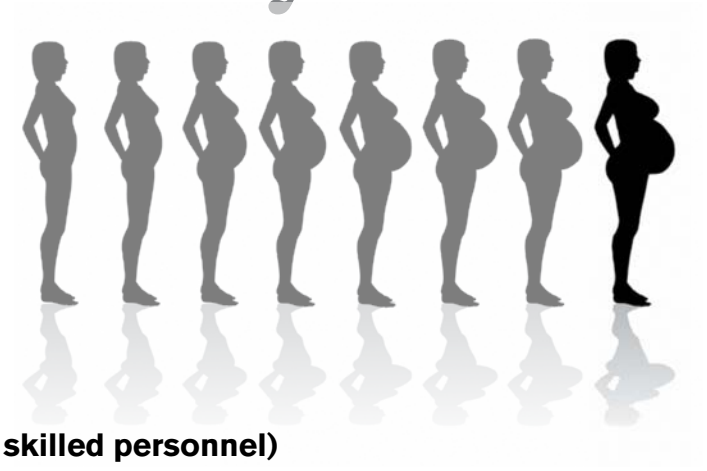
Heroin and other opiates, including methadone, can induce a severe withdrawal syndrome in the baby, some symptoms lasting from four to six months. Convulsions can also occur in the babies of mothers who take methadone. The prenatal use of amphetamines is associated with low birthweight, premature birth, and intracranial hemorrhage. The use of cocaine is associated with a greater risk of sudden infant death syndrome (SIDS). Marijuana consumption is associated with lower birthweight and smaller size at birth (IUGR).

Long-term effects reported in children exposed to prenatal drugs include increased risk of cognitive deficits, lower IQ, lower scores in short-term memory and verbal reasoning, as well as a need for farther-reaching psychological intervention during childhood and adolescence *(506–521)*.



The interventions presented in this document were selected on the basis of current scientific evidence and on an evaluation of their utility and potential for reducing neonatal morbidity.

III. Interventions during delivery



1. Clean and safe delivery practices (with skilled personnel)

Background Access to skilled care by personnel at a health care facility during pregnancy, childbirth and puerperium is critical to ensuring the health of mothers and newborns.

Evidence Deliveries assisted by skilled personnel in high-quality health facilities have fewer complications and less perinatal and neonatal morbidity and mortality *(522-525)*.

2. Accompanying the mother during labor and delivery

Background Birth is not a disease. Delivery is a normal physiological process with emotional aspects that are fundamental and must be respected. The presence of a family member or other trusted person (doula) during pregnancy, childbirth, and postpartum is a woman's right. It provides her physical and emotional support, as well as helping to keep her properly informed.

Evidence The continuous presence of a support person during labor and delivery reduces the duration of labor, the need for caesarean section or instruments to assist delivery, the need for pain medication, and the incidence of newborns with Apgar scores < 7 at 5 minutes *(526-532)*.

3. Erythromycin in PROM before delivery in the first 37 weeks of gestation

Background One factor associated with premature rupture of membranes (PROM) before delivery in the first 37 weeks of gestation, or close to term, is infection in the woman and/or fetus. Treating the mother prophylactically with antibiotics can reduce this risk. Bacterial resistance to penicillin and the fact that amoxicillin/clavulanate creates a risk of enterocolitis with have led to the use of erythromycin, and with good results.

Diagnosis PROM before labor, and clear suspicions of chorioamnionitis.

Treatment Erythromycin, 250 mg orally, every 6 hours for 10 days.

Evidence Statistically significant reduction of: chorioamnionitis; neonatal morbidity, including infection (pneumonia); use of surfactant; use of oxygen; and abnormality in cerebral ultrasound tests conducted before discharge *(533-539)*.

Photo: Micahel Bisceglie

4. Monitoring labor with partograms

Background A partogram is a graphic visual representation of the measurements and events related to the course of the labor. The relevant measurements included in a partogram can include statistics such as cervical dilation over time, fetal heart rate, and the mother's vital signs. Clinical monitoring of the course of labor can prevent, detect, and facilitate managing the appearance of complications that can do damage that is sometimes irreversible or fatal to the mother and neonate.

Evidence The use of partograms reduces unnecessary interventions and perinatal complications *(540-548)*.

5. Caesarean section in breech presentation with LBW infants

Background The preferred route for the birth of neonates with LBW or who are premature, in cases of breech presentation, has been a matter of controversy. However, it has been demonstrated that, in practice, caesarean section diminishes perinatal complications.

Treatment Elective caesarean section.

Evidence Reduced neonatal morbidity and mortality, less asphyxiation and birth trauma than with vaginal deliveries of newborns with LBW *(549-554)*.

6. Antibiotic prophylaxis in caesarean section

Background Caesarean section is currently one of the most common operations in hospitals. The four most frequent indications are previous caesarean section, dystocia or arrested labor, breech presentation, and fetal stress. The most frequent type of complication related to caesarean section is infection. Without prophylactic antibiotics, endometritis occurs in almost 40% of caesarean sections where risk factors are present.

Treatment Cefalotin, single dose, 2 grams IV, during the caesarean section.

Evidence The use of prophylactic antibiotics in elective or non-elective caesarean section effectively reduces the incidence of endometritis and severe sequelae such as abscesses, septic shock, and septic thrombophlebitis *(555-561)*.

7. Modified active management of the third stage of labor

Background Birth extends from the emergence of the baby until the placenta is expelled. It is a period of great risk and remains the leading cause of maternal death throughout the world because of hemorrhage.

Treatment Oxytocine, 5-10 IU, IM, or

Methylergonovine, 0.5 mg, IM, or

Misoprostol, 0.4-0.8 mg, orally or sublingually,

+ Umbilical cord traction and uterine contraction + abdominal uterine massage

Evidence All of these have been shown to reduce bleeding and the number of transfusions for the mother by 60%. All increase the risk of placental retention, as well as anemia in the newborn, though oxytocics double the frequency of placental retention. Additional advantages of misoprostol are a longer half-life, stability at room temperature, and the possibility of oral administration. Oxytocine plus misoprostol can reduce postpartum hemorrhage after caesarean section *(562-580)*.

8. Late clamping of the umbilical cord

Background The practice of clamping the cord early, before placental transfusion ceases, or within 10-15 seconds after birth is frequent in health care facilities. It is not supported by scientific evidence and is harmful to the baby.

Evidence

Late clamping of the umbilical cord – when it stops pulsing (between 2 and 3 minutes) – is physiologically sound [TN: original simply says "es fisiológico"] and increases neonatal hematocrit by up to 50% over levels found with early clamping. It increases the newborn's iron reserves, and reduces the prevalence of anemia in the first 4 to 6 months of life. It also improves cerebral oxygenation in premature newborns during the first 24 hours of life. A recent report states that late clamping of the cord facilitates the first transfusion of hematopoietic stem cells, precursors of endothelial cells, mesenchymal precursor cells, and pluripotent stem cells. *(581-592).*

WHO and UNICEF recommend at least two home visits to mothers and newborns: the first within 24 hours after birth (day 1) and a second on day 3, and if possible, a third after the first week of life (day 7).

IV. Maternal interventions after delivery

1. Early skin-to-skin contact

Background Early contact between mother and baby fosters bonding. The greater the baby's social integration with its mother is, the stronger its bond with her will be. The first hours of life are the critical period for successful bonding. The quality of early relations is crucial for development.

Intervention Place the newborn in skin-to-skin contact with its mother within the first half hour after delivery.

Evidence This intervention fosters the beginning and continuance of exclusive breastfeeding, early bonding between mother and newborn, stability of temperature, cardiorespiratory variables, and crying patterns. No negative effects, either short- or long-term, have been reported *(593-602)*.

2. Mother-newborn rooming-in

Background The formation of affective ties is a vital human need. Such ties provide the basis for the individual's psychological and social development. From birth, a human baby depends on an adult for survival, and the bond formed with the adult becomes the means by which the young person achieves a unique and specific sense of itself, thus acquiring the sense of security needed to become progressively more autonomous and independent.

Intervention The newborn remains beside the mother 24 hours a day.

Evidence Mother-newborn rooming-in increases the mother's confidence and self-esteem, and fosters the development of her skills. It facilitates bonding and the beginning and continuance of breastfeeding, as well as the parents' identity as parents, and their knowledge of their child. Finally, it gives the parents the peace of mind and enthusiasm that they need when they leave the care facility *(603-608)*.

3. Detecting and managing puerperal endometritis

Background This is the most common infectious process during the puerperium. The endometrium is infected by germs that enter through the wound remaining in the area of the endometrium where the placenta was inserted, and from there the infection spreads to the entire endometrial mucous membrane. Endometritis can be caused by a single microorganism, but is most commonly caused by several. Only in one third of cases can the causal organism be identified.

Diagnosis Fever of over 38º C in the mother on the third or fourth day of puerperium, with tachycardia and chills. The lochia become thick, purulent-looking or chocolaty, and fetid.

Risk factors Primiparas and multiparas, premature rupture of membranes more than 6 hours before delivery , caesarean section, prolonged labor, induced delivery, preeclampsia, preterm delivery, anemia, lack of prenatal check-up, sexually transmitted infections, and low socioeconomic stratum.

Treatment The combination of gentamicin + clindamycin would seem an appropriate treatment, but susceptibility to antibiotics in the particular country will play a role in the decision.

Photo: Johnathan Hubschman

Evidence The detection and timely management of puerperal endometritis is associated with less morbidity and maternal mortality *(609-613)*.

4. Detecting, preventing, and managing postpartum depression

Background Postpartum depression is one of the most frequent postpartum diseases, affecting 1 out of 8 women giving birth. If not treated properly, it can persist for months and even years. Postpartum depression is present when the mother develops depression after the birth of a child. Sometimes, the phenomenon can be explained by the fact that the child was not wanted, or is not normal. In most cases, however, there is no explanation for the depression.

Diagnosis At any time within the first three months after delivery, a woman may present with:

- Difficulty going to sleep, or sleeping too much
- Lack of interest in usual activities or pastimes
- Feelings of guilt
- Loss of energy
- Difficulty concentrating or making decisions
- Changes in appetite or eating
- Feeling tired all the time
- Thoughts of suicide or death
- Physical violence and death of the child(ren)

Risk factors

- Personal or family history of depression
- An undesired or unplanned pregnancy
- Marital or financial problems
- Significant life changes, such as the death of a relative or a change of jobs
- Medical problems, or complications with the pregnancy
- Miscarriage in a previous pregnancy

Treatment The common antidepressants for postpartum use are the selective serotonin inhibitors such as sertraline, paroxetine, citalopram, and fluoxetine. If the mother is breastfeeding, sertraline chlorhydrate in a dose of 50 mg/day orally is the drug of choice, since it passes through to the milk in lower quantities.

Some women with mild to moderate depression can be treated with support groups. Severe depression requires psychotherapy.

Evidence In the mother: feelings of guilt, frustration, lack of interest, neglect of baby. In the newborn: greater morbidity and mortality, more prolonged colic and crying *(614-628)*.

V. Neonatal interventions after delivery

Immediate neonatal adaptation is the set of cardiac, hemodynamic, respiratory, and other changes on which an adequate transition from intrauterine life to life in the outside environment depends. The majority of newborns make this transition without complications, but others require some immediate intervention, such as neonatal resuscitation. Those that survive healthy depend on other basic interventions to prevent complications like neonatal ophthalmia, omphalitis, skin infection, or hemorrhagic disease of the newborn.

Beginning and continuing exclusive breastfeeding is one of the principal cost-effective interventions to reduce morbidity and mortality, both neonatal and in childhood. Premature or low birthweight newborns can be cared for with the kangaroo mother technique, which fosters bonding and breastfeeding and reduces postnatal complications.

Other interventions – prevention of hypothermia or hypoglycemia, and hand washing to prevent infection – can dramatically reduce neonatal mortality simply and at low cost. Although some newborns will need more sophisticated and expensive interventions – surfactant, mechanical ventilation, antibiotics for sepsis, for example – adequate prenatal intervention can considerably reduce morbidity.

1. Neonatal resuscitation with ambient air

Background

Asphyxiation at birth is one of the leading causes of neonatal mortality and long-term neurological sequelae. In Latin America and the Caribbean, more than 50,000 children die every year from asphyxiation, accounting for 29% of all deaths before 28 days of age. Immediate and effective neonatal resuscitation can prevent the vast majority of these deaths. However, we often lack the proper equipment and oxygen supply where it is needed. Positive-pressure bag and mask ventilation can be used at facilities that lack staff trained in sophisticated resuscitation techniques (such as ET intubation, cardiac massage, drugs). It has been suggested that resuscitation can be as effective with ambient air as with 100% oxygen. If available, pulse oximetry should be used, with the sensor attached to the right-side upper limb (the wrist or palm of the hand), in order to evaluate the need for additional oxygen. In the case of neonates born at term, it is best to begin resuscitation with oxygen in ambient air (21%), and proceed to 100% oxygen if bradycardia is present after 90 seconds. The administration of supplemental oxygen should be regulated by mixing oxygen and air.

Evidence

Ambient air is as good as 100% oxygen for the resuscitation of asphyxiated newborns, reducing both mortality and neurological sequelae *(629-636)*.

2. Immediate care for the healthy newborn

Background At the world level, 90%-95% of children are born in good shape and do not require any resuscitation, but only immediate care: preventing heat loss, attending properly to the umbilical cord (with a sterile/clean cut and ligature), beginning breastfeeding in the first hour, and avoiding any separation from the mother.

Diagnosis Breathing or crying

Good muscle tone

Treatment *At birth:*

- Maintain room temperature in the delivery room between 28º C and 30º C.
- Dry and cover.
- Aspiration of the mouth or nose should not be routine (but only used when necessary to remove obstructions or meconium).
- When it stops pulsing, the umbilical cord is closed with umbilical tape or a clamp 2-3 cm from the base, and cut with sterile scissors.
- Apply 1 mg of vitamin K1 intramuscularly.
- Administer eye infection prophylaxis in the form of silver nitrate (1%), tetracycline (1%), or erythromycin.
- Put an identification bracelet on the newborn.
- Keep the newborn in skin-to-skin contact with its mother from birth, and begin breastfeeding within an hour of birth.
- Erythromycin (0.5%)

Evidence Routine immediate care for healthy newborns prevents hypothermia, hypoglycemia, anemia, hemorrhagic disease of the newborn, eye infection, switching or loss of a newborn, and a delayed start to exclusive breastfeeding *(637-651)*.

3. Care of the umbilical cord

Background Omphalitis is one of the leading causes of sepsis in the neonatal period, often secondary to traditional treatment of the umbilical cord, to the way of cutting it and instruments used for the purpose, and to the application of dressings with creams, powders, lotions, and even some herbs. Omphalitis contributes to neonatal morbidity and mortality in developing countries. Various means are used to reduce omphalitis infection and mortality: simply keeping the umbilical cord dry, and using antiseptics, antibacterial agents, or alcohol.

Treatment Use an antiseptic solution initially (triple stain or alcohol), and then keep clean and dry.

Evidence Antiseptic solutions such as triple stain (Tween 80, gentian violet, and proflavine sulfate) or alcohol have been effective, although chlorhexidine or povidone-iodine can also be used. A case-control study in Nepal showed that the use of chlorhexidine on the umbilical stump reduced neonatal mortality by 24%, and up to 34% if applied during the first 24 hours, as compared with simple clean-and-dry management of the cord. The traditional treatment of the umbilical cord with breast milk seems not to have adverse effects, and is associated with the cord falling off more quickly. The use of alcohol or chlorhexidine delays the event by several days. During omphalitis epidemics, triple stain has been a more effective preventive agent, but can delay the cord's falling off *(652-662)*.

4. Skin care at birth

Background The surface of the newborn's skin, the vernix, and the amniotic fluid are full of substances that help protect against bacterial invasion.

Treatment

The following are recommended for the newborn's bodily hygiene:

- Avoid immediate bathing of preterm or low birthweight babies.
- Avoid removing the vernix from the skin.
- Full-term and stable newborns can be bathed with a sponge, but not by immersion, and care should be taken not to wet the umbilical cord.
- The scalp should be cleaned carefully, as should excess blood.
- If covered with blood or amniotic fluid, the baby can be cleaned with cotton impregnated with sterile water and a non-antiseptic neutral soap.
- If a fetid odor is present, or amnioitis is suspected, use soap to clean.
- Careful hygiene of ears, nostrils, and places where blood has accumulated should be carried out.

Evidence

The surface of the skin, the vernix, and the amniotic fluid protect the newborn against bacterial invasion at birth *(663-672)*.

5. Breastfeeding in the first hour

Background

Early skin-to-skin contact means placing the naked healthy neonate on its stomach on the mother's naked breast [immediately after birth, or shortly thereafter (within 24 hours). Although, from an evolutionary perspective, skin-to-skin contact is the norm, current practice in many places is to separate the newborn from the mother shortly after birth. Early skin-to-skin contact has been shown to be associated with exclusive and continuing breastfeeding, as well as with positive physiological and behavioral characteristics in the mother and newborn.

Intervention

Place the newborn in skin-to-skin contact with its mother, and initiate breastfeeding within the first hour after delivery, whether the birth be vaginal or caesarean.

Evidence

Initiating breastfeeding for the full-term newborn in the first hour of life reduces neonatal mortality by 22%. Delaying it more than 1 hour after birth increases the probability of neonatal death by as much as a factor of 2.5; delaying it by a day increases neonatal mortality by a factor of 4.5; and a delay of 3 days raises it by a factor of 11.

Early skin-to-skin contact (at any time from 1 to 24 hours after birth) has been shown to have statistically significant positive effects on the continuation of breastfeeding 1 to 4 months after birth, and to be associated with more optimal duration of breastfeeding. Statistically significant benefits of early skin-to-skin contact have also been demonstrated in newborns' maintenance of their temperature in the neutral range, in their crying patterns, in their blood glucose, and in overall scores for love and affectionate contact behavior on the part of the mother during breastfeeding in the first days of life. Premature newborns who are almost full-term have shown improved cardiorespiratory stability when exposed to early skin-to-skin contact *(673-685)*.

6. Kangaroo mother program (skin-to-skin contact)

Background

The kangaroo mother program arose in a framework of primary care strategy, as an option to be used in the comprehensive care of premature and low birthweight infants, and is valid for both developed and developing countries. It has evolved into a form of care that is emphatically human-oriented and low-cost in a range of care scenarios – from situations with no resources whatsoever to facilities with funding and advanced technology.

The components of the program are as follows. Position: skin-to-skin contact 24 hours a day 7 days a week on the chest of the mother (or another family member). Nutrition: exclusive breastfeeding. Follow-up: early discharge with strict ambulatory monitoring up to 40 weeks of corrected age. Intervention
Skin-to-skin contact and breastfeeding start as soon as possible in the neonatology unit, and the newborn is to be kept in skin-to-skin contact at home with its mother 24 hours a day.

Evidence

A systematic review began with 6,127 studies, and selected 15, including 9 random controlled trials (RCTs) and 6 observational studies in low- and medium-income countries, all involving children in hospitals < 2000 g (~ 32–34 weeks of GA). The meta-analysis of the RCTs, as well as a separate meta-analysis of the observational studies of the kangaroo mother program starting in the first week of life, compared the results of the program with the results of standard care, and showed (for the first time) a statistically significant reduction of neonatal mortality (51%, CI 29%-82%) and severe morbidity – mostly infection (66%, CI 35%-83%).

The following benefits have been observed. The physical growth of the children in the kangaroo mother program exceeds that of premature or low birthweight infants cared for in incubators. The duration of exclusive breastfeeding is longer for children in the program; more breast milk is produced; and hospital stays are reduced, which reduces costs and diminishes the risk of hospital infections. Children subject to environmental risks are also protected (they have fewer rehospitalizations due to hypothermia, bronchoaspiration, and infection). The program improves mother-newborn and family-newborn bonds, and unites families more effectively *(686-698).*

7. Stabilizing and transporting the neonate

Background

The purpose of transferring critically sick neonates is to reduce mortality and morbidity, and to minimize sequelae to the extent possible, using technically appropriate, optimal management. The ideal is to anticipate the need and transport the infant "in utero." When this is not possible, the neonate should be transferred by a specialized team equipped to deal with the infant's vulnerability, its disease or abnormality, and the physical process involved in the transfer. The recognition of potentially destabilizing factors minimizes these risks.

Criteria

The following criteria should be assessed for any transfer:

- The neonate has a condition that cannot be treated in the facility where it was born.
- The referral center provides treatment and stabilization insofar as it is able. The center receiving the referral has the space, capacity, and trained personnel available to treat the patient, and has accepted the referral.
- The referring facility sends the relevant medical records, (ideally along with cord blood and placenta as well).
- The transfer is handled by skilled personnel, and uses appropriate equipment and means of transportation.

Evidence

High-risk pregnancies and births in health units without adequate neonatal intensive care have a higher incidence of destabilization, perinatal mortality, and neurological sequelae. They should therefore have skilled personnel, and appropriate equipment and means of transportation *(699-723).*

8. Treating neonatal sepsis with a single daily dose of gentamicin

Background

Gentamicin is widely used to treat presumed or confirmed neonatal septicemia. Animal studies and systematic reviews of studies of older children and adults suggest that a daily dose is better than multiple doses, providing adequate levels in the blood without nephrotoxic or auditory effects.

Treatment

Gentamicin, 4 mg/kg, one dose daily, IV or IM, for 7-10 days.

Evidence

Pharmacokinetic evidence indicates that a single daily dose is better than a regimen of multiple doses to treat septicemia in newborns with over 32 weeks of gestation *(724-731).*

9. Treating respiratory distress syndrome (RDS) with natural surfactant

Background

Respiratory distress syndrome (RDS) is caused by a deficiency or dysfunction of the pulmonary tensioactive substance called surfactant. A broad range of products made from tensioactive agents – both

synthetic and animal-derived preparations – has been formulated and studied in clinical trials. These substitute surfactants have been tested as a way of preventing RDS in premature newborns at high risk, as well as for treating those already experiencing breathing problems.

Diagnosis

Gestational age < 37 weeks.

Progressive respiratory insufficiency.

Hypoxemia with reduction of SaO 2 and elevated CO2.

Chest x-ray: reduction of pulmonary volume with diffuse reticulogranular infiltrate described as looking like rough glass, and aerial bronchograms.

Treatment

Artificial surfactant: 4 mL/kg per dose, IT

Synthetic surfactant: 5 mL/kg per dose, IT

Evidence

In newborns already experiencing breathing problems, multiple doses of natural surfactant produce better oxygenation, and better results in terms of ventilation parameters, while reducing the risk of pneumothorax, pulmonary interstitial emphysema, bronchopulmonary dysplasia, and necrotizing enterocolitis. In all cases, it is associated with lower mortality *(732-741).*

10. Neonatal screening to detect congenital hypothyroidism, galactosemia, phenylketonuria, and cystic fibrosis

Background

Neonatal screening tests are used to identify newborns who are carriers of an endocrine pathology, infection, or metabolic errors, before the disease manifests itself, and to prevent, if possible, any physical or mental disability or death. The principal screening tests detect an endless number of pathologies, but the most common in our environments are hypothyroidism, galactosemia, phenylketonuria, and cystic fibrosis.

Hypothyroidism is due to a deficiency of circulating thyroid hormones, and if it occurs during embryonic development or in the first months or years of life, it can have serious impact on intellectual, somatic, motor, bone, and functional development.

Galactosemia is a rare recessive autosomal disease characterized by a reduced ability to convert galactose in the diet into glucose, as a result of a deficiency of one of the three enzymes necessary for the conversion. Symptoms usually appear in the first days or weeks of life, and can be fatal since they lead to acute hepatic toxicity, hemorrhagic diathesis, and a predisposition to sepsis by *Escherichia coli.*

The primary defect in phenylketonuria is absence or deficiency of the liver enzyme phenylalanine hydroxylase. This prevents the conversion of phenylalanine into tyrosine, which in turn precludes the normal subsequent conversions. Children with this type of disorder show limited signs of it until they develop mental retardation – which may not be discernable until the second year of life, by which time it is irreversible.

A diagnosis of cystic fibrosis is usually suggested by phenotypic clinical manifestations (chronic sinopulmonary disease, pancreatic insufficiency, malnutrition, liver disease, or salt-loss syndrome) and confirmed by findings of a high concentration of sodium and chlorine in pharmacologically stimulated perspiration. The analysis of mutations can be useful in: identifying carriers, obtaining diagnostic confirmation in patients with atypical clinical presentations, and making prenatal diagnoses in high-risk pregnancies.

Diagnosis

Diagnosis is made by taking a blood sample from the cord, or drops of fresh capillary blood, usually from the heel, 4-7 days after birth.

Confirmation

Pathology	Normal value
Hypothyroidism	12-24 hours TSH < 37 mIU/mL of serum
	24 hours - 14 days TSH < 30 m IU/mL
	>14 days TSH < 20 m IU/mL
Galactosemia	Total galactose: < 10 mg/dL of blood
Phenylketonuria	Phenylalanine 26-91 mM
Cystic fibrosis	Immunoreactive trypsinogen <90 n...g/mL of blood

Treatment

Hypothyroidism: levothyroxin, 10-15 µg/kg/day until TSH is normalized, then adjust dose.

Galactosemia: Strict elimination of galactose and lactose from the diet; breastfeeding is contraindicated, and soy-based formula can be used.

Phenylketonuria: Restrict phenylalanine in the diet, as well as proteins in general.

Cystic fibrosis: There is no specific treatment. Treatment only relieves symptoms and delays the progress of the disease.

Evidence

Very early diagnosis and treatment of confirmed cases diminishes or eliminates the risk of suffering from the disease, and reduces alterations of intellectual, somatic, motor, bone, and functional development *(742-760)*.

11. Detecting and preventing tuberculosis and hepatitis B

Background

The hepatitis B virus continues to be a serious public health problem. In pediatric patients, vertical transmission through the placenta is the most frequent route of infection. The incidence of perinatal transmission is 70%-80% when the mother is HBsAg-positive and HBeAg-positive. For tuberculosis, the BCG vaccine has proven to be relatively effective (> 80%) for the serious forms of the disease such as tubercular meningitis and miliary tuberculosis, especially in the pediatric population.

Treatment

Neonates exposed to a HBsAg-positive mother should immediately (ideally in the first 12 hours) receive hyperimmune immunoglobulin for hepatitis B (HBIg), and should begin the hepatitis B vaccination series at the latest within the first month of life, with the recombinant vaccine administered at a different site from that used for the immunoglobulin injection.

All unexposed healthy newborns should receive an obligatory first dose of hepatitis B vaccine intramuscularly immediately upon birth.

The BCG (bacillus Calmette-Guérin) vaccine was developed in 1921 by Calmette and Guérin of the Pasteur Institute. It is composed of an attenuated live strain of mycobacterium bovis that over many years in different laboratories has been developed from multiple cultivated substrains. Neonates weighting over 2,000 g at birth should receive an obligatory dose of BCG intradermally before being discharged from the hospital.

Evidence

Protection against perinatal transmission of hepatitis B and tuberculosis *(761-766)*.

12. Detecting and treating retinopathy of prematurity (ROP) in the newborn

Background

Newborns with very low birthweights (< 1,500 g) or gestational age ≤ 32 weeks, and premature babies with a history of prolonged oxygen supplementation or of mechanical ventilation, are at greater risk of

developing retinopathy of prematurity. ROP is the abnormal development of the blood vessels in the retina. It commonly begins during the first days of life, and can progress rapidly, causing blindness in a matter of weeks.

Diagnosis Pupillary dilation and indirect ophthalmoscopy begin at week 31, and the neonate's condition should be monitored until the retina matures at 40 weeks.

Treatment Once the premature baby is diagnosed, photocoagulation should be used. Laser is considered the best way of treating ROP.

Evidence Preventing exposure to high oxygen levels by controlled use of oxygen or pulse oximetry can reduce the number of newborns with serious and irreversible stages of the disease *(767-780)*.

13. Early home visits for newborn care

Background Three fourths of all neonatal deaths occur in the first week of life, and 25% to 45% in first 24 hours. This is also the period of most maternal deaths. Nevertheless, 47% of mothers and newborns do not receive adequate care during birth, and 72% of births outside institutional settings are not followed up by a postpartum check-up. It is recommended that health care services conduct the first postnatal visit after the first week of life, when the period of highest vulnerability has passed. The importance of providing care in the first hours and days of life has not been sufficiently stressed. This is the period in which the care continuum is most frequently interrupted.

Intervention WHO and UNICEF recommend at least two home visits to mothers and newborns: the first within 24 hours after birth (day 1) and a second on day 3. If possible, a third visit should be made after the first week of life (day 7).

Evidence Several studies have demonstrated that early home visits for the care of the newborn effectively reduce neonatal mortality in high-risk populations. They have also been shown to yield improvements in key neonatal care practices, such as commencing breastfeeding, exclusive breastfeeding, skin-to-skin contact, delayed bathing, and better hygiene, as well as hand washing with clean water and soap, and care of the umbilical cord *(781-787)*.

14. Supine sleeping position and sudden infant death syndrome (SIDS)

Background SIDS is the sudden inexplicable death of a child under one year of age.

Risk factors Male sex, prematurity, low birthweight.

Intervention Neonates and infants should always sleep on their backs.

Evidence There is sufficient evidence that putting a baby to rest on its back, avoiding exposure to tobacco smoke, and breastfeeding considerably reduce the incidence of sudden infant death syndrome (788-795).

15. Exclusive breastfeeding

Background Breast milk should be the first thing that the newborn tries, which means that nothing (such as water, other liquids, or ritual foods) should be given before breast milk. Breast milk completely meets an infant's nutritional needs and fluid requirements during the first six months of life. Water or other liquids are not needed to maintain good hydration, even in warm climates.

Intervention Exclusive breastfeeding, 8 or more times in 24 hours, day and night.

Evaluation If a baby urinates at least 6 times in 24 hours, its ingestion of breast milk is adequate. Otherwise, the number of feedings should be increased, or the breastfeeding technique being used should be evaluated.

Evidence *For the infant:* Exclusive breastfeeding protects against disease and improves the immune system, protecting in the long term against obesity, diabetes, cancer, and high cholesterol.

For the mother: Exclusive breastfeeding reduces the risk of postpartum hemorrhage, fosters uterine involution, and delays the return of menstruation, which helps the mother prevent new pregnancies, and protects her against anemia by conserving iron. It also reduces the risk of breast or ovarian cancer before menopause.

Psychological and developmental benefits: Exclusive breastfeeding fosters the mother-infant bond, as well as optimal growth and development, including cerebral growth.

Economic benefits: Exclusive breastfeeding saves families the cost of buying breast milk substitutes, and reduces health care costs.

Environmental benefits: Exclusive breastfeeding conserves natural resources and reduces pollution.

Impact on mortality: 16% of neonatal deaths can be prevented if all newborns are exclusively breastfed from their first day of life, and 22% of neonates will be saved if breastfeeding begins in the first hour of life *(796-818)*.

VI. Summary of interventions and their management

Interventions	Management
I. Prepregnancy interventions	
1. Using body mass index (BMI) to monitor nutritional status prior to pregnancy	**When**: At each check-up. **How**: Weight (kg)/height (m)^2. **Why**: To detect deviations in nutrition and correct them. **How long**: All the time.
2. Folic acid supplementation	**When**: 2-3 months before pregnancy. **How**: 400 µg/day (0.4 mg/day) orally. **Why**: To prevent folate deficiency and, during pregnancy, anomalies of the neural tube and other birth defects. **How long**: Indefinitely
3. Detecting, preventing and treating. anemia with iron	**When**: Pallor, or Hb < 12 g/dL: 60 mg of elemental iron/day, taken orally. 120 mg of elemental iron/day, taken orally. Severe pallor, or Hb < 7 g/dL: 120 mg elemental iron/day. Administered orally. **How**: With food or at bedtime. **Why**: To address anemia. **How long to treat**: Until anemia improves.
4. Micronutrients and reproductive health in women	**When**: In the course of health surveillance, 3 months before conception and as long during the postpartum period as breastfeeding continues. **How**: Multivitamin supplements and balanced diet. **Why**: To prevent acute and chronic deficiencies, overeating, or congenital problems upon becoming pregnant. **How long to treat**: Indefinitely
5. Detecting and treating sexually transmitted infections (HIV, Herpes, Gonococcus, Papilloma, etc.)	**When**: In the course of health surveillance. **How**: Medical evaluation and laboratory work. **Why**: To prevent health problems and perinatal complications. **How long to treat**: Depends on the disease.

Interventions	Management
I. Prepregnancy interventions (continuation)	
6. Deparasitization in areas of high prevalence	**When**: In the course of health surveillance. **How**: Albendazole, 400 mg orally, single dose; Mebendazole, 100 mg twice a day orally for 3 days; or Mebendazole 500 mg orally, single dose. **Why**: To prevent malnutrition and anemia due to parasitemia. **How long to treat**: Once a year.
7. Detecting and treating chronic diseases (cardiovascular, nutritional, endocrine)	**When**: In the course of health surveillance. **How**: Clinical evaluation and laboratory work. **Why**: To prevent malnutrition, obesity, diabetes and future perinatal complications. **How long to treat**: Depends on disease and protocols.
8. Detecting, preventing, and managing domestic violence	**When**: In the course of health surveillance. **How**: Medical evaluation of warning signs or signs or violence. **Why**: To prevent mortality, depression, physical injury, and low self-esteem. **How long to treat**: Depends on the injuries and on national protocols for violence management.
9. Detecting, preventing, and managing alcohol and tobacco consumption	**When**: In the course of health surveillance. **How**: Medical evaluation of warning signs in consumption patterns. **Why**: To prevent mortality, depression, antisocial personality, poor school performance, and future reproductive dysfunction. **How long to treat**: On an ongoing basis [TN: via support groups.
10. Detecting, preventing, and managing depression	**When**: In the course of health surveillance. **How**: Medical evaluation of warning signs. **Why**: To prevent mortality, poor school performance and future postpartum depression. **How long to treat**: On an ongoing basis via support groups.
11. Detecting and preventing cervical cancer	**When**: In the course of health surveillance. **How**: Cytology and colposcopy. **Prevention target:** Human papillomavirus (HPV) in all adolescents 11-12 years old, and in women 13-26 who have not received the vaccine previously. **Why**: To prevent cancer and mortality. **How long to treat**: First dose when detected, second two months after the first, and a third 6 months after the first.
12. Complete immunization series	**When**: In the course of health surveillance. **How**: Complete the vaccination series according to the country's Ministry of Health guidelines. **Why**: To prevent morbidity and future congenital infections. **How long to treat**: Follow age guidelines for vaccination series.
13. Detecting and treating periodontal disease	**When**: In the course of health surveillance. **How**: Dental check-up (semiannual). **Why**: To prevent oral morbidity and future occurrence of low birthweight, prematurity, sepsis, etc. **How long to treat**: Depends on morbidity.
14. Preventing pregnancy in adolescents	**When**: In the course of health surveillance. **How**: Educational interventions targeting service providers and parents, plus programs on the use of contraceptives. **Why**: To prevent perinatal mortality and other adverse situations, including future low birthweight or premature birth. **How long to treat**: On an ongoing basis.

Interventions	Management
II. Interventions during pregnancy	
1. Prenatal check-up	**When**: 5 check-ups in the course of the pregnancy. **How**: Follow WHO/PAHO guidelines. **Why**: To prevent and detect risk. **How long**: During pregnancy.
2. Preventing fetal death	**When**: Throughout pregnancy. **How**: Adequate access to obstetric care, particularly during the prenatal period, labor, and delivery. **Why**: To prevent and detect risk of fetal death.
3. Preventing preterm birth	**When**: Throughout pregnancy. **How**: Adequate access to obstetric care, particularly during the prenatal period, labor, and delivery. Greater use of evidence-based interventions. **Why**: To prevent and detect risk of fetal and neonatal death.
4. Managing premature rupture of membranes	**When**: During prenatal check-up and delivery. **How**: *In the absence of preterm labor* where no pathology is present, administer erythromycin, 250 mg orally, every 6 hours for 7 days; if GA > 26 or < 36 weeks, administer prenatal corticoids. *In the presence of labor, with GA < 37 weeks,* administer an initial dose of penicillin G, 5 million IU, IV, then 2.5 million IU, IV, every 4 hours. **Why**: To reduce the risk of early neonatal infection, RDS, and neonatal mortality.
5. Using the CLAP/WR perinatal clinical record (PCR) and perinatal card	**When**: During prenatal check-up, delivery, puerperium, and the neonatal stage. **How**: Follow CLAP/WR guidelines. **Why**: To ensure proper use of the guidelines.
6. Weight gain during pregnancy	**When**: At each prenatal check-up. **Why**: To detect deviations in the weight increase pattern. **How:** Use tables from IOM, 2009. **How long to treat**: At each check-up.
7. Reducing unnecessary caesarean sections	**When:** During labor and delivery. **How:** Avoid vaginal or caesarean births before the full 39 weeks of GA. **Why:** To prevent prematurity and its complications
8. Immunization with tetanus toxoid, taking previous vaccination status into account	**When:** At first contact and 4 weeks later. **How:** 0.5 mL per dose, IM. **Why:** To prevent neonatal tetanus. **How long**: 2 doses, or until 5 doses have been received.
9. Preventing influenza with vaccination	**When:** At first prenatal check-up. **How:** Single dose of inactivated seasonal or pandemic influenza virus vaccine. **Why:** To prevent influenza A (H1N1) 2009 and severe complications during pregnancy.
10. Syphilis screening and case management	**When**: At first prenatal visit and before delivery. **How**: Conduct VDRL or RPR tests twice during pregnancy. **Why**: To detect syphilis and prevent congenital syphilis. **How long to treat**: If test is positive, administer a single dose of benzathine penicillin, 2.4 M units.

Interventions	Management
II. Interventions during pregnancy (continuation)	
11. Detecting and treating asymptomatic bacteriuria	**When**: At first prenatal visit when gestation is < 12 weeks, and at weeks 28 and 32. **How**: *Diagnosis:* reactive strips or urine culture. *Treatment:* Cefalexin, 500 mg, orally every 8 hours; amoxicillin, 500 mg, orally every 8 hours; or cefadroxil, nitrofurantoin. 7-10 day course. **Why**: Pyelonephritis prevents preterm delivery and LBW. **How long to treat**: 7-10 days.
12. Treating and preventing anemia with iron	**When**: Throughout pregnancy, postpartum, and breastfeeding period. **How**: Pallor, or Hb < 12 g/dL: 60 mg/day elemental iron. Severe pallor, or Hb < 7 g/dL: 120 mg elemental iron/day. Administered orally. **Why:** To cure anemia. **How long to treat**: Throughout pregnancy, and three months postpartum.
13. Preventing preeclampsia and eclampsia with calcium	**When**: In all pregnant women with risk factors for preeclampsia (< 3 portions of dairy products/day, or BMI < 18.5 or > 25 in the first trimester). **How**: 1-2 g calcium/day orally. **Why**: To prevent hypertension and preeclampsia in women at risk. **How long to treat**: Throughout pregnancy.
14. Preventing preeclampsia and eclampsia with aspirin	**When**: In all pregnant women with risk factors for preeclampsia (BMI < 18.5 or > 25.0 in the first trimester). **How**: 75-100 mg/day orally. **Why**: To prevent preeclampsia, premature delivery, low birthweight, and perinatal mortality. **How long to treat**: Throughout pregnancy.
15. Detecting and treating sexually transmitted infections	**When**: At prenatal check-ups. **How**: Clinical evaluation and laboratory tests. **Why**: To prevent infections, birth defects, and perinatal complications. **How long to treat**: Depends on disease.
16. Antiretrovirals and other measures to reduce the risk of vertical transmission of HIV	**When**: During pregnancy and childbirth. **How**: Zidovudine: *During pregnancy*: 100 mg orally 5 times/day beginning between weeks 14 and 34 and continuing throughout pregnancy. *During elective caesarean section*: 2 mg/kg IV followed by continuous infusion of 1 mg/kg/hour up to delivery. Should be accompanied by: elective caesarean section, education for parents, and use of formula for feeding. **Why**: To reduce vertical transmission. **How long to treat**: Until delivery is complete.
17. Detecting and treating diabetes	**When**: At prenatal check-up. **How**: A family history of diabetes, BMI > 25.0, fasting blood glucose > 105 mg/dL. **Why**: To prevent birth defects and perinatal complications. **How long to treat**: Depends on disease and protocols.
18. Deparasitization in areas of high prevalence	**When**: Second and third trimester. **How**: Albendazole, 400 mg orally, single dose. **Why**: To prevent anemia. **How long to treat**: A single dose 2 times.

Interventions	Management
II. Interventions during pregnancy (continuation)	
19. Detecting and treating group B streptococcus	**When**: During pregnancy. **How:** Rectal and vaginal culture between weeks 35 and 37. For intrapartum prophylaxis: Penicillin G: 5 million units IV (initial dose), then 2.5 million units IV every 6 hours for 48 hours, or ampicillin, initial dose 2g IV, then 1g IV every 4 hours up to delivery. If woman is allergic to penicillin, administer cefazolin, initial dose 2g IV, then 1g IV every 8 hours up to delivery. **Why**: Prevents early neonatal infection by group B streptococcus.
20. Nifedipine during preterm labor	**When:** During preterm labor. **How:** 10 mg orally. If uterine activity continues, administer 10 mg every 20 minutes orally, with a total of 3 doses. **Why**: Prevents premature birth, RDS, intraventricular hemorrhage, and jaundice. **How long to treat**: Every 20 minutes, 3 doses in all.
21. Prenatal corticosteroids (betamethasone, dexamethasone) to foster lung maturation	**When**: From 26 weeks to < 35 weeks of gestation. **How**: BMT: 12 mg IM every 24 hours in 2 doses. DMT: 6 mg IM every 12 hours in 4 doses. **Why**: Reduces neonatal mortality, RDS, intraventricular hemorrhage, NNE, sepsis **How long to treat**: Only cycle.
22. Detecting, preventing, and treating Rh isoimmunization	**When**: If there is a history, administer gammaglobulin at weeks 28 and 34 of gestation. In the absence of a history, administer within 72 hours after delivery if baby is Rh positive. **How**: 120-300 milligrams, IM or IV. **Why**: To reduce intrauterine death, fetal hydrops, jaundice, and/or severe anemia.
23. Detecting and treating periodontal disease	**When**: 2 check-ups during pregnancy. **How**: Dental check-up. **Why**: To reduce risk of premature birth. **How long to treat**: Per dentist's recommendation.
24. Detecting, preventing, and managing domestic violence, abuse and depression	**When:** Always. **How**: Seek support from some family member, and psychosocial support. **Why**: To prevent death or disability, and emotional trauma. **How long to treat**: Duration of support group on a case-by-case basis.
25. Detecting and preventing exposure to tobacco	**When:** Throughout pregnancy. **How**: Psychosocial support. **Why**: Prevent IUGR, low birthweight, and sudden infant death syndrome. **How long to treat**: On a case-by-case basis.
26. Detecting and preventing exposure to alcohol	**When:** Throughout pregnancy. **How**: Psychosocial support. **Why**: To prevent fetal alcohol syndrome. **How long to treat**: On a case-by-case basis.
27. Detecting and preventing exposure to drugs	**When:** Throughout pregnancy. **How**: Psychosocial support. **Why**: To prevent low birthweight, withdrawal syndrome, birth defects, and sudden infant death syndrome. **How long to treat**: On a case-by-case basis.

Interventions	Management
III. Interventions during delivery	
1. Clean and safe delivery practices (with skilled personnel)	**When**: During delivery. **How**: Hand washing, clean instruments, facilitating environment. **Why**: To prevent infections and complications. **How long to treat**: During delivery and postpartum.
2. Accompanying the mother during labor and delivery	**When**: During labor and delivery. **How**: Permitting and encouraging a family member or other person to be present. **Why**: To prevent obstetric complications, minimize the duration of labor, and reduce the need for caesarean section or pain medication.
3. Erythromycin in PROM before delivery in first 37 weeks of gestation	**When**: In the absence of labor. **How**: Erythromycin, 500 mg orally every 8 hours. **Why**: Prevents preterm birth, neonatal sepsis, and chorioamnionitis. **How long to treat**: 7 days.
4. Monitoring labor with partograms	**When**: During labor. **How**: Partogram. **Why**: To reduce unnecessary interventions and perinatal complications. **How long to treat**: Throughout labor.
5. Caesarean section in breech presentation with LBW infants	**When**: During labor. **How**: Elective caesarean section. **Why**: To reduce perinatal complications, asphyxiation, and birth trauma.
6. Antibiotic prophylaxis in caesarean section	**When**: Elective or non-elective caesarean section. **How**: Cefalotin, 2g IV, single dose, during caesarean section. **Why**: To prevent endometritis and its severe sequelae. **How long to treat**: A single dose.
7. Modified active management of the third stage of labor	**When**: During the third stage of labor (birth). **How**: Oxytocine, 5-10 IU, IM; methylergonovine 0.5 mg, IM; or misoprostol, 0.4-0.8 mg orally; + traction/contratraction + abdominal uterine massage. **Why**: To reduce postpartum bleeding. **How long to treat**: One dose.
8. Late clamping of the umbilical cord	**When**: During delivery. **How**: Clamp at 2-3 minutes. **Why**: To permit more deposit of iron in the newborn, preventing anemia during the first 4-6 months of life, and improving the newborn's cerebral oxygenation.

Interventions	Management
IV. Maternal interventions after delivery	
1. Early skin-to-skin contact	**When**: Immediately after birth. **How:** Place baby in skin-to-skin contact with its mother. **Why**: To promote early bonding and the beginning of breastfeeding. **How long to treat**: As long as possible.
2. Mother-newborn rooming-in	**When**: 24 hours a day. **How:** Place the baby in contact with its mother. **Why**: To promote early bonding and the beginning of breastfeeding, as well as parents' confidence in caring for the baby. **How long to treat**: As long as possible.
3. Detecting and managing puerperal endometritis	**When**: Fever in the mother third or fourth day after birth. **How:** Gentamicin + clindamycin. **Why**: To reduce maternal mortality from sepsis. **How long to treat**: 10 days.
4. Detecting, preventing, and managing postpartum depression	**When**: At any time within 3 months after delivery. **How:** Detect through warning signs; treat with support groups or, in severe cases, antidepressants. **Why**: To reduce maternal and neonatal morbidity and mortality. **How long to treat**: Until symptoms recede.
V. Neonatal interventions after delivery	
1. Neonatal resuscitation with ambient air	**When**: Immediately after birth when required. **How:** Follow neonatal resuscitation protocol. **Why**: To avoid the toxicity of oxygen and ROP sequelae as well as bronchopulmonary dysplasia. **How long to treat**: Up to 10 minutes.
2. Immediate care for the healthy newborn	**When**: Upon birth. **How:** Following immediate care protocol. **Why**: To prevent hypothermia, hypoglycemia, sepsis, and other complications at birth.
3. Care of the umbilical cord	**When**: Upon birth, and until it falls off. **How**: Initially apply antiseptic solution, then keep clean and dry. **Why**: To prevent omphalitis and sepsis. **How long to treat**: Until it falls off.
4. Skin care at birth	**When:** Avoid immediate bathing of the preterm or low birthweight newborn. **How**: Keep clean by sponge bath; do not immerse. **Why**: To prevent hypothermia and infection. **How long to treat**: Always.
5. Breastfeeding in the first hour	**When:** From the first hour after birth. **How**: Place the newborn in skin-to-skin contact with its mother, and initiate breastfeeding. **Why**: To foster exclusive breastfeeding and a longer period of breastfeeding. **How long to treat**: Continue exclusive breastfeeding until 6 months old.
6. Kangaroo mother program (skin-to-skin contact)	**When:** When the newborn is stable and can suck. **How**: Keep the newborn in skin-to-skin contact with its mother at home 24 hours a day. **Why**: To foster bonding, provide psychological benefits, extend breastfeeding, and reduce neonatal mortality. **How long to treat**: Generally a month.

Interventions	Management
V. Neonatal interventions after delivery (continuation)	
7. Stabilizing and transporting the neonate	**When:** When it is necessary to transfer a newborn from the health care facility to a facility of greater complexity. **How**: By any means of transportation adequately equipped for transporting newborns, and with skilled personnel, following established criteria for transfer. **Why**: To reduce complications and neonatal mortality. **How long to treat**: Throughout the transport process.
8. Treating neonatal sepsis with a single daily dose of gentamicin	**When:** When neonatal sepsis is suspected. **How**: Gentamicin, 4 mg/kg, one dose daily, IV or IM, for 7-10 days. **Why**: To reduce complications and neonatal mortality. **How long to treat**: 7-10 days.
9. Treating respiratory distress syndrome (RDS) with natural surfactant	**When:** When hyaline membrane disease is suspected in a preterm newborn. **How**: *Artificial surfactant*: 4 mL/kg per dose, IT. *Synthetic surfactant*: 5 mL/kg per dose, IT. **Why**: To reduce complications and neonatal mortality. **How long to treat**: Repeat the dose according to how the condition evolves.
10. Neonatal screening to detect congenital hypothyroidism, galactosemia, phenylketonuria, and cystic fibrosis.	**When**: Between days 4 and 7 of extrauterine life. **How**: Blood drawn from the newborn (heel). **Why:** Early diagnosis to prevent sequelae in intellectual and somatic development. **How long to treat**: Immediately upon diagnosis.
11. Preventing tuberculosis and hepatitis B	**When**: Before discharge. **How**: BCG and hepatitis B vaccine. [TN: that doesn't answer the question of "detecting," which the running text does touch on] **Why:** To prevent sequelae and neonatal mortality. **How long to treat**: BCG: once only; hepatitis B: first dose.
12. Detecting and treating retinopathy of prematurity (ROP) in the newborn	**When**: At 4-6 weeks of age. **How**: Ophthalmological evaluation and laser photocoagulation treatment. **Why**: To prevent blindness. **How long to treat:** Depends on degree of ROP.
13. Early home visits for newborn care	**When**: On days 1, 3, and 7 after birth. **How**: Evaluate basic neonatal care and check key practices. **Why**: To detect neonatal morbidity and support exclusive breastfeeding.
14. Supine sleeping position sudden infant death syndrome (SIDS)	**When**: Always up to 1 year of age. **How**: By ensuring that the baby sleeps on its back. **Why**: To reduce the possibility of sudden death.
15. Exclusive breastfeeding	**When:** From first hour after birth. **How**: Eight times or more per 24 hours, day and night. **Why**: To foster bonding, reduce neonatal infection, and provide psychological, economic, and environmental benefits. **How long to treat**: Continue exclusive breastfeeding until 6 months old.
15. Lactancia materna exclusiva	**Cuándo:** Desde la primera hora después de nacer. **Cómo**: Ocho veces o más en 24 horas, de día y de noche. **Por qué**: Favorece apego, disminuye infecciones neonatales, así como beneficios psicológicos, económicos y al medio ambiente. **Cuánto tiempo tratar**: En forma exclusiva hasta los 6 meses de edad.

Early skin-to-skin contact (at any time from 1 to 24 hours after birth) has been shown to have statistically significant positive effects on the continuation of breastfeeding 1 to 4 months after birth, and to be associated with more optimal duration of breastfeeding.

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III. Interventions during delivery

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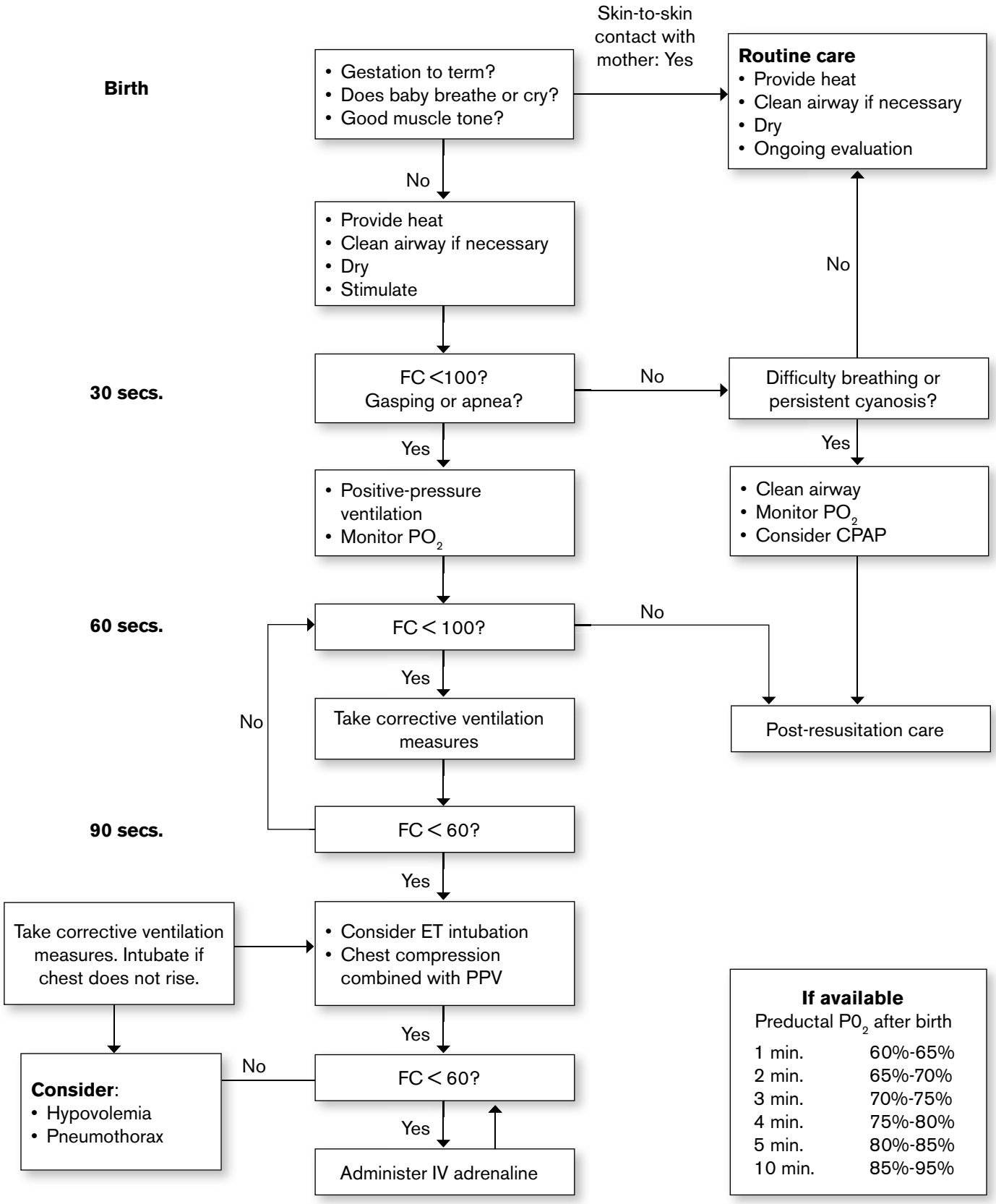
VIII. Annexes

Recommendations of the World Health Organization (WHO)

- Each woman has a fundamental right to receive proper prenatal care, and plays a central role in all aspects of this care, including participation in the planning, carrying out and evaluation of the care; and social, emotional and psychological factors are decisive in the understanding and implementation of proper prenatal care.
- Information about birth practices in hospitals (rates of cesarean sections, etc.) should be given to the public served by the hospitals.
- There is no justification in any specific geographic region to have more than 10-15% cesarean section births.
- There is no evidence that routine electronic fetal monitoring during labor has a positive effect on the outcome of pregnancy.
- There is no indication for pubic shaving or a pre-delivery enema.
- Pregnant women should not be put in a lithotomy (flat on the back) position during labor or delivery. They should be encouraged to walk during labor and each woman must freely decide which position to adopt during delivery.
- The systematic use of episiotomy (incision to enlarge the vaginal opening) is not justified.
- Birth should not be induced (started artificially) for convenience and the induction of labor should be reserved for specific medical indications. No geographic region should have rates of induced labor over 10%.
- Artificial early rupture of the membranes, as a routine process, is not scientifically justified.
- The healthy newborn must remain with the mother whenever both their conditions permit it. No process of observation of the healthy newborn justifies a separation from the mother.
- The immediate beginning of breastfeeding should be promoted, even before the mother leaves the delivery room.

Neonatal resuscitation flowchart (AAP 2010)



Evaluate and determine risk before pregnancy

ASK

- How old are you?
- Do you have a stable partner?
- Do you have sexual relations?
- Do you and your partner use some method of family planning?
- Have you had vaginal discharge?
- Do you use alcohol, tobacco, or drugs?
- Have you had contact with insecticides or chemicals?
- If there have been previous pregnancies, investigate history of: perinatal deaths, low birthweight, premature birth, abortions, congenital malformations of the neural tube (CMFNTs)
- Have you had any chronic disease?
- Have you been the victim of any type of violence?

DETERMINE OBSERVE

- Weight
- Size
- BMI
- Hb
- STI
- Discharge
- Pallor
- Oral cavity (pain, bleeding, inflammation, halitosis, caries)
- Vaccination series

Risk factors for malformations of the neural tube:
Exposure to anticonvulsive drugs, maternal diabetes, low socioeconomic level, maternal malnutrition, deficiency of folic acid, maternal hyperthermia, genetic factors, agricultural work, exposure to pesticides, occupational type, contact with pesticides during pregnancy.

Classify

EVALUATE	CLASSIFY	TREAT
One of the following signs: • < 19 years old • BMI < 18.5 or > 29.9 • Hb < 7 g/dl or intense pallor • Untreated sexually transmitted infections (STI) • Previous disease brought under control • Alcohol, tobacco, or drug use • High risk for malformations of the neural tube	**PREGNANCY NOT ADVISED, or delay advised**	1. Transfer if necessary, or treat if able. 2. Control existing disease. 3. Provide nutritional counseling. 4. Seek cause and treat anemia with iron. 5. Congenital anomalies and neural tube defects: folic acid, 4-5 mg orally daily. 6. Deparasitize with albendazole. 7. Provide family planning. 8. If positive VDRL test:, administer benzathine benzylpenicillin, 2.4 mill IU, IM.
• 35 or older • BMI > 25.0 • Hb between 7 and 12 g/dl or moderate pallor • Previous disease brought under control • Oral health problems • Exposed to chemicals or insecticides • Perinatal death, low birthweight, premature birth, previous abortion • Previous birth defects • Multiple sexual partners • Not using family planning • STI under treatment	**IN A POSITION TO BECOME PREGNANT BUT WITH RISK FACTORS**	1. Nutritional counseling and adequate diet. 2. Give iron. 3. Folic acid, 1.0 mg daily orally 3 months before pregnancy. 4. Deparasitize with albendazole. 5. Provide family planning. 6. Personal hygiene. 7. Oral prophylaxis and treatment. 8. Counsel on prevention of breast and cervical cancer (HPV vaccination).
• Age 19-35 • BMI between 18.5 and 24.9 • Hb 12 g/dl, or no pallor • VDRL negative • HIV negative	**IN A POSITION TO BECOME PREGNANT**	1. Give folic acid, 1.0 mg/day orally 3 months before pregnancy. 2. Family planning. 3. Personal hygiene. 4. Oral hygiene. 5. Counsel on prevention of breast and cervical cancer (HPV vaccination). 6. Counsel on healthy lifestyle: nutrition, exercise, prevention of exposure to toxic substances and infection.

Evaluate and determine risk during pregnancy

DETERMINE SIGNS AND SYMPTOMS OF DANGER

ASK

- How old are you?
- Have you had a prenatal check-up? How many times?
- When was your last delivery?
- Have deliveries been natural or via caesarean section?
- How many pregnancies have you had?
- Have you had premature or low birthweight children?
- Have you had children with malformations?
- Have you had a child die before birth or during the first week of life?
- Do you feel the baby move?
- Have you had a fever?
- Have you had vaginal discharge?
- Do you have any disease? What?
- Have they given you any drugs? What?
- Have you lost consciousness?
- Do you smoke, drink, or use drugs?

DETERMINE

- Probable delivery date
- Gestational age
- Weight
- Size
- BMI
- Uterine height
- Multiple gestation
- Previous caesarean section
- Blood pressure
- Intense palmar pallor
- Swelling in face, hands, and/or legs
- Signs of systemic and/or sexually transmitted disease
- Immunization with tetanus toxoid
- Condition of oral cavity (bleeding, inflammations

Determine:

- Hb, HIV and hepatitis B status
- VDRL test at first visit and before delivery
- Blood group, Rh, and Coombs test
- Blood glucose
- Urine culture or reactive strips

Classify

EVALUATE	CLASSIFY	TREAT
Presence of any of the following signs: • Pregnancy over 41 weeks • Diminished or absent fetal movement • Severe systemic disease • Urinary infection with fever • Uncontrolled diabetes • Uncontrolled hypertension and/or convulsions, blurred vision, loss of consciousness, or intense cephalia • Severe palmar pallor and/or Hb < 7 g/dL • PROM before 37 weeks	**PREGNANCY WITH IMMINENT RISK**	1. **Refer URGENTLY facility offering more complex services.** 2. Treat hypertension. 3. In case of PPROM, administer initial dose of erythromycin, 250 mg orally. 4. If GA age is between 26 and 36 weeks, administer initial dose of prenatal steroids.
One of the following signs: • Under 19 years or over 35 years old • First pregnancy or large multiple fetuses • Without prenatal check-up • Period between pregnancies < 2 years • Uterine height does not correlate with gestational age • Previous caesarean section • Background of premature, low birthweight, and/or malformed children • Background of early miscarriage, fetal or neonatal death • Controlled systemic disease • Urinary infection without fever • Controlled diabetes • Moderate palmar pallor and/or Hb 8-10 g/dL • Vaginal discharge • Teratogenic drug intake • Alcoholism, smoking, or drug addiction • Controlled hypertension • Inadequate weight gain • Abnormal presentation • Multiple gestation • Mother Rh negative • Positive VDRL, HIV, or hepatitis B test • Oral health problems • Not immunized with tetanus toxoid	**HIGH-RISK PREGNANCY**	1. **Refer for consultation by specialist.** 2. In case of multiple gestation, refer before 30 weeks of gestation. 3. If VDRL test is positive, initiate treatment with benzathine penicillin. 4. Advise the mother to continue with the treatment instituted. 5. Administer iron, folic acid, and multivitamins. 6. If there is a history of hypertension, administer calcium + aspirin (100 mg/day) supplement. 7. Administer tetanus toxoid. 8. In areas of high prevalence, administer albendazole. 9. Provide HIV/AIDS-STI counseling. 10. Decide on reconsultation. 11. Provide counseling on nutrition, pregnancy care, and breastfeeding. 12. Teach warning signs. 13. Plan for referral with the family as risk factors and response capacity dictate.
• Pregnancy without imminent or high risk	**LOW-RISK PREGNANCY**	• Teach warning signs. • Plan with the family for delivery in the health care facility. • Monitor throughout pregnancy. • Provide counseling on nutrition, pregnancy care, puerperium, breastfeeding, and vaccines for the infant. • Provide HIV/AIDS counseling. • Advise the mother to continue with the treatment instituted. • Administer iron, folic acid, and multivitamins. • Administer tetanus toxoid.

Evaluate and determine risk during delivery

DETERMINE SIGNS AND SYMPTOMS OF DANGER

ASK	***DETERMINE***
• When was your last menstruation? • Have you had labor pains? • Have you had vaginal bleeding? • Have you had vaginal discharge? What color? • Have you had severe headache? • Have you had blurred vision? • Have you had convulsions?	• Blood pressure • Temperature • Presence of contractions within 10 minutes • Fetal heart rate • Cervical dilation and appearance • Swelling in face, hands, and/or legs • Vaginal bleeding now or earlier

Determine:
- Hb, Ht, VDRL test, HIV, hepatitis B
- Blood typing, Coombs test

ASK ALL MOTHERS WHETHER
THEY HAVE THEIR PERINATAL CARD

Classify

EVALUATE	CLASSIFY	TREAT
Presence of any of the following signs: • Labor in progress at less than 37 weeks • Vaginal bleeding • Premature rupture of membranes (PROM) > 12 hours • Uncontrolled hypertension and/or convulsions, blurred vision, loss of consciousness, or intense headache • Changes in fetal heart rate (FHR) (<120 or >160/ minute) • Abnormal fetal presentation in labor • Swelling in face, hands, or legs	**PREGNANCY WITH IMMINENT RISK**	1. **Refer URGENTLY to a facility that offers more complex care, with the patient lying on her left side.** 2. Prevent hypotension. 3. Treat hypertension. 4. In cases of premature labor, inhibit contractions with nifedipine and administer corticoids (betamethasone or dexamethasone). 5. In cases of PROM, administer the first dose of the appropriate antibiotic. 6. In cases of PPROM, administer the first dose of erythromycin, 250 mg orally. 7. If possible, administer oxygen.
One of the following signs: • Mother Rh negative • Positive VDRL, HIV, or hepatitis B test	**HIGH-RISK DELIVERY**	1. **Refer for consultation by specialist.** 2. If VDRL test is positive, begin benzathine penicillin treatment. 3. Provide HIV/AIDS-STI counseling 4. Decide on reconsultation. 5. Provide counseling on nutrition, pregnancy care, oral hygiene, and breastfeeding. 6. Teach warning signs.
• Pregnancy without imminent or high risk	**LOW-RISK DELIVERY**	• Indicate that the patient should walk freely during labor, and provide for oral rehydration. • Conduct normal delivery with active birth and late clamping of the cord. • Counsel on warning signs during puerperium. • Provide HIV/AIDS counseling.

BMI: Body Mass Index

Height (m)	Weight in kg																			
	45	**48**	**51**	**54**	**57**	**60**	**63**	**66**	**69**	**72**	**75**	**78**	**81**	**84**	**87**	**90**	**93**	**96**	**99**	**101**
1.50	20	21	23	24	25	27	28	29	31	32	33	35	36	37	39	40	41	43	44	45
1.53	19	21	22	23	24	26	27	28	29	31	32	33	35	36	37	38	40	41	42	44
1.56	18	20	21	22	23	25	26	27	28	30	31	32	33	35	37	37	38	39	41	42
1.59	18	19	20	21	23	24	25	26	27	28	30	31	32	33	34	36	37	38	39	40
1.62	17	18	19	21	22	23	24	25	26	27	29	30	31	32	33	34	36	37	38	39
1.65	17	18	19	20	21	22	23	24	25	26	28	29	29	31	32	33	34	35	36	37
1.68	16	17	18	19	20	21	22	23	24	26	27	28	29	30	31	32	33	34	35	36
1.71	15	16	17	18	19	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35
1.74	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34
1.77	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33
1.80	14	15	16	17	18	19	19	20	21	22	23	24	25	26	27	28	29	30	31	31
1.83	13	14	15	16	17	18	19	20	21	21	22	23	24	25	26	27	28	29	30	30
1.86	13	14	15	16	16	17	18	19	20	21	22	23	23	24	25	26	27	28	29	29
1.89	13	13	14	15	16	17	18	18	19	20	21	22	23	24	24	25	26	27	28	29
1.92	12	13	14	15	15	16	17	18	19	20	20	21	22	23	24	24	25	26	27	28
1.95	12	13	13	14	15	16	17	17	18	19	20	21	21	22	23	24	24	25	26	27
1.98	11	12	13	14	15	15	16	17	18	18	19	20	21	21	22	23	24	24	25	26

$BMI = WEIGHT/HEIGHT^2$

Underweight:	BMI < 18.5
Normal:	BMI of 18.5–24.9
Overweight:	BMI of 25.0–29.9
Obese:	BMI ≥ 30.0

Source: World Health Organization - WHO 1998

Pan American Health Organization

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