



**Effective Perinatal Care (EPC)**

# **Midwifery/Obstetrical Care**



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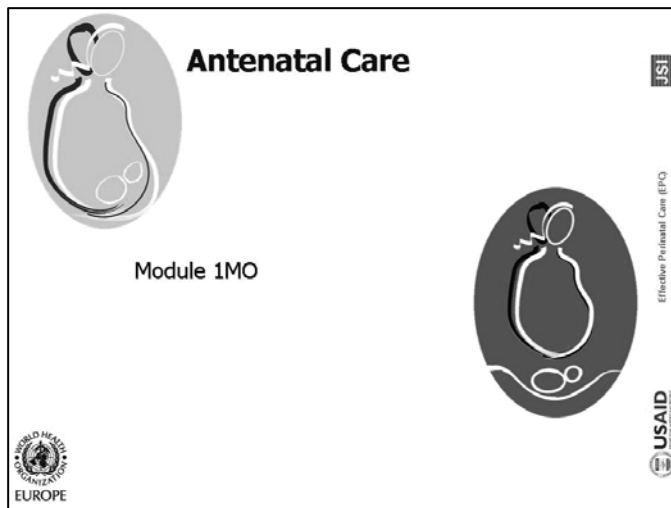
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## **Antenatal Care**





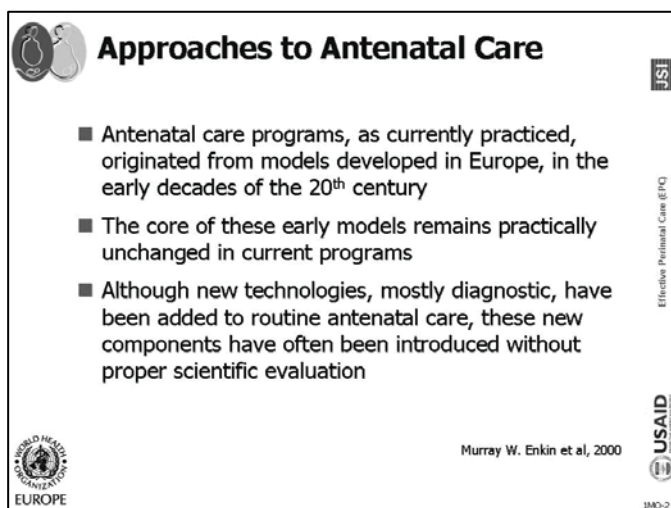
### Slide 1MO-1 Antenatal Care

The goals of this module are to:

- Understand the purpose and importance of antenatal care
- Know the main principles of antenatal care, based on best evidence
- Be able to explain the importance of visits to a medical establishment before pregnancy and in the antenatal period
- Know which tests to conduct during antenatal care
- Describe a problem-oriented approach as an alternative to traditional routine risk assessment and explain its advantages

tional routine risk assessment and explain its advantages

- Be able to prioritize care in critical situations including the involvement of the woman and/or her family in decision-making.



### Slide 1MO-2 Approaches to Antenatal Care

- Antenatal care programs, as currently practiced, originated from models developed in Europe, in the early decades of the 20<sup>th</sup> century
- The core of these early models remains practically unchanged in current programs
- Although new technologies, mostly diagnostic, have been added to routine antenatal care, these new components have often been introduced without proper scientific evaluation

Murray W. Enkin et al, 2000

Antenatal care programmes were developed to find ways of lowering maternal and perinatal mortality, as well as perinatal morbidity. In the course of time, medical science development and technological expansion contributed new technologies to existing programmes; however, these innovations are often introduced without sufficient efficiency and safety evidence.

There exist a series of important issues concerning antenatal care, including the

type of care that should be provided to all women, and the requirements of women who have difficulties or complications that emerged during pregnancy.

Other issues covered in antenatal care programmes include the frequency of antenatal clinic visits, what services can be offered to women during each visit, and which examinations/tests can be provided. Quality of care is of paramount importance; therefore it is essential to know women's opinion on provided care.

*Murray W. Enkin et al. A guide to effective care in pregnancy and childbirth. Third edition, Oxford University Press, 2000*

**The Aims of Antenatal Care**

- Educate, advise and support the pregnant woman and her partner/family
- Provide preventive interventions
- Screen throughout pregnancy for signs of abnormality
- Refer to appropriate levels of care if problems arise
- Deal with minor pregnancy-associated problems

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### Slide 1MO-3 The Aims of Antenatal Care

The aim of antenatal care is to assist a woman in staying healthy and thus enhance the health and wellbeing of her unborn baby and herself. Antenatal care also means providing assistance and support to a pregnant woman and her partner or family to help them in their transition to parenthood. This means that medical personnel should not only provide care, but also inform and educate a pregnant woman and her partner or family.

*“Three important opportunities during antenatal care should not be missed: 1) promote healthy lifestyles that improve long-term health outcomes for the woman, her unborn child, and possibly her family; 2) Establish a birth plan with the woman and her family; and 3) Prepare mothers and partners for parenting and for what will happen after the birth” (adapted from the WHO World Health Report, 2005, Chapter 3, p 3).*

There exists a series of important issues concerning antenatal care, including (1) the type of care that should be provided to all women and (2) what are the requirements of women having difficulties or complications that emerge during pregnancy. Other issues cover frequency of antenatal clinic visits, what services can be offered to women during each visit, which examinations/tests can be provided.

Quality of care is of paramount importance; therefore it is important to know women’s opinion on provided care.

*Essential Antenatal, Perinatal and Postpartum Care. WHO, Copenhagen, 2002*

**Role of the Health Workers in Antenatal Clinics**

- Promote health activities and prevent illness
- Provide curative services
- Liaise with other services such as specialist care and antenatal education
- Teach woman both knowledge and skills regarding her own health care
- Become a supportive provider who is approachable and willing to listen to the woman’s needs and to assist with any concerns she or her family may have about the pregnancy, birth or postpartum period

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### Slide 1MO-4 Role of the Health Workers in Antenatal Clinics

The role of a health professional in antenatal care is to:

- Support psychological adaptation towards pregnancy, delivery, breast feeding and parental role
- Follow pregnancy in order to secure health and well-being of both mother and her foetus
- Examine all women in order to detect signs of obstetric complications
- Provide women with important information regarding their health: salubrious nutrition, giving up smoking, HIV prevention, family planning, abuse prevention.

Granting women with more self-control opportunities during pregnancy fully corresponds to their desires and needs.

Two small trials have evaluated allowing women to carry their own case-notes. This simple reversal of the usual practice had no apparent harmful effects, and was associated with an increased likelihood of feeling in control during pregnancy. The results of these trials suggest that



consideration should be given to a policy of allowing women to carry their own records during pregnancy, and also that other forms of care, which offer women greater control during the childbearing period, should be evaluated.

First of all, it is essential to inform the woman about symptoms during pregnancy that might indicate emergence of pregnancy complications. Antenatal courses are of great importance in providing a woman and her family with information about pregnancy and birth .

*Murray W. Enkin et al. A guide to effective care in pregnancy and childbirth. Third edition, Oxford University Press, 2000*

**Background for Development of a New WHO Model of Antenatal Care**

- Four antenatal visits of proper quality are sufficient to ensure good perinatal outcome. Increased number of visits does not lead to better quality of care
- Many women feel uncomfortable with unnecessary visits
- Too many visits can often waste scarce resources, which could be used more effectively
- Women prefer to be monitored by a midwife or a general practitioner, rather than a specialist and this does not worsen perinatal outcomes

Villar J, Bergsjo J., 2002

**Slide 1MO-5 Background for Development of a New WHO Model of Antenatal Care**

Antenatal examinations are required to secure mother’s health and foetal well-being. Time and the number of antenatal visits depend upon the woman herself.

Traditional approach: monthly visits to antenatal clinic from the day of first visit until 28 weeks of pregnancy, then once in two weeks until week 36, followed by weekly visits until delivery. However, last studies indicate that higher numbers of appointed visits for women with a normal pregnancy

is not necessary.

*Villar J, Bergsjo J. WHO Antenatal Care Randomized Trial: Manual for the Implementation of the New Model. Geneva, World Health Organization (WHO), 2002*

**New WHO Schedule for Antenatal Visits**

- First observation – before Week 12
- Second observation – Week 26
- Third observation – Week 32
- Fourth observation – Week 38

Villar J, Bergsjo J., 2002

**Slide 1MO-6 New WHO Schedule for Antenatal Visits**

The slide presents minimal effective programme of antenatal care, offered by World Health Organization in 2001.

All randomized controlled studies revealed absence of significant difference between state of health and satisfaction level of women after five visits as compared to eight.

*Villar J, Bergsjo J. WHO Antenatal Care Randomized Trial: Manual for the Implementation of the New Model. Geneva, World Health Organization (WHO), 2002*

**Number of Antenatal Visits in Selected Countries of Eastern Europe**

■ Armenia - 8	■ Lithuania - 5
■ Moldova - 6	■ Russia - 13 - 16
■ Georgia - 4	■ Kazakhstan - 4 - 14
■ Ukraine - 13	

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**Slide 1MO-7 Number of Antenatal Visits in Selected Countries of Eastern Europe**

Different countries, depending on their level of development and available resources, choose an acceptable system of antenatal care (preferably taking women’s requests into account).

**The Number of Antenatal Visits**

- The key factor is not the number of antenatal visits, but rather performing procedures of proven effectiveness, which may increase a woman’s satisfaction with care

Murray W. Enkin et al, 2000  
WHO EURO, 2002

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**Slide 1MO-8 Number of Antenatal Visits**

Foundations of antenatal care:

- Any intervention into the natural pregnancy and birth process-flow must be justified to be of benefit rather than harm
- Any method restricting mother’s independence, her freedom of choice, and access to her baby, requires absolute proof that such practice is of benefit rather than harm.

*Essential Antenatal, Perinatal and Postpartum Care. WHO, Copenhagen, 2002*

*Murray W. Enkin et al. A guide to effective care in pregnancy and childbirth. Third edition, Oxford University Press, 2000*

**Care in Early Pregnancy**

- Most abnormalities that may affect the foetus are already present by 12<sup>th</sup> week
- Additional intake of folic acid reduces the risk of severe central nervous system lesions by 50%

WHO EURO, 2002

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**Slide 1MO-9 Care In Early Pregnancy**

Getting help before pregnancy and during the early antenatal stage is very important to the woman. This fact requires special attention and the key point is for a woman to request medical pregnancy supervision as soon as possible. The importance of consulting before pregnancy is evident. Fetal deviations can be detected during antenatal supervision, however prophylactic measures taken before conception may help avoiding a number of such deviations. For instance, it is hard to have influence on frequency of preterm delivery during pregnancy, yet it is much easier

before pregnancy. Prescription of folic acid to prevent defects of neuraxis development, adequate health assessment, and proper consulting of women with diabetes mellitus before pregnancy must be timely. In addition, recommendations could be given on salubrious nutrition and behavioural changes (e.g. for smoking women).

**Recommended Procedures for Routine Examination**

- Blood pressure measurement
- Urine analysis
- Dynamic measurement of symphysis-fundal distance
- Feet examination to diagnose varicose veins and oedema
- Rh-factor verification
- Blood test (blood group, haemoglobin level)
- One time ultrasonography (during Week 18-20) to identify possible foetal malformations
- Estimation of body weight index (BWI) during the first visit

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1MO-10

### Slide 1MO-10 Recommended Procedures for Routine Examination

It is constantly argued which tests and procedures should be conducted during pregnancy and when should they be conducted. Studies showed that many of the common examinations are useless which in turn brought up the issue of limiting the number of useless tests conducted during pregnancy. Besides, treatment of pregnancy complications should be outpatient, except for unavoidable cases that require in-patient treatment. Some tests, however, are vitally necessary.

**Arterial blood pressure:** Should be measured during every visit to detect hypertension symptoms.

**Urine test:** Should be conducted during patient registration at the medical establishment to determine bacteria presence for screening diagnostics of asymptomatic bacteriuria. During further visits urine analyses for proteinuria should be conducted.

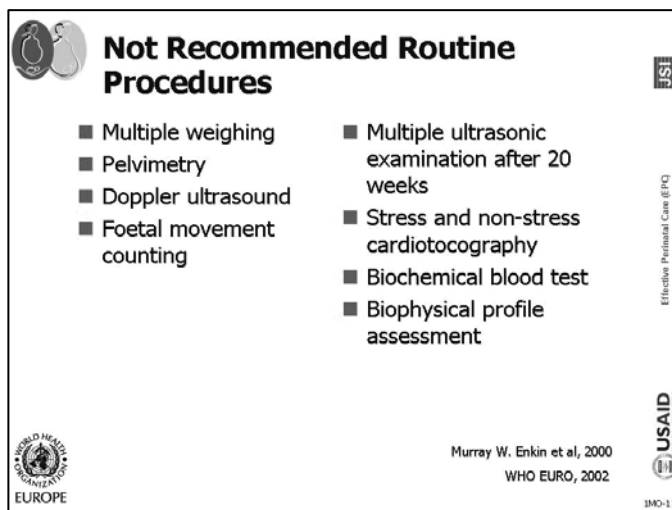
**Legs examination:** Legs should be examined during every visit to diagnose varicose veins. Women who stand for long periods or who do heavy manual work may benefit from advice on exercises for their legs. However, oedema (except for massive or quickly arising face or lower back oedemata) should not be considered as pathological state indicators, since lower limb oedema is present in a majority of normal pregnancies.

**Rh-factor verification:** It is necessary to determine Rh-factor and antibodies presence, as well as prepare to introduce anti-D-gamma globulin for women with Rh-negative (1) after any procedure or event which may lead to foetomaternal transfusion, (2) during Week 28 of pregnancy, and (3) after delivery.

**Blood test (blood grouping and haemoglobin level):** Blood test should be conducted in early pregnancy to determine group and type if they were not known before. Haemoglobin level must be measured at least once during pregnancy, preferably around Week 32.

*Murray W. Enkin et al. A guide to effective care in pregnancy and childbirth. Third edition, Oxford University Press, 2000*

*Essential Antenatal, Perinatal and Postpartum Care. WHO, Copenhagen, 2002*



**Not Recommended Routine Procedures**

- Multiple weighing
- Pelvimetry
- Doppler ultrasound
- Foetal movement counting
- Multiple ultrasonic examination after 20 weeks
- Stress and non-stress cardiotocography
- Biochemical blood test
- Biophysical profile assessment

Murray W. Enkin et al, 2000  
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## Slide 1MO-11 Not Recommended Routine Procedures

**Multiple weighing:** Recent studies indicate that measurement of gained weight during every visit is unjustified and there is no need in advising women to limit nutrition for slower gain of weight.

**Pelvimetry:** It was proven, that neither clinical nor roentgenological pelvimetry have sufficient prognostic value to determine size discrepancy of foetus' head and mother's pelvis and thus justify scheduled cesarean section in case of cephalic presentation. Consequently, these proce-

dures have no value for routine antenatal care.

**Doppler ultrasound:** Assessing the fetal heart pulsation appears to have little, if any effect on pregnancy outcome when used as a screening test in unselected pregnancies. However Doppler ultrasound use in high-risk pregnancies (complicated mainly by foetal growth retardation or maternal high blood pressure) shows that there are fewer stillbirths and neonatal deaths among normally formed babies when the results of Doppler velocimetry are made available to the clinicians.

**Foetal movement counting:** Conducted studies do not testify that routine foetal movement counting contributes to lower probability of intrauterine foetal death during late pregnancy period.

**Multiple ultrasonic examinations after 20 weeks:** Expediency of routine ultrasonic examinations of women during pregnancy is not currently proven.

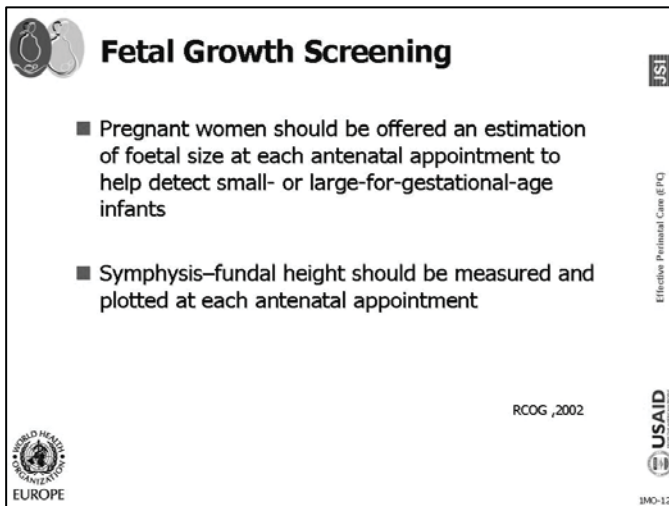
**Stress and non-stress cardiotocography:** According to the available data, there is no evidence of antenatal cardiotocography advisability as a means for additional assessment of foetus' well-being -- only during high-risk pregnancies .

**Biochemical investigation:** (e.g. estriol level analysis) has no clinical value.

**Biophysical profile analysis:** Has some prognostic significance, but does not lead to improved results.

*Murray W. Enkin et al. A guide to effective care in pregnancy and childbirth. Third edition, Oxford University Press, 2000*



*Essential Antenatal, Perinatal and Postpartum Care. WHO, Copenhagen, 2002*



## Fetal Growth Screening

- Pregnant women should be offered an estimation of foetal size at each antenatal appointment to help detect small- or large-for-gestational-age infants
- Symphysis–fundal height should be measured and plotted at each antenatal appointment

RCOG ,2002

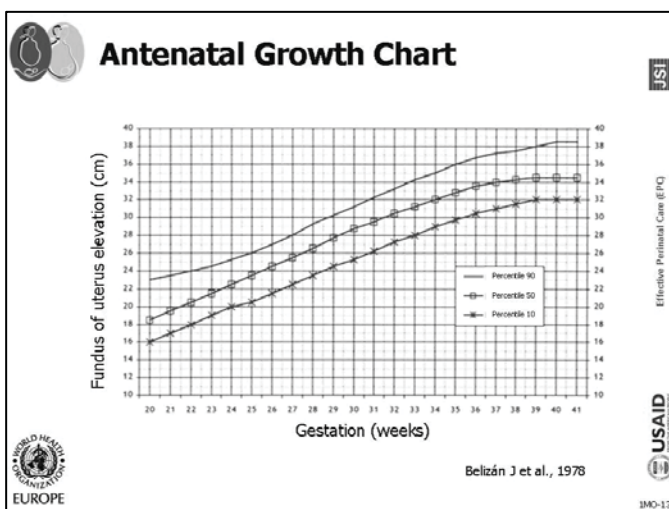
### Slide 1MO-12 Fetal Growth Screening

Fundal height (FH) measurement has limited diagnostic accuracy to predict an SGA neonate. Use of a customised fundal height chart improves accuracy to predict an SGA fetus. A series of measurements (fundal-symphysial height measurement chart) increases sensitivity and specificity of this method.

Special charts customized by weight, height, nationality, parity, etc., increase sensitivity up to 49%.

*Royal College of Obstetricians and Gynaecologists. The investigation and management of the small for gestational age fetus. November 2002.*

*Gardosi, Jason & Francis, Andre. Controlled trial of fundal height measurement plotted on customised antenatal growth charts. BJOG, 106, 309-317, 1999.*



### Slide 1MO-13 Antenatal Growth Chart

Fundal-symphysial height measurement with a tape-line and marking its dynamics on a gravidogram is a simple and inexpensive method-of-choice for antenatal care. This method allows diagnosing small or large foetus size for the corresponding gestational age, however it does not always indicate pathology.

*Belizán J et al. Diagnosis of intrauterine growth retardation by a simple clinical method: measurement of uterine height. American Journal of Obstetrics and Gynecology, 1978, 131, 643–646.*

### Screening for Foetal Abnormalities

- Structural abnormalities screening
- Ultrasonography is recommended to detect structural abnormalities; the usual choice of its performing between 18 and 20 weeks is in effect a trade-off
- It is desirable that ultrasonography screening for structural abnormalities is performed by an experienced ultrasound specialist using standard equipment

Murray W. Enkin et al, 2000

### Slide 1MO-14 Screening for Fetal Abnormalities

The only thing that can be worse than ultrasonic investigation absence is a poor ultrasonic investigation. There is no evidence of ultrasonic investigation benefits after Week 24 and it is therefore not recommended (level A).

*Murray W. Enkin et al. A guide to effective care in pregnancy and childbirth. Third edition, Oxford University Press, 2000*

### Definition of "Obstetric Risk"

- "Obstetric risk" is the probability of complications that might arise during pregnancy, delivery, and postpartum period

### Slide 1MO-15 Definition of 'Obstetric Risk'

The risk concept is based on 3 assumptions:

- Certain groups of women have a higher death probability during childbirth
- There exists an opportunity to detect women prone to such risk
- If these women are detected, fatal outcomes can be prevented.

### Benefits of Risk Identification

- Opportunity to predict complications – which predisposing factors evolve into risks?
- Is it possible to detect women with these risk factors?
- Are there any possibilities to prevent emergence of these complications?

### Slide 1MO-16 Benefits of Risk Identification

Currently a series of indicators are used to identify signs that make the need of more thorough antenatal care evident. It should be noted, however, that women with such signs may have complication-free pregnancy and birth, while unexpected complications may develop for women without these symptoms.

Latest studies call for attentive and solicitous attitude towards all women regardless of whether they belong to the risk-group or not.

**Difficulties in Identifying Risks**

- Three questions to ask ourselves considering "risk approach":
  - Do we know risk factors?
  - Are we able to identify all women with these factors?
  - Are we able to offer evidence-based effective interventions to prevent effect of these factors?

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**Slide 1MO-17 Difficulties in Identifying Risks**

Risk assessment is more precise for the second and subsequent pregnancies.

The most accurate estimates can be made during late periods of pregnancy.

Many factors are only markers, which testify statistically reliable correspondence to prognosis.

**Case Study 1: Anna, 22 years**

- Came to antenatal clinic with amenorrhea
- History
  - Second pregnancy - gestational age 10 weeks
  - 1<sup>st</sup> delivery by caesarean section due to pelvis and head disproportion (foetus weight: 4.500 kg)
  - No postoperative complications, the child grows normally
  - Chronic pyelonephritis, severe myopia

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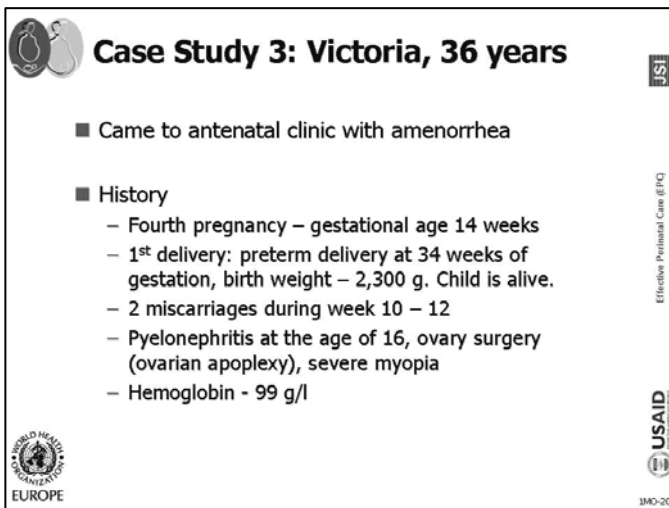
**Slide 1MO-18 Case Study 1: Anna, 22 years**

**Case Study 2: Anna, 22 years**

- Came to antenatal clinic with amenorrhea
- History
  - Second pregnancy - gestational age 38 weeks
  - 1<sup>st</sup> delivery by caesarean section due to pelvis and head disproportion (foetus weight: 4.500 kg)
  - No postoperative complications, the child grows normally
  - Chronic pyelonephritis, severe myopia

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**Slide 1MO-19 Case Study 2: Anna, 22 years**

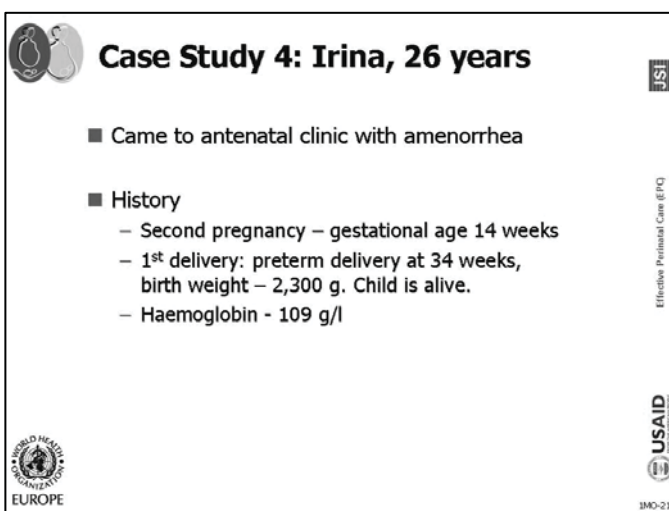


**Case Study 3: Victoria, 36 years**

- Came to antenatal clinic with amenorrhea
- History
  - Fourth pregnancy – gestational age 14 weeks
  - 1<sup>st</sup> delivery: preterm delivery at 34 weeks of gestation, birth weight – 2,300 g. Child is alive.
  - 2 miscarriages during week 10 – 12
  - Pyelonephritis at the age of 16, ovary surgery (ovarian apoplexy), severe myopia
  - Hemoglobin - 99 g/l

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**Slide 1MO-20 Case Study 3: Victoria, 36 years**

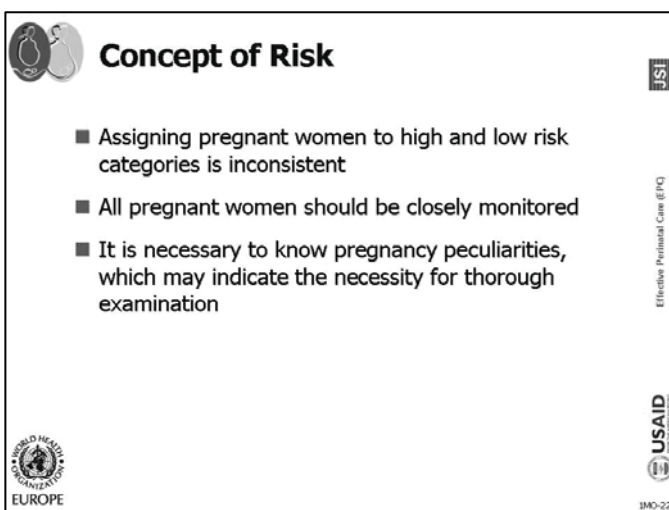


**Case Study 4: Irina, 26 years**

- Came to antenatal clinic with amenorrhea
- History
  - Second pregnancy – gestational age 14 weeks
  - 1<sup>st</sup> delivery: preterm delivery at 34 weeks, birth weight – 2,300 g. Child is alive.
  - Haemoglobin - 109 g/l

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**Slide 1MO-21 Case Study 4: Irina, 26 years**



**Concept of Risk**

- Assigning pregnant women to high and low risk categories is inconsistent
- All pregnant women should be closely monitored
- It is necessary to know pregnancy peculiarities, which may indicate the necessity for thorough examination

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**Slide 1MO-22 Concept of Risk**

Employment of traditional systems for risk assessment often leads to unjustified specialized care, while women with severe complications oftentimes lack such care.

Until recently antenatal care was for the purpose of detecting women that belong to a risk group, while now we realize that it is not always possible to determine factors leading to mother's death. A more realistic approach to antenatal care is ensuring proper supervision and attention. Notably, close health supervision of every

woman is required. This is an "alternative path" of the initial approach to maternity care.

WHO does not recommend traditional systems for risk assessment. Vigilant approach to all pregnant women is recommended. This does not mean that all women should belong to a risk group; conversely, they should all be attributed to a group with a normal pregnancy process, unless there appear explicit indicators in evidence of existing complications.



**"Traditional" Approach to Risk Assessment**

- High rate of false-positive and false-negative results
- Poor pregnancy outcomes are observed among only 10 to 30% of women attributed to the risk group

Murray W. Enkin et al, 2000

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**Slide 1MO-23 "Traditional" Approach to Risk Assessment**

From 20 to 50% of women that had pre-term delivery or gave birth to children with low body weight were attributed to a low risk-level group during initial risk assessment.

*Murray W. Enkin et al. A guide to effective care in pregnancy and childbirth. Third edition, Oxford University Press, 2000*

**WHO Does Not Recommend Traditional Scoring Systems for Risk Assessment**

- Evidence has shown that the traditional classification of women using the criteria of low, medium and high risk is inefficient for predicting complications during pregnancy and delivery

Murray W. Enkin et al, 2000  
WHO EURO, 2002

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**Slide 1MO-24 WHO Does Not Recommend Traditional Scoring Systems for Risk Assessment**

Every pregnancy has a risk probability. There is always a probability for the process to go worse; however, one should not look at pregnancy pessimistically.

Pregnancy should initially be accepted as a physiologically normal phenomenon, until there is clear evidence to the contrary.

As previously noted, a review of the medical literature indicates that there is defi-

nitely scope for reducing the number of antenatal visits and for altering the professional seen from the more highly trained (and therefore more expensive) obstetrician to the midwife or family doctor.

It is very important for all providers to identify complications that are serious and/or life-threatening, since detection of serious complications and obtaining the appropriate level of care is one of the primary functions of antenatal care. However applying a medical model to all pregnant women is disadvantageous. An approach of vigilance for all pregnant women is being advocated.

**AVOID OVERDIAGNOSIS:** this will not be beneficial for a woman or her baby.

*Murray W. Enkin et al. A guide to effective care in pregnancy and childbirth. Third edition, Oxford University Press, 2000*

*Essential Antenatal, Perinatal and Postpartum Care. WHO, Copenhagen, 2002*

**New Approach to Risk Assessment**

- Vigilant approach to all pregnant women
- All women should be attributed to a group with normal pregnancy process unless there appears explicit indicators of harmful or negative symptoms
- Assistance should not be risk-oriented, but rather address resolution of a specific problem

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**Slide 1MO-25 New Approach to Risk Assessment**

After diagnosing a complication, it should be closely reviewed and analyzed to determine potential risk severity for a woman and her foetus, rather than attributing a woman to some risk category.

Risk group classification should not automatically lead to routine treatment procedures for all women.

**Consequences of Traditional Approach to Risk Assessment**

- Provision of unjustified specialized care
- Failure to provide required assistance and to refer women with severe complications to third-level healthcare settings

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**Slide 1MO-26 Consequences of Traditional Approach to Risk Assessment**

It is impossible to predict which woman may develop complications and therefore a formal risk assessment system is ineffective:

- to prevent maternal mortality
- for resources conservation

*Essential Antenatal, Perinatal and Post-partum Care. WHO, Copenhagen, 2002*

**Risk Assessment**

- Over 85% of all pregnancies do not require interventions by the specialists, therefore simple monitoring, and psychological and emotional support should be considered the norm


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**Slide 1MO-27 Risk Assessment**


40% of women develop pregnancy problems, while only 15% require specialized care to treat complications defined as life-threatening.

*Essential Antenatal, Perinatal and Post-partum Care. WHO, Copenhagen, 2002*



## Recommendations

- It should be clear what we are trying to prevent by antenatal care: maternal mortality, infant mortality, or perinatal mortality
- Over diagnosis is the greatest threat. Over and incorrect diagnoses lower medicine's impact
- It is impossible to develop a single risk assessment scoring system to predict many of the different adverse outcomes connected with delivery
- Medical personnel should be flexible and allow women previously at high risk be reclassified as low risk if their symptoms improve



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## Slide 1MO-28 Recommendations

The constant danger of antenatal care is over diagnosis. Incorrect diagnoses lower medicine's significance, especially during the natural pregnancy process, as well as lead to a loss of confidence in the maternity health protection system itself. Still, consequences of underestimation are also dangerous.

Careful approach towards all women and individual care protocols are the major principles that should be followed.

Medical personnel should be flexible in keeping the protocols of antenatal care and allow opportunity of women's transfer from the higher risk-group to a lower one in case their condition changes. Previously employed risk-grouping will become redundant if all women receive constant and close care.

*Essential Antenatal, Perinatal and Postpartum Care. WHO, Copenhagen, 2002*

## ***Physiological adaptations to pregnancy***

<b>Areas of the body</b>	<b>Physiological changes</b>	<b>Women's experience</b>
Endocrine system. Important because hormonal control affects the woman throughout pregnancy; the most active hormones include:	<p>Human chorionic gonadotrophin</p> <p>Estrogen: produced by the placenta after 12 weeks of gestation; suppresses ovulation, inhibits lactation, encourages growth of the breasts, uterus and vagina</p> <p>Progesterone: produced by the placenta after 12 weeks of gestation; responsible for development of breast tissue, relaxes smooth muscle all over the body</p> <p>Thyroid-stimulating hormone: stimulates the metabolism through the action of thyroxin</p> <p>Melanocyte-stimulating hormone: as pregnancy progresses and the pituitary gland enlarges more is produced</p>	<p>The early rise in this hormone is the basis for many pregnancy tests, and it is thought to be the cause of early pregnancy nausea</p> <p>Tender breasts Amenorrhoea (no menstrual period) Uterus grows</p> <p>Tender breasts Prevents uterine contractions May lead to varicose veins, constipation or urinary tract infections</p> <p>Feeling of warmth</p> <p>Darkening of skin pigment Linea nigra, chloasma and secondary areola of nipples develops</p>
Metabolism	Increases to meet demands of mother and foetus	Weight gain of about 10–12 kg
Respiratory system	15–20% increase in demand for oxygen; easier gas exchange; lower ribs flare	Dyspnoea (awareness of breathing) in later pregnancy
Gastrointestinal system	Whole system relaxes, mainly due to progesterone, although internal organs are squashed by growing uterus	Heartburn Constipation May need smaller meals
Renal system	<p>Increased blood flow to kidneys causes 50% increase in glomerular filtration</p> <p>Action of progesterone causes kinking of the ureters</p>	<p>Glycosuria (sugar in the urine) can occur</p> <p>Urinary tract infection can occur, frequency of micturation due to pressure on the bladder from the growing uterus and foetal head</p>
Reproductive system	<p>Uterus: thickens and grows from a pelvic organ weighing 70 g to an abdominal organ weighing 1 kg</p> <p>Much greater blood supply</p> <p>Cervical canal is filled by operculum, mucous plug or show</p> <p>Vagina: has increased blood supply and estrogen acts on mucous-producing cells</p>	<p>Changing body image: at 12 weeks, uterine fundus is felt above the pubic bone at 24 weeks, uterine fundus is palpated above the umbilicus at 38 weeks, uterus presses on xiphysternum (lower edge of sternum, in the centre of rib cage)</p> <p>Increase in vaginal discharge</p>
Breasts	<p>Both estrogen and progesterone encourage growth and blood supply increases</p> <p>Montgomery's tubercles become more active and prominent</p>	Vascular changes visible, colostrum may be secreted
Skeletal system	Progesterone softens the ligaments, which assists in the delivery	Can cause back pain, or lordosis (curved spine)

## New WHO Antenatal Care Model: Table of main items

Villar, J.,P. Bergsjö. WHO. 2002

**Notes:** Mark the appropriate completed measures (non-shaded cells). Use the closest gestational age to the date of visit.

Patient Name \_\_\_\_\_  
Address and Phone number \_\_\_\_\_  
Medical Record Number \_\_\_\_\_

FIRST VISIT for all women that refer healthcare settings, regardless of their pregnancy term. If the first visit occurs later than recommended, fulfil all the prior measures until the current term. DATE: __/__/____	Visits			
	1 <sup>st</sup> < 12 weeks	2 <sup>nd</sup>	3 <sup>rd</sup>	4 <sup>th</sup>
Classification form with base programme component eligibility				
Clinical examination				
Severe clinical anaemia? Haemoglobin test.				
Midwifery examination: determining pregnancy term and uterus size				
Gynaecological examination (can be postponed until second visit)				
Blood pressure measurement				
Mother's height / weight				
Syphilis express-test, detection of STD symptoms				
Urine analysis (express-test)				
Blood grouping and Rh-factor verification				
Administration of antitetanus serum				
Iron / folic acid supplement				
Critical situation recommendations / emergency phone line				
Completion of antenatal care form				
<b>SECOND and SUBSEQUENT VISITS</b> DATE: __/__/____	<i>Approximate pregnancy term in weeks</i>			
Clinical examination to detect anaemia		26		
Midwifery examination: determining pregnancy term, uterus size and foetal heartbeat rate				
Blood pressure measurement				
Mother's weight (only for women with low weight detected during Visit 1)				
Urine analysis for proteinuria (only for nullipara women / women with history of preeclampsia)				
Iron / folic acid supplement				
Critical situation recommendations				
Completion of antenatal care form				
<b>THIRD VISIT:</b> in addition to second visit DATE: __/__/____			32	
Haemoglobin test				
Administration of antitetanus serum (second dose)				
Preparation for forthcoming delivery / birth planning				
Lactation / contraception recommendations				
<b>FOURTH VISIT:</b> in addition to second and third visits DATE: __/__/____				38
Detection of breech presentation/referral for external cephalic version				
Completion of antenatal care form, recommendation to have the form available during hospitalization				

Medical staff member responsible for antenatal care:

Name: \_\_\_\_\_

Signature: \_\_\_\_\_

## **Routine Antenatal Screening**

### **A. Recommended routine examinations according to results of studies:**

**Blood Pressure:** Should be measured during each visit to detect hypertension. Hypertension is only an indicator, which may be or may not be an evidence of preeclampsia. Woman's referral to specialized treatment can be recommended if diastolic pressure is higher than 90 mm of mercury, or increased by 10 mm as compared to initial indicators, collected before 20<sup>th</sup> week of pregnancy.

**Urine Analysis:** Should be conducted during enrolment to medical establishment to detect bacteria, for screening purposes, or to diagnose symptom-free bacteriuria. If bacteria level exceeds 100,000 colonies in 1 ml, antibiotic treatment is required. During subsequent visits urine analysis for proteinuria should be made. For screening examination purposes any urine analysis is suitable, however, to receive the complete and precise data, analysis of summary protein excretion should be conducted for urine collected during 24 hours.

**Fundal Height Measurement:** Several studies noted good sensitivity and specificity of fundal height measurement for predicting low weight during birth of developing foetus. This test can also be helpful for screening in order to further research possible foetus development and height limitations. (*Antenatal Care Basics, WHO*)

**Abdominal Palpation:** Foetal lie is usually determined during every visit, however, it cannot be determined precisely before Week 36; instead, the procedure may cause woman's discomfort.

**Legs examination:** Legs should be examined during every visit to diagnose varicose veins. Women who stand for long periods or who do heavy manual work may benefit from advice on exercises for their legs. However, oedema (except for massive or quickly arising face or lower back oedemata) should not be considered as pathological state indicators, since lower limb oedema is present in a majority of normal pregnancies.

**Blood Tests (blood grouping and haemoglobin level):** Blood test should be conducted in early pregnancy to determine group and type if they were not known before. Haemoglobin level must be measured at least once during pregnancy, preferably around Week 32. Sometimes blood retest is prescribed for Week 36, especially if haemoglobin level is low.

#### ***Rh-factor Verification:***

It is necessary to determine Rh-factor and antibodies presence, as well as prepare to introduce anti-D-gamma globulin for non-sensitized women with Rh-negative (1) after any procedure or event which may lead to foetomaternal transfusion, (2) during Week 28 of pregnancy, and (3) after delivery.

### **B. Examinations, which were sometimes and are still included into the traditional antenatal care model, but their efficiency in the capacity of routine measures during normal pregnancy flow is not evidence-based:**

**Weighing:** Recent studies indicate that measurement of gained weight during every visit is unjustified and there is no need in advising women to limit nutrition for slower gain of weight.

**Pelvimetry:** It was proven, that neither clinical nor roentgenological pelvimetry have sufficient prognostic value to determine size discrepancy of foetus' head and mother's pelvis and thus justify scheduled caesarean section in case of cephalic presentation. Consequently, these procedures have no value for routine antenatal care. Size discrepancy of foetus' size and mother's pelvis is best detected during thorough pregnancy process supervision (Enkin et al., 2000).

**Doppler ultrasound:** Assessing the fetal heart pulsation appears to have little, if any effect on pregnancy outcome when used as a screening test in unselected pregnancies. However Doppler ultrasound use in high-risk pregnancies (complicated mainly by foetal growth retardation or maternal high blood pressure) shows that there are fewer stillbirths and neonatal deaths among normally formed babies when the results of Doppler velocimetry are made available to the clinicians.

**Routine Foetal Heartbeat Auscultation** has no apparent prognostic value however "...it may be of psychological benefit to mothers. Women should be offered auscultation at each visit from the time the midwives and doctors can detect a heartbeat"

**Foetal Movement Counting:** Conducted studies do not testify that routine foetal movement counting contributes to lower probability of intrauterine foetal death during late pregnancy period. In point of fact, it requires additional resources without tangible improvement of perinatal outcomes. Routine counting leads to more frequent detections of reduced foetal activity and more frequent use of additional methods for assessment of foetus status, thus resulting in higher hospitalization numbers of pregnant women and increase of induced deliveries. Yet, at early pregnancy stages women should be questioned about foetal movement during every visit, even though some women do not feel foetal movement until after Week 16.

**Routine Use of Iron Food Supplements:** Routine use of iron food supplements is not required for groups of population which receive adequate nutrition. (Yet, use of such supplements may be expedient in regions with high anemia and endemic malaria indicators).

Normal processes of hematologic adaptation during pregnancy are often erroneously interpreted as evidence of iron deficiency, which requires correction. After the first pregnancy trimester neither supplements of iron, nor do folic synonyms have any positive influence on further pregnancy/delivery flow or foetus status, including hypertension and gestational proteinuria, haemorrhage during and after delivery, intrauterine infection, preterm delivery, low foetus weight during birth, still-birth and neonatal mortality. Besides, women do not feel subjective benefit of increased haemoglobin concentration. Moreover, women with low haemoglobin level may be in a more advantageous position in case of potential haemorrhage caused by high volume of circulating blood. Without any other evidence of iron deficiency, low haemoglobin level should not be considered indication for taking additional iron preparations.

**Routine Ultrasonic Examination:** Expediency of routine ultrasonic examinations of women during pregnancy is not currently proven (Enkin et al., 2000). Clinical value studies of routine ultrasonic examinations during late pregnancy indicated increased antenatal hospitalization numbers and induced-birth quantities without any improvement of perinatal outcomes. However, advisability of ultrasonic examination in *individual* clinical situations was evident, for instance, to detect signs of foetus vital activity or death; to estimate gestational age (before Week 22 of pregnancy); to estimate foetus development; to localize placenta; to verify assumed multiple pregnancy; to evaluate the volume of amniotic fluid while suspecting hydramnion or oligohydramnios; to specify foetal lie; as well as to assist during procedures like circular cervix of the uterus suture, or outer turning for cephalic presentation.

**Stress and Non-stress Cardiotocography:** According to the available data, there is no evidence of antenatal cardiotocography advisability as a means for additional assessment of foetus well-being during high-risk pregnancies. Clinical use of this method should obviously be limited to situations when acute foetal hypoxia is possible, e.g. during suddenly reduced foetal movement or antenatal haemorrhage (Enkin et al., 2000).

**Biochemical Investigation:** (e.g. estriol level analysis) has no clinical value.

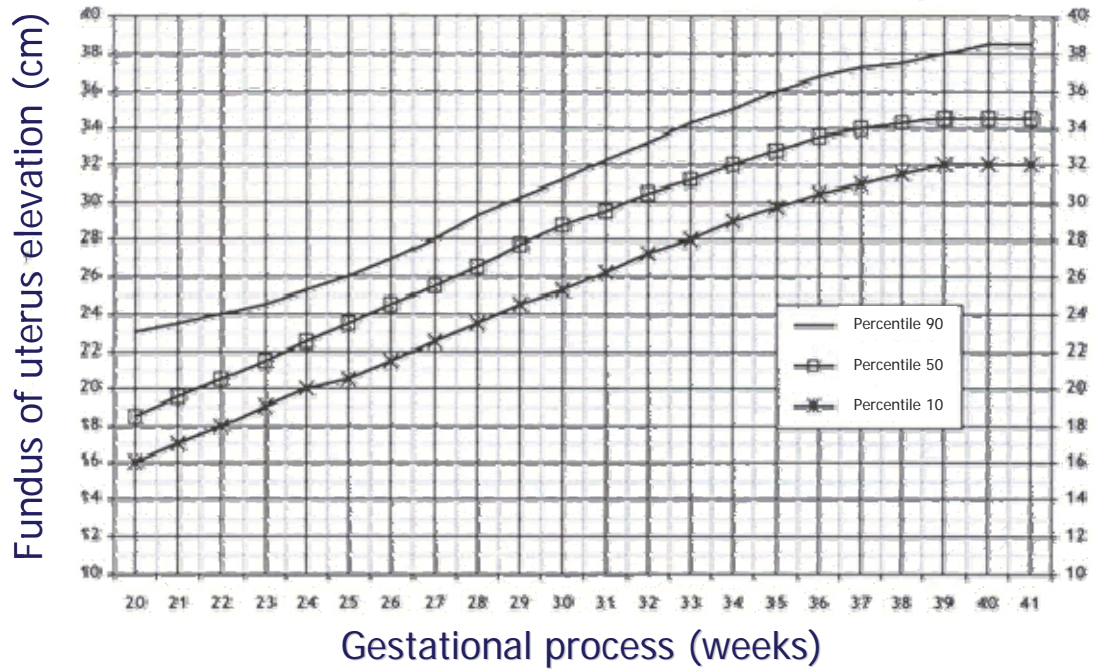
**Biophysical profile analysis:** Has some prognostic significance, but does not lead to improved results.

**Some preventive measures  
or measures to reduce common discomfort**

<b>Symptom</b>	<b>Advice to women</b>	<b>Additional treatment opportunities</b>
Fatigability	<ul style="list-style-type: none"> <li><input type="checkbox"/> Have more rest</li> <li><input type="checkbox"/> Follow health nutrition principles</li> <li><input type="checkbox"/> Do simple exercises</li> </ul>	
Morning nausea/vomiting	<ul style="list-style-type: none"> <li><input type="checkbox"/> Eat few dry crackers or a piece of bread early in the morning</li> <li><input type="checkbox"/> Avoid spicy or fatty food</li> <li><input type="checkbox"/> Eat more often and in small portions</li> <li><input type="checkbox"/> Inform women that in most cases nausea and vomiting will stop spontaneously after first three months of pregnancy</li> </ul>	<ul style="list-style-type: none"> <li><input type="checkbox"/> ginger</li> <li><input type="checkbox"/> acupressure – Nayguan point (P6) (pressure point at three finger widths from wrist)</li> <li><input type="checkbox"/> antihistaminic drugs</li> </ul>
Heartburn	<ul style="list-style-type: none"> <li><input type="checkbox"/> Eat more often and in small portions</li> <li><input type="checkbox"/> Avoid spicy and fatty food</li> <li><input type="checkbox"/> Avoid coffee and sodas containing caffeine</li> <li><input type="checkbox"/> Do not lie/bend down after eating</li> <li><input type="checkbox"/> Place your head on a high pillow during sleep</li> <li><input type="checkbox"/> When suffering from heartburn, drink some milk or eat a yogurt</li> </ul>	<ul style="list-style-type: none"> <li><input type="checkbox"/> antacid drugs for women, which suffer from heartburn despite of changes in way of living and diet</li> </ul>
Constipations	<ul style="list-style-type: none"> <li><input type="checkbox"/> Drink at least 8 glasses of water and other liquids a day</li> <li><input type="checkbox"/> Eat food rich in dietary fibers, e.g. green vegetables and bran mush</li> </ul>	
Haemorrhoids	<ul style="list-style-type: none"> <li><input type="checkbox"/> Consume more roughage and dietary fibers food</li> </ul>	<ul style="list-style-type: none"> <li><input type="checkbox"/> anti-haemorrhoidal creams</li> </ul>
Feet/legs oedema	<ul style="list-style-type: none"> <li><input type="checkbox"/> Raise your legs a couple of times during the day</li> <li><input type="checkbox"/> Sleep on your side</li> </ul>	
Varicose veins	<ul style="list-style-type: none"> <li><input type="checkbox"/> Inform women, that this is a common symptom without any harm</li> </ul>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Compressive elastic stockings may reduce feet/legs oedema, but do not prevent varicose veins</li> </ul>
Back pain	<ul style="list-style-type: none"> <li><input type="checkbox"/> Wear shoes without heels</li> <li><input type="checkbox"/> Avoid lifting weight</li> <li><input type="checkbox"/> When lifting weight, bend your knees and not your back</li> </ul>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Water exercises</li> <li><input type="checkbox"/> Massage therapy</li> </ul>



### Antenatal Growth Chart



### Birth Plan

#### INTRODUCTION

My name is \_\_\_\_\_ My due date is \_\_\_\_\_

My midwife/doctor is \_\_\_\_\_ My baby's doctor will be \_\_\_\_\_

My support person(s) during labour will be \_\_\_\_\_

These people will be present for the birth

We would like to have our other children visit:  
tend:

We have attended or are planning to attend:

- during labour
- after I go to the mother-baby unit
- not at all

- prenatal classes
- dad classes
- hospital tour
- sibling tour
- exercise classes

I am part of this research study:

Is there anything you would like us to know about you (i.e. important issues, fears, concerns)?

#### GETTING TO KNOW YOU...

My goal is:

- to use supportive and comfort measures offered by support person and nurse only
- to use pain medications in addition to supportive and comfort measures
- other, please explain \_\_\_\_\_

### FIRST STAGE OF LABOUR COPING WITH CONTRACTIONS

Women have found the following comfort measures helpful when coping with the discomforts associated with contractions. Please check which of the following comfort measures you would like your nurse to offer you during your labour:

- |   |  |
|---|--|
| <input type="checkbox"/> tub bath/jacuzzi/shower  | <input type="checkbox"/> wear my own clothes/night wear                                |
| <input type="checkbox"/> walking                  | <input type="checkbox"/> use many pillows (must bring your own)                        |
| <input type="checkbox"/> hot/cold compresses      | <input type="checkbox"/> massage   |
| <input type="checkbox"/> listen to my own music   | <input type="checkbox"/> use of Nitronox (self-administrated combination of two gases) |
| <input type="checkbox"/> use the birthing ball    | <input type="checkbox"/> an epidural   |
| <input type="checkbox"/> use my own "focal" point | <input type="checkbox"/> other _____   |

### THE BIRTH OF THE BABY

Your midwife or nurse will help you to find different, comfortable positions during the pushing stage of your labour.

Which of the following would you also like to try:

- use the squatting bar
- give birth on my side
- do **not** want to use stirrups
- other \_\_\_\_\_

After my baby is born, I would like to:

- have \_\_\_\_\_ cut the umbilical cord
- have my baby put on my stomach right away
- have the baby wrapped in a blanket before holding
- have our own bonnet put on the baby
- have \_\_\_\_\_ diaper my baby for the first time
- have \_\_\_\_\_ take pictures/video during the birth
- other \_\_\_\_\_

**UNEXPECTED LABOUR EVENTS**

If you need more information about any of the following topics, ask your doctor or midwife:

- |   |   |
|---|---|
| <input type="checkbox"/> external fetal monitoring  | <input type="checkbox"/> forceps/vacuum extractor |
| <input type="checkbox"/> internal fetal monitoring  | <input type="checkbox"/> episiotomy               |
| <input type="checkbox"/> artificial rupture of membranes                                  | <input type="checkbox"/> cesarean birth           |
| <input type="checkbox"/> induction of labour, use of cervical foley catheter and oxytocin |   |

**POSTNATAL HOSPITALIZATION**

*It is best for mothers and their babies to stay together 24 hours a day. The maternity staff fully endorses this 'best practice'. The nursing staff will support and help you care for your baby in your room.*

I am planning to:

- breastfeed
- formula feed

During my stay on the mother-baby unit, I would like to:

- have my baby with me all the time
- be a part of baby's examinations (admission and discharge)
- be present during any tests my baby may be having (i.e. PKU/TSH heel pick blood test)
- have the nurse show me and \_\_\_\_\_ how to do a baby bath
- give my baby's first bath on my own
- have \_\_\_\_\_ give the first baby bath
- have our baby boy circumcised
- have my baby BCG and Hepatitis B vaccinated
- other \_\_\_\_\_

After going home, these people will be helping me:

\_\_\_\_\_

\_\_\_\_\_

Additional ideas or comments:

\_\_\_\_\_

\_\_\_\_\_

I would appreciate a telephone follow-up call after I go home from the mother-baby unit. *(First time moms usually receive a phone call from the public health nurse after they go home):*

- yes       no       undecided

Date

Mom's signature

Dad's

Support person's signature

## **Scientific Basis for the Content of Antenatal Care**

### **I. Philosophy, recent studies, and power to eliminate or alleviate adverse maternal outcomes.**

**Villar J, Bergsjø P.**

*Acta obstetrica gynecologica Scandinavica, 1997 Jan; 76(1):1-14*

#### **Abstract**

**Background:** Scope and content of antenatal care programs are ritualistic rather than evidenced-based. We wanted to identify elements of antenatal care which are of proven benefit in preventing or ameliorating specific adverse outcomes in the mother: bleeding, anemia, preeclampsia, sepsis and genitor-urinary infection and obstructed labor.

**Methods:** Review of recent literature, especially randomized controlled trials.

**Results and Conclusions:** Recent trials indicate that fewer routine visits for low-risk women do not put pregnancies at increased risk but may lessen patient satisfaction. Bleeding in pregnancy has many causes, none of which can be eliminated through antenatal care. Risk factors can be identified by history taking. Counselling and advice on what to do is the best options. Anemia in pregnancy is common, especially in developing countries. Routine iron supplementation is not necessary in well-nourished populations, but iron and folate should be provided for every pregnant woman in areas of high anemia prevalence; based on circumstantial evidence. Hemoglobin (Hb) determination as a routine test is more important late (around week 30) than early in pregnancy: high Hb is a danger signal. It is uncertain whether early detection of pre-eclampsia will reduce the incidence of eclampsia. Recent trials do not support routine aspirin to prevent pre-eclampsia among low risk women, nor is there evidence that anti-hypertensive treatment of mild pre-eclampsia will prevent more severe disease, but improved detection and care may still lead to better outcome. As to infections, urine culture and dipstick for leucocyte esterase and nitrite with subsequent treatment of positive cases will reduce the risk of pyelonephritis and appears to be cost-effective. Serological screening and treatment of syphilis is inexpensive and cost-effective. Obstructed labor can be anticipated in multiparas based on obstetrical history. Hospital delivery should be secured. Height of nulliparas should be recorded where hospital birth is not routine and a discriminatory level for hospital delivery decided locally. External version of breech lie does reduce the incidence of breech births and caesarean delivery. screening and syphilis treatment are also inexpensive and economical. Multipara women should expect delivery difficulties based on their obstetrical anamnesis. In such cases, delivery should be planned in the hospital. Increase of primipara women should be registered in the areas, where hospital delivery is not a common case and decision about delivery in a hospital is made on the local level. External foetus turning in case of pelvic presentation does not reduce delivery frequencies with this pathology, as well leave numbers of caesarean sections intact.

**Keywords:** anemia; antenatal care; bleeding in pregnancy; evidence-based medicine; obstructed labor; pre-eclampsia; urinary infections.

## **II. Scientific basis for the content of routine antenatal care. II. Power to eliminate or alleviate adverse newborn outcomes; some special conditions and examinations.**

**Villar J, Bergsjø P.**

*Acta obstetrica gynecologica Scandinavica, 1997Jan, 76(1):15-25.*

### **Abstract**

*Background:* There is uncertainty concerning antenatal care as a tool to eliminate or alleviate adverse outcomes in the newborn. We identified congenital conditions, intrauterine infections, intrauterine growth retardation, preterm birth and some specific infectious diseases in the mother with a view of prophylactic and other interventions. The value of some special diagnostic tools is also under discussion.

*Methods:* Review of recent literature, especially randomized controlled trials and systematic reviews.

*Results and Conclusions:* Genetic abnormalities cannot be prevented after conception, but many of them, and a number of acquired conditions, can be discovered by ultrasonographic and biochemical diagnostics. The advisability of screening must be determined locally for each condition, based on prevalence, treatment options and the legal requirements for abortion. Smoking excessive alcohol intake and severe undernutrition cause fetal growth retardation. Interventions to reduce maternal smoking have had limited success. Protein-energy supplementation only modestly affects birthweight. Routine measurement of uterine height is a good predictor of severe growth retardation and in rural settings of perinatal death. Preterm birth has been linked to ascending infection and subsequent rupture of the membranes. Attempts to eradicate local infections have shown some benefit but results are not convincing yet. Cervical cerclage and betamimetic drugs have little, if any, effect. Claims for reduction of physical strain (> 5 hours) at work should be supported. Tuberculosis in the mother should be discovered and treated. Malaria prophylaxis during pregnancy will protect the mother and possibly benefit the fetus. Adequate tetanus immunization of all mothers is a high priority intervention in developing countries. In HIV-positive mothers, Zidovudine ante- and perinatally will lower perinatal HIV-transmission significantly. Risk scoring may help identify some women for referral to higher level of care. Routine ultrasonography does not improve the outcome of pregnancy in terms of live births and morbidity, but may influence mortality through discovery and abortion of fetuses with major malformations. One vaginal examination during pregnancy is recommended but no repeat procedure unless medically indicated.

*Key words:* antenatal care; congenital malformations; evidenced-based medicine; fetus; intrauterine growth retardation; malaria; preterm birth; tuberculosis.

## EDUCATION FOR PARENTHOOD

Parentcraft sessions are commonly introduced in the antenatal period when mothers and fathers (or other partners and friends) can meet with others in a similar situation to discuss hopes, fears and expectations and to exchange their knowledge and experience. The aim is to familiarize the families with the changes that are taking place during pregnancy, what to expect during labour and to provide education and advice on the changes that parenthood will bring.

The midwife should be there to answer the couples' questions, to provide reassurance and to give mothers confidence in their ability to cope with pregnancy, labour and the baby in the postpartum period.

The timing of the sessions is important. It is useful to have one or two early sessions to discuss diet, smoking and alcohol consumption, although ideally this should be provided long before couples decide to have a baby (e.g. at school or during preconceptional care). Meeting other parents who are going through the same changes in their lives helps to provide support and companionship during this new adventure in life.

The majority of parent education sessions are traditionally held in the last 12 weeks of pregnancy although there is no real reason to delay them until this late in the pregnancy. It is, however, important to discuss issues of importance to parents at the time of the pregnancy when they attend classes. As labour approaches this becomes the issue of most importance, breastfeeding becomes even more important once the baby is there although some preparation must be given during the pregnancy too. Adjustment to marriage and the roles of the partners once the baby is born may be important issues to discuss earlier on in pregnancy or after the baby is born. Adjusting the topics to be discussed to the timing of the pregnancy and postpartum period makes it easier for the parents to be more receptive to what they are being taught.

While it is traditional for classes to be held during the pregnancy, it is more appropriate for classes to continue at least into the first year of parenthood. Talking of postpartum experiences during pregnancy when the baby is only an abstract (and often romanticized) idea is not very helpful in assisting parents to cope with the many difficult experiences that often accompany the joyful moments of life with a new baby. Current approaches to childbirth and parenthood education involve a series of classes extending throughout the pregnancy and first year of the baby's life.

### Possible topics for sessions

Pregnancy care:

- so-called minor discomforts of pregnancy
- nutrition during pregnancy and after delivery
- preparation for breastfeeding
- antenatal exercises
- psychological adjustments during pregnancy.

Labour and birth:

- process of labour and birth
- pain relief in labour
- companionship in labour
- common interventions used in many labours
- Caesarean section
- psychological adjustments to labour and birth



- skin-to-skin contact with the newborn and early breastfeeding.

Postpartum care of the mother:

- breastfeeding
- postnatal exercises
- psychological adjustments to marriage and life with a new baby
- sexuality during pregnancy and after birth
- working after childbirth.

Postpartum care of the baby:

- care of the baby/equipment needed
- coping with crying babies
- stimulating your baby
- baby's developmental milestones
- immunization for babies.

The father's role:

- the father's role throughout the transition to parenthood
- father's concerns.

This is not a definitive list but includes most of the commonly held discussions.

### *The purpose of education for parenthood*

The objectives of educating parents for parenthood are:

- to give a couple more confidence;
- to help a woman have a happy, healthy pregnancy, birth and parenthood experience;
- to prepare the couple for the reality of labour and to provide the woman with tips to help her cope;
- to persuade them to adopt a healthy lifestyle to ensure a speedy recovery after birth;
- to help and support the woman to breastfeed through telling her about successful breastfeeding techniques and management;
- to assist her to care for her baby regardless of what feeding method she uses;
- to help the couple to adjust to parenthood;
- to provide a source of support which continues throughout the couple's transition to parenthood;
- to provide appropriate education and information for parents about pregnancy, birth and parenthood.

### *Skills required to facilitate the education of parents*

The skills required to offer appropriate and effective education for parents are many and are discussed in more detail in the accompanying reading. But the following at least are needed in anyone preparing parents for their transition to parenthood:

- sound knowledge of the process of pregnancy, labour and the puerperium and the ability to relate this to the changes which the women and their partners will experience and to the care they receive;
- knowledge of fetal and infant growth and development, and health care;
- sensitivity and knowledge of the psychological adjustments that most parents will experience as they enter into parenthood;

- some understanding of teaching methods, including lecturing and discussion, and the use of visual aids (which can be homemade or improvised);
- effective communication skills so that women and their families can understand the information presented, the ability to answer questions honestly, counselling skills and the ability to listen to and be sensitive to couples' concerns;
- the ability to modify, adapt, change and revise the content and format of the session to suit the needs of the couples concerned;
- the recognition that the most important people in the maternity care system are the women and their families.

### *Antenatal exercises*

Parentcraft classes also provide opportunities for women to learn exercises that will help them during pregnancy and birth. Exercises should be taught by someone who has been specially trained and is competent to do this. The goal is not to create physical fitness during pregnancy but to assist the mother to cope in labour by learning to relax as much as possible. Focusing on exercises which sensitize the woman to feelings of tension and relaxation in her body during pregnancy may help her to be aware of sensations of tension during labour and to relax herself as much as possible during this time.

The importance of resting should be discussed, as should the techniques of coping with posture changes and the relief of minor disorders such as backache.

The aim is to create an environment with a relaxed atmosphere. The exercises should be rhythmical and should not cause any discomfort. They are taught by demonstration, and the women are observed to ensure that they are doing them correctly and avoiding damage.

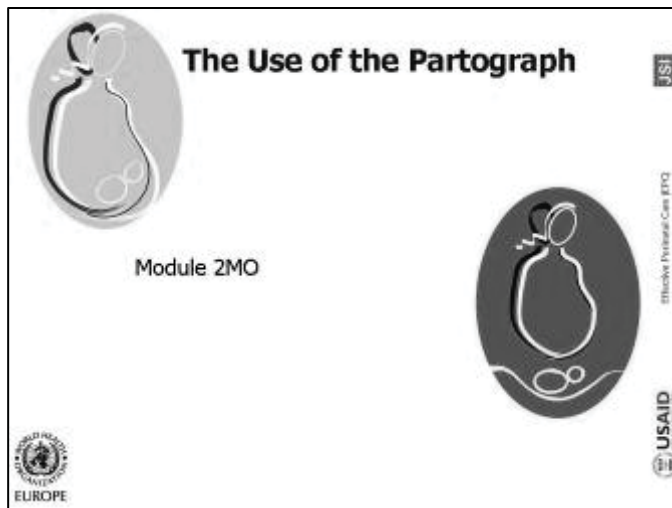
Following each exercise session there should be a period of relaxation. Relaxation must be practised regularly to reduce body tensions. It is particularly useful during pregnancy, labour and the early postpartum period. Learning to tighten individual muscles followed by relaxing helps the mother become aware of the difference between being tense and relaxed. Breathing can be used to increase the depth of relaxation – slower breathing leads to increased relaxation. This can be used to relieve discomfort in labour. The emphasis is on rhythmic breathing; avoid rapid breathing (hyperventilation), shallow panting or long periods of holding the breath.

*Promoting Effective Perinatal Care. Essential Antenatal, Perinatal and Postpartum Care. MODULE 6. EDUCATION FOR PARENTHOOD. WHO EURO, Copenhagen, 2002*



## **The Use of the Partograph**



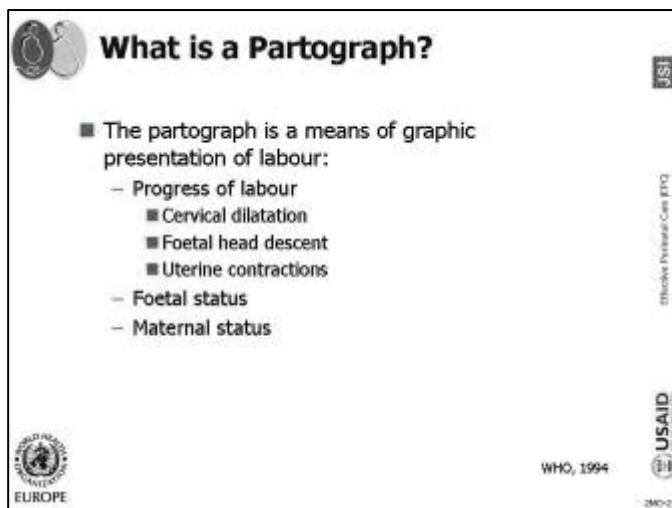


managing labour

### Slide 2MO-1 The Use of the Partograph

The main goal of this module is how to use a partograph to manage labour. By the end of the module the participants will:

- Know the history and the background of the partograph
- Understand the effectiveness of the partograph for improving perinatal outcomes
- Know how a partograph is used and how to complete one
- Be able to interpret the partograph and use it to make decisions in



### Slide 2MO-2 What is a Partograph?

A partograph is a graphic representation of labour.

The following indicators are shown on the partograph using unbroken graphs:

Progress of labour

- Cervical dilatation
- Foetal head descent
- Labour

Foetal status

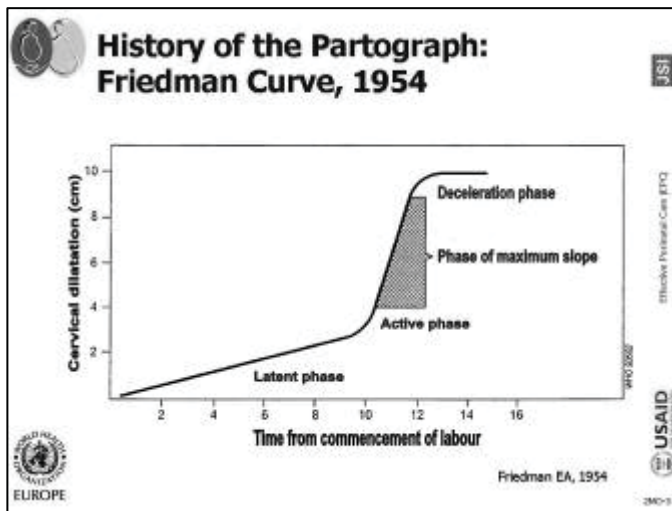
- Foetal heart beat rate
- Moulding of the foetal head
- Condition of amniotic fluid

Maternal status

- Pulse and blood pressure
- Body temperature
- Urine (quantity, presence of protein and acetone)

The indicators mentioned help assess the progress of labour and help make decisions about interventions when labour does not progress normally.

*Preventing Prolonged Labour: a practical guide. Maternal Health and Safe Motherhood Programme. Geneva, 1994.*



**Slide 2MO-3 History of the Partograph: Friedman Curve, 1954**

In their daily practice, healthcare staff has to make decisions about how to manage labour and birth and what to do when the progress of labour is abnormal. However, to detect pathology, the norm must be clearly defined.

In 1954 Dr. Friedman, an American obstetrician, published the results of a study where he assessed the dynamics of cervical dilatation in 100 primiparae. The results of the rectal assessment of cervical dilatation were plotted on the

cervical dilatation chart (cervicograph) where the X-axis was the hours of labour, and the Y-axis was cervical dilatation (cm). A graph of the average cervical dilatation rate was drafted based on mathematic analysis. This graph was later named “the Friedman curve.”

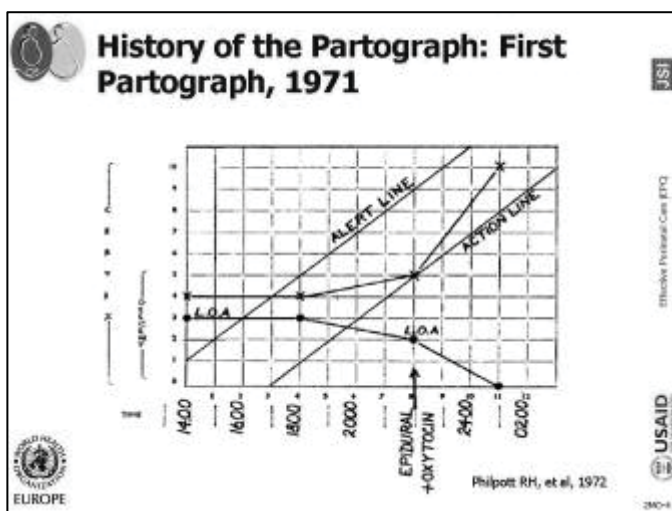
The Friedman study identified the latent and active phases of the first stage of labour. In the latent phase, the uterine contractions are irregular, but the cervix slowly and gradually effaces and dilates. In the active phase, cervical dilatation and foetal head descend are faster. The active phase usually starts with cervical dilatation of 3-4 cm and includes stages of acceleration and plateau (deceleration).

For a while, the Friedman curve was used as a standard of normal cervical dilatation dynamics. A similar graph was developed for each woman in labour and compared with the Friedman curve. Discrepancies between the two curves were read to mean that the labour was abnormal.

Many scientists noted methodology errors in Friedman’s study, the major one being heterogeneity of the population involved. Thus, the study involved women whose labours were complicated with unsatisfactory progress, oxytocin stimulation, assisted vaginal delivery, twin labour and labour with epidural anaesthesia, etc.

Very soon the Friedman curve lost its practical value; however, Friedman’s study encouraged many similar trials among different populations in order to find a “normal” dilatation pattern.

*Friedman EA: The graphic analysis of labor. Amer J Obstet Gynecol, 1954; 68: 1568-1571*



**Slide 2MO-4 History of the Partograph: First Partograph, 1971**

In 1971, based on the cervicograph, Philpott developed the first partograph to be used in Zimbabwe hospitals where experienced obstetricians were in short supply . The main goal was to provide a simple but effective labour monitoring tool to midwives that reflected not only a cervical dilatation pattern but other important indicators about the progress of labour, and the maternal and foetal condition. Philpott was the one who introduced the concepts of Alert and Action Lines.

Philpott identified the Alert line in a study of 624 women. Philpott selected 10% primiparae with the slowest progress of labour and calculated their average dilatation rate in the active phase of labour (i.e. from 3 to 10 cm). The rate was 1 cm per hour and was charted on the partograph as the Alert line. This rate was named the minimal normal rate both for primiparae, and for multiparae. In case of slower progress of labour, the cervicograph crossed the Alert line. In such cases the woman was transported to a central level maternity where prolonged labour could be managed. This tactic was based on the high rate of cephalopelvic disproportion in African women requiring operative interventions, and crossing the Alert line was considered a high risk of cephalopelvic disproportion and obstruction.

It should be noted that the average dilatation rate of 1 cm/h is slower than the rate of 1.2 cm/h proposed by Friedman.

Based on the same study, Philpott and Castle developed the Action Line, 4 hours to the right of the Alert line, believing that quickly correcting the unsatisfactory progress of labour could lead to successful vaginal deliveries. In a prospective study, the authors determined that 50% of women who crossed the Alert line but did not reach the Action line, were able to deliver spontaneously without oxytocin administration. If a woman reached the Action line, it was an indication to augment labour with oxytocin. Such tactics reduced the rate of prolonged labour (active labour lasting over 12 hours) and the rate of caesarean section.

By 1971 John Studd, a professor at Birmingham hospital (UK) visited Zimbabwe and was impressed with the preliminary results of the use of the partograph. Together with Philpott and Castle, he decided to study the effectiveness of the partograph in a European population, identifying the average dilatation rate of women in the UK.

By 1973, nearly half of UK clinical maternities used Philpott's partograph as a part of Studd's trial involving 15 000 women of different races.

After the results of Studd's trial suggesting that the use of the partograph helps to detect prolonged labour early, the use of the partograph became a routine practice in the UK.

*Philpott RH, Castle WM: Cervicographs in the management of labour in primigravidae. I. The alert line for detecting abnormal labour. J Obstet Gynaecol Br Commonw, 1972; 79: 592-598*

*Philpott RH, Castle WM: Cervicographs in the management of labour in primigravidae. II. The action line and treatment of abnormal labour. J Obstet Gynaecol Br Commonw, 1972; 79: 599-602*

*JOHN STUDD. Partograms and Nomograms of Cervical Dilatation in Management of Primigravid Labour British Medical Journal, 1973, 4, 451-455*



**History of the Partograph: WHO, 1988**

**Slide 2MO-5 History of the Partograph: WHO, 1988**

By 1988, many different partographs had been designed.

In 1988 a working group of WHO experts devised a WHO partograph synthesizing and including the best features. Today this partograph model is widely used in European countries.

*Preventing Prolonged Labour: a practical guide. Maternal Health and Safe Motherhood Programme. Geneva, 1994.*

**The WHO Partograph, 1988 Benefits**

- Effective standard for observing the progress of labour
- Provides early detection for the unsatisfactory progress of labour
- Detection of cephalopelvic disproportion before the obstruction appears
- Helps to make quick and logical decisions for managing labour
- Identifies the necessary interventions
- Simple, low cost, accessible and clear

**Slide 2MO-6 The WHO Partograph, 1988 Benefits**

The partograph was designed within the Safe motherhood initiative which started in 1987. It was proposed as a tool to improve the quality of managing delivery and to decrease the rates of maternal and neonatal mortality and morbidity.

The partograph can detect cephalopelvic disproportion before the obstruction is clear, allowing staff to making quick and logical decisions for managing the delivery and identifies the necessary interventions.

The WHO partograph is simple, low-cost, accessible visual aide.

*Preventing Prolonged Labour: a practical guide. Maternal Health and Safe Motherhood Programme. Geneva, 1994.*

**The Use of the Partograph Reduced:**

The incidence of prolonged labour	from 6.4% to 3.4%
The proportion of labours requiring augmentation	from 20.7% to 9.1%
The emergency Caesarean section rate	from 9.9% to 8.3%
Intrapartum stillbirth rate	from 0.5% to 0.3%

**Slide 2MO-7 The Use of the Partograph Reduced**

The slide presents some results of a cohort study testing partograph. The study was based in several healthcare settings of South-East Asia, involving 35,484 women.

*World Health Organization partograph in management of labour. WHO maternal health and safe motherhood program, Lancet 1994; 343:1399-404*

**Key Principles for Using the Partograph (1)**

- The partograph is used to record mainly the first stage of labour
  - However, after full cervical dilatation is reached, you should continue to record vital information related to the mother and the fetus (foetal heart rate, uterine contractions, maternal pulse, and blood pressure)
- The partograph is started if there are
  - Two or more uterine contractions in 10 min lasting 20 sec or more in the latent phase
  - One or more uterine contractions in 10 min lasting 20 sec or more in the active phase
  - No complications requiring urgent interventions or delivery

WHO, 1994

### Slide 2MO-8 Key Principles for Using the Partograph (1)

Essentially, the partograph is a graphic representation of the progress of labour in hours and includes three components: foetal condition, progress of labour and maternal condition.

The partograph should be started when:

- Two or more uterine contractions in 10 minutes, each lasting 20 seconds or more in the latent phase
- One or more uterine contractions in 10 minutes, each lasting 20 seconds or

more in the active phase

- No complications requiring emergency care and / or termination of labour.

The partograph is filled out in the labour room during labour.

The partograph is designed to be used mainly for monitoring the first stage of labour.

However, even after full cervical dilatation is reached, you should continue to record vital information related to the mother and the fetus, such as foetal heart rate, uterine contractions, maternal pulse, and blood pressure. The frequency of records should be determined by the local clinical guidelines.

*Essential Antenatal, Perinatal and Postpartum Care. WHO, Copenhagen, 2002*

*Preventing Prolonged Labour: a practical guide. The Partograph, Part 1: Principles and Strategy. WHO, Geneva, 1994.*

**Key Principles for Using the Partograph (2)**

The partograph is filled out during the labour not after birth

During labour, the partograph must be kept in the labour room

The partograph is filled in and interpreted by trained personnel (midwife or obstetrician)

Filling in the partograph should be stopped when

- Complications requiring urgent delivery arise

WHO, 1994

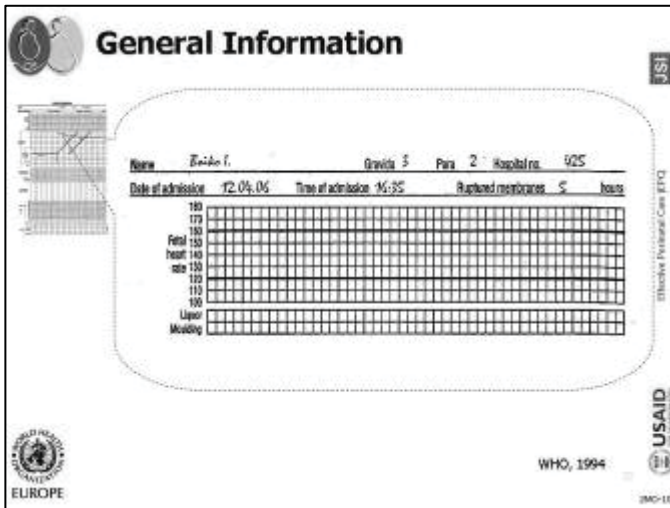
### Slide 2MO-9 Key Principles of Using the Partograph (2)

The partograph can be used by staff well-trained in obstetrics, for any labour managed in the maternity care setting, provided they can:

- Monitor and manage normal labour
- Perform vaginal examinations in labour and assess cervical dilatation
- Precisely plot cervical dilatation on the chart, according to the time

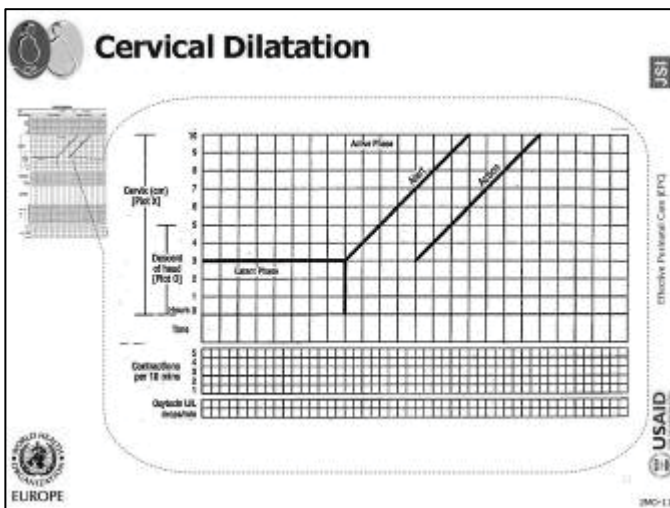
*Essential Antenatal, Perinatal and Postpartum Care. WHO, Copenhagen, 2002*

*Preventing Prolonged Labour: a practical guide. Maternal Health and Safe Motherhood Programme. Geneva, 1994.*



**Slide 2MO-10 General Information**

Information about the woman: first and last name, obstetric data (number of births, pregnancies in anamnesis), the # of birth cases in her history file, date of hospitalization, time of hospitalization, hours since membrane rupture at the moment of beginning the partograph (if membranes are intact keep this area blank). All this general information is recorded in the upper part of the partograph.



**Slide 2MO-11 Cervical Dilatation**

The main part of the partograph is the cervical dilatation chart.

Real time is recorded on the time line. Chart time from the moment the mother is admitted to the maternity department.

Cervical dilatation is plotted with an "X" on the chart.

The 1<sup>st</sup> stage of labour is split into two phases – latent and active.

The latent phase is the period of slow

cervical dilatation from 0 to 3 cm.

Active phase is the period of fast cervical dilatation from 3 to 10 cm.

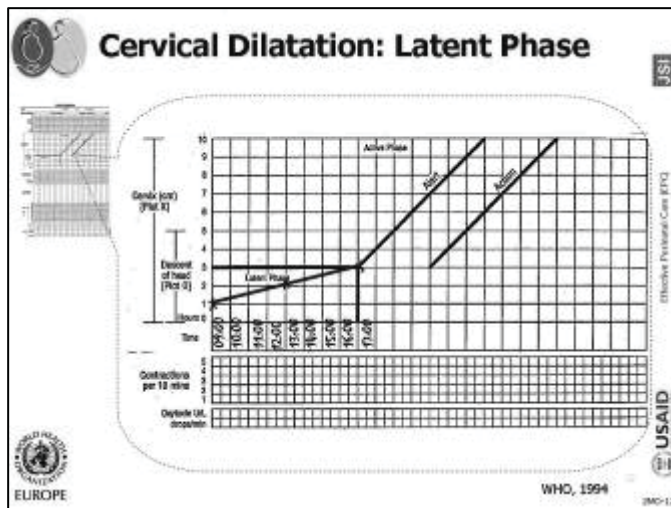
On the left, there is a vertical line of numbers from 0 to 10. Each number / cell refers to 1 cm dilatation. The X-axis represents 24 cells, each referring to 1 hour.

In the section marked as the active phase, a straight line from 3 to 10 cm is drawn. This is the Alert Line. The Alert line is the 10<sup>th</sup> percentile of cervical dilatation, corresponding to 1 cm / hour dilatation rate.

The Action line stands in parallel to the Alert line, 4 hours to the right.

*Essential Antenatal, Perinatal and Postpartum Care. WHO, Copenhagen, 2002*

*Preventing Prolonged Labour: a practical guide. The Partograph, Part 1: Principles and Strategy. WHO, Geneva, 1994.*



## Slide 2MO-12 Cervical Dilatation: Latent Phase

If a woman is admitted to the maternity department in the latent phase, cervical dilatation is marked on the appropriate spot of the first vertical line, and the time is recorded just below "X" in the line designated for recording the time.

If contractions stop, it means that the woman has false labour pains.

If contractions are present, a vaginal examination is performed every 4 hours, and the findings plotted on the

partograph.

Normal duration of the latent phase should not exceed 8 hours. If the latent phase exceeds 8 hours, it is termed a prolonged latent phase.

Prolonged latent phase is diagnosed retrospectively.

**Incorrect diagnosis of false labour or a prolonged latent phase results in unnecessary labour induction which may further result in unnecessary caesarean section or amniotomy.**

If the latent phase lasts longer than 8 hours, and the labour does not progress, the woman should be examined for cervical dilatation.

If the stage of cervix effacement and dilatation does not change and no foetal distress is detected, the diagnosis should be revised. The labour probably has not started.

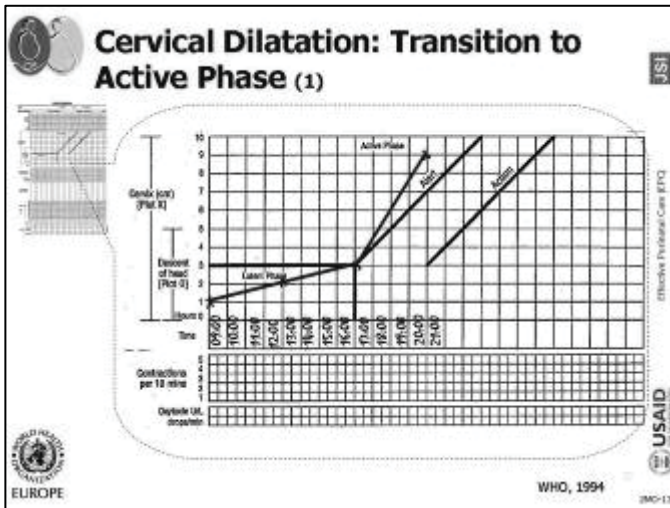
If the stage of effacement and dilatation advanced, amniotomy and oxytocin stimulation should be performed:

- Examine the woman every 4 hours.

If the woman does not advance to the active phase of labour after 8 hours of oxytocin infusion, a caesarean section should be performed.

*Essential Antenatal, Perinatal and Postpartum Care. WHO, Copenhagen, 2002*

*Preventing Prolonged Labour: a practical guide. The Partograph, Part 1: Principles and Strategy. WHO, Geneva, 1994.*

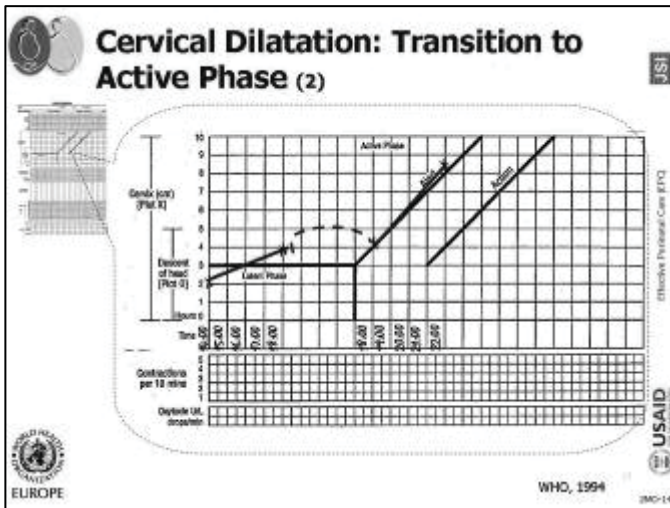


**Slide 2MO-13 Cervix Dilatation: Transition to Active Phase (1)**

With labour progressing, cervical dilatation gradually reaches 3 cm.

A woman with a cervix dilated to 3 cm is said to have reached the active phase of the first stage of labour.

*Preventing Prolonged Labour: a practical guide. The Partograph, WHO, Geneva, 1994.*



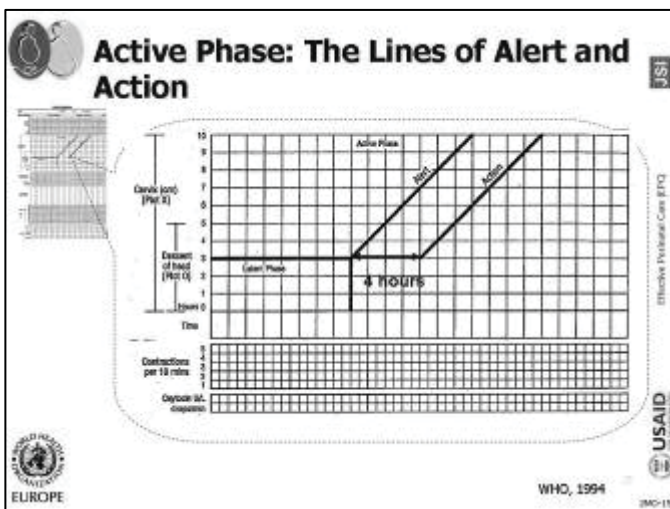
**Slide 2MO-14 Cervix Dilatation: Transition to Active Phase (2)**

If a vaginal examination in 4 hours identifies the woman to have reached the active phase, plotting of cervical dilatation should be transferred to the active phase area and plotted immediately on the Alert line.

With this, the time line is moved as well, and charted to the left of the vertical line where the X on the Alert line is placed.

The broken line plots the move.

*Preventing Prolonged Labour: a practical guide. The Partograph, WHO, Geneva, 1994.*



**Slide 2MO-15 Active Phase: The Lines of Alert and Action**

The Alert line is the line corresponding to the dilatation rate of 1 cm per hour. This rate is minimal norm both for primiparae and for multiparae.

The Action line is located 4 cells (4 hours) to the right of the Alert line. If labour reaches this line, the reasons for the slow progression of labour should be investigated and measures should be taken.

The 4 hour distance was randomly selected but it proved to be most appropriate to assess the situation. How often should a vaginal examination be performed? The partograph provides an irrefutable answer. If we assume that crossing the Action line is not desirable, the next vaginal examination should be

done no later than the Action line would be crossed if there were no changes in cervical dilatation. Therefore, if the current cervical examination is conducted on the Alert line, the next time it should be performed is in 4 hours. Thus, a vaginal examination is performed every 4 hours if there are no clinical indications for an earlier or a later examination.

*Essential Antenatal, Perinatal and Postpartum Care. WHO, Copenhagen, 2002*

*Preventing Prolonged Labour: a practical guide. The Partograph, WHO, Geneva, 1994.*

1022 pregnant women were monitored in labour using the partograph, during a 4 month period.

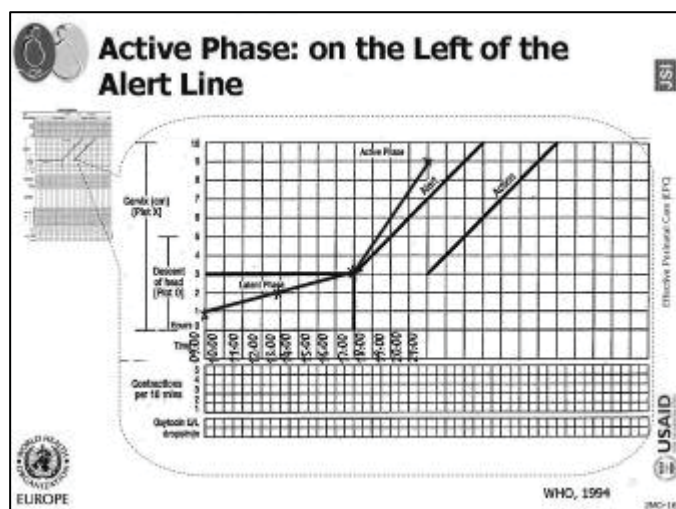
In those women who crossed the Alert line, but did not reach the Action line, the level of neonatal resuscitation was 4 times higher than in the group with cervical dilatation at the rate of 1 cm per hour and faster (RR - 4.0, CI - 2.1-7.6;  $p < 0.001$ ). The rate of intrapartum stillbirths was also higher but not as significant.

In the group of women who crossed both lines, the rate of intranatal stillbirths was 10 times higher than in the group with a cervical dilatation of 1 cm per hour and faster (RR - 9.9, CI - 2.8-34.7;  $p < 0.001$ ).

Medical interventions (amniotomy, oxytocin administration) were performed in half of the cases when the Alert line was crossed. Among the women who did not receive these interventions, 44% crossed the Action line, as compared with 26% of those who were given amniotomy and/or oxytocin infusion ( $p = 0.06$ ).

The results confirm the benefit and effectiveness of the partograph, and prove the importance of timely action when the Alert line is crossed.

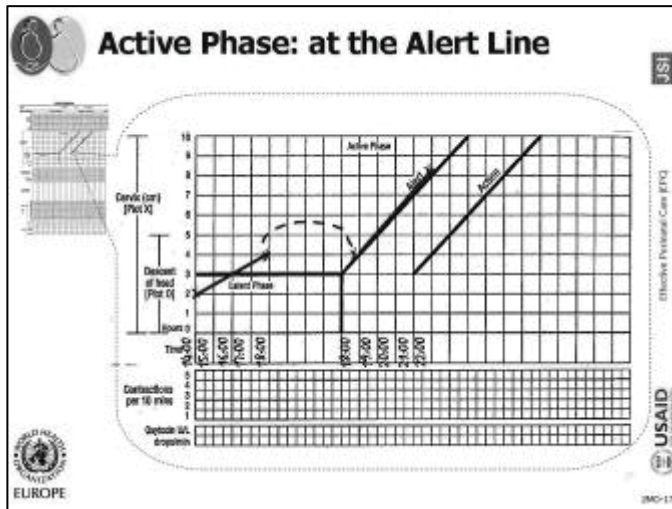
*Dujardin B, De Schampheleire I, Sene H, Ndiaye F. Value of the alert and action lines on the partogram. Lancet. 1992 May 30;339(8805):1336-8*



### Slide 2MO-16 Active Phase: on the Left of the Alert Line

If the cervical dilatation chart is on the left of the Alert line, it means that the rate of cervical dilatation exceeds 1 cm per hour. The progress is normal, no interventions are necessary, only monitoring.

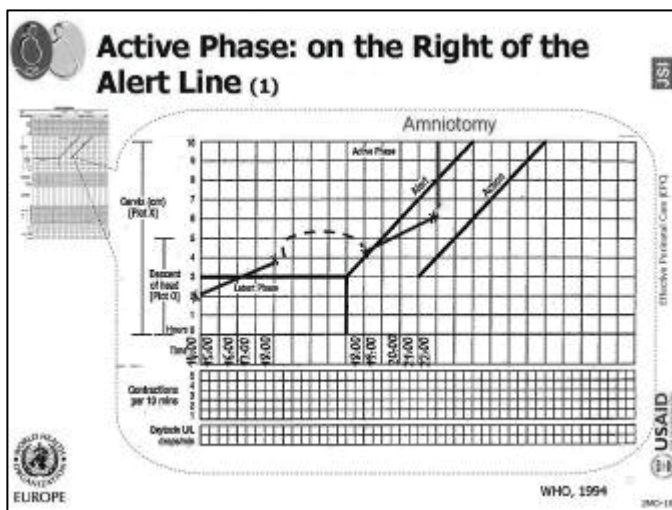
*Preventing Prolonged Labour: a practical guide. The Partograph, WHO, Geneva, 1994.*



**Slide 2MO-17 Active Phase: at the Alert Line**

If the cervical dilatation chart is on the Alert line, it means that the dilatation rate is 1 cm per hour. The progress is normal, no interventions are necessary, only monitoring.

*Preventing Prolonged Labour: a practical guide. The Partograph, WHO, Geneva, 1994.*



**Slide 2MO-18 Active Phase: on the Right of the Alert Line (1)**

If the cervical dilatation chart is to the right of the Alert line, it means that the rate of cervical dilatation is less than 1 cm per hour.

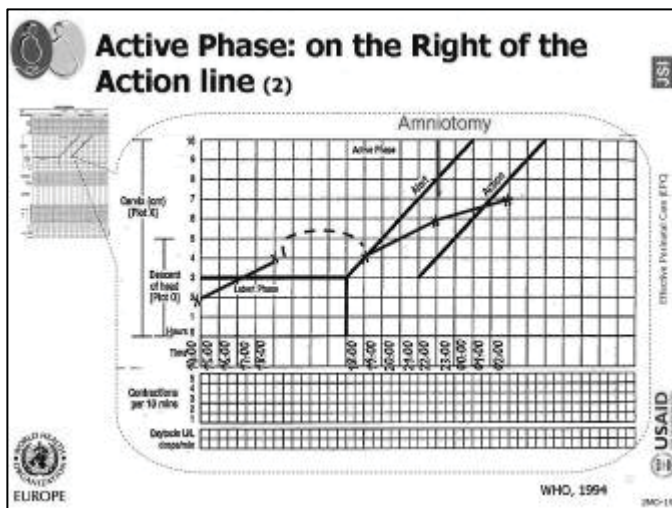
The progress of labour is abnormal and amniotomy is needed.

If in one hour after amniotomy there is still no active labour is (3-4 contractions during 10 minutes, each lasting more than 40 seconds), labour should be stimulated with oxytocin.

**When the Alert line is crossed, the woman should be transferred to higher level of care, in case of no possibility of operative delivery (Caesarean section, vacuum extraction, forceps) due to the lack of equipment and / or trained personnel.**

*Managing Complications in Pregnancy and Childbirth A guide for midwives and doctors, WHO, 2002*

*Preventing Prolonged Labour: a practical guide. The Partograph, WHO, Geneva, 1994.*



**Slide 2MO-19 Active Phase: on the Right of the Action Line (2)**

Reaching and crossing the Action line requires the following measures:

- Full clinical assessment of maternal and foetal status and obstetric situation
- Delivery by Caesarean section in case of foetal distress or obstructed labour
- If no contraindications – start IV infusion of oxytocin
- Vaginal examination after 3 hours, then every 2 hours

- If dilatation rate of 1 cm per hour between any two examinations is not reached perform caesarean delivery.

*Preventing Prolonged Labour: a practical guide. The Partograph, WHO, Geneva, 1994.*

**Effect of Different Partograph Action Lines on Birth Outcomes: 2-hour versus 4-hour Action Line**

- Use of 2-hour partograph:
  - More frequent crossing of Action line
  - More interventions without improving maternal or neonatal outcomes
  - More women transferred to higher level of care
- No differences in cesarean delivery rate or women dissatisfied with labor experience

2-hour Action line partograph has no advantages compared with 4-hour partograph

Lavender T et al, 2006

**Slide 2MO-20 Effect of Different Partograph Action Lines on Birth Outcomes: 2-hour versus 4-hour Action Line**

A randomized trial of primigravida women with uncomplicated pregnancies, in spontaneous labour at term, was conducted in the northwest of England. A total of 3,000 women were randomly assigned to groups; 2,975 (99.2%) were available for analysis. Women were assigned to have their labors recorded on a partogram with an Action line 2 or 4 hours to the right of the Alert line. If progress crossed the Action line,

diagnosis of prolonged labour was made and managed according to standard protocol. Primary outcomes were rate of caesarean delivery and maternal satisfaction.

There were no differences in caesarean delivery rates (136/1,490 compared with 135/1,485; relative risk [RR] 1, 95% confidence interval [CI] 0.80–1.26) or women dissatisfied with their labour experience (72/962 compared with 81/967; RR 0.89, 95% CI 0.66–1.21). More women assigned to the 2-hour arm had labours that crossed the Action line (854/1,490 compared with 673/1,485; RR 1.27, 95% CI 1.18–1.37); received more intervention (772/1,490 compared with 624/1,485; RR 1.23, 95% CI 1.14–1.33); and, if admitted to the midwife-led unit, were transferred to higher level of care (366/674 compared with 285/666; RR 1.26, 95% CI 1.13–1.42).

Thus, for primigravida women selecting low intervention care, the 2-hour partogram increases the need for intervention without improving maternal or neonatal outcomes, compared with the 4-hour partogram, advocated by the World Health Organization [A].

*Lavender T, Alfirovic Z, Walkinshaw S. Effect of Different Partogram Action Lines on Birth Outcomes: A Randomized Controlled Trial. Obstetrics & Gynecology 2006;108:295-302.*

**Descent of the Head Determined by Abdominal Examination**

Head is mobile above the pelvic brim

Head accommodates the full width of five fingers above the pelvic brim = 5/5

Head is engaged

Head is two fingers width above the pelvic brim = 2/5

WHO, 1994  
WHO EURO, 2002

**Slide 2MO-21 Descent of the Head Determined by Abdominal Examination**

For convenience, the width of five fingers is a guide to assessing the head above the pelvic brim. A head which is mobile above the brim will accommodate the full width of five fingers.

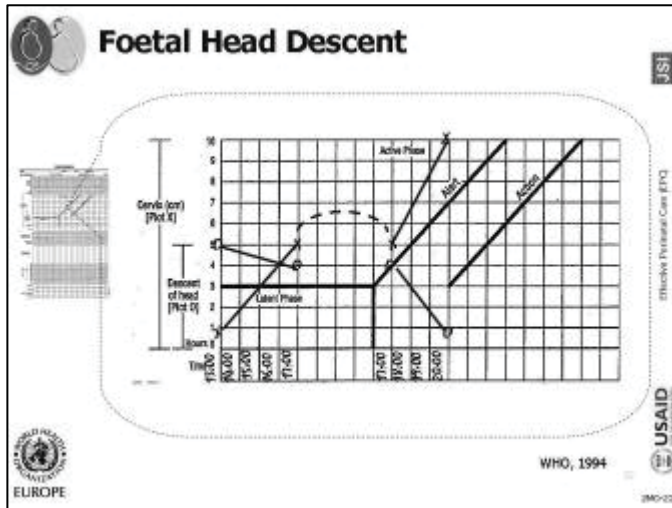
As the head descends, the portion of the head remaining above the brim, will be represented by fewer fingers (4/5th, 3/5th, etc.). It is generally accepted that the head is engaged when the portion above the brim is represented by two fingers' width or less.



Descent of the head should always be assessed by abdominal examination immediately before doing a vaginal examination so that you will know where to expect to feel the head during the vaginal examination.

*Essential Antenatal, Perinatal and Postpartum Care. WHO, Copenhagen, 2002*

*Preventing Prolonged Labour: a practical guide. The Partograph, Part 1: Principles and Strategy. WHO, Geneva, 1994.*



**Slide 2MO-22 Foetal Head Descent**

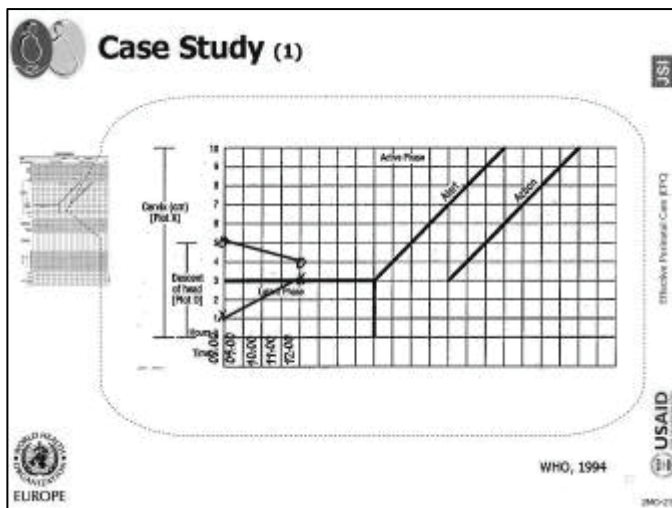
Foetal head descent is plotted with an “O” on the chart.

To plot foetal head descent on the partograph, use the “Foetal head descent” scale marked from 5 to 0.

Remember that measuring the descent of the baby’s head helps the health professional follow the progress of labour.

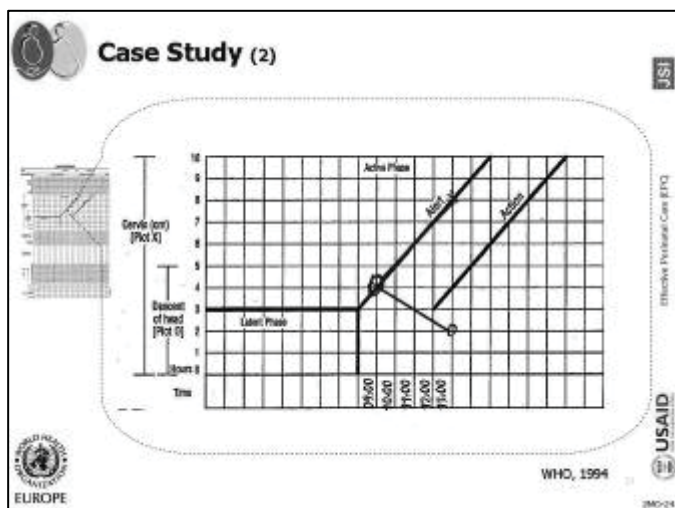
The “O” is always placed on the same vertical line with the “X” and should be moved as well if necessary.

*Essential Antenatal, Perinatal and Postpartum Care. WHO, Copenhagen, 2002*



**Slide 2MO-23 Case Study (1)**

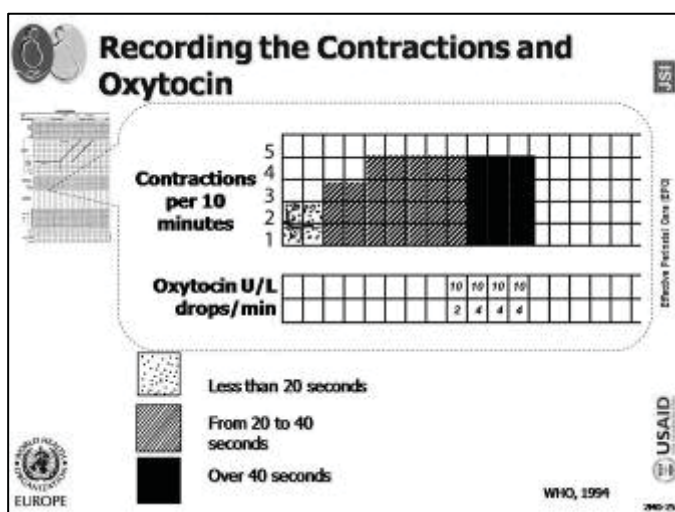
An example of plotting cervical dilatation information and foetal head descent upon admitting a woman in the latent phase.



**Slide 2MO-24 Case Study (2)**

An example of plotting cervical dilatation information and foetal head descent upon admitting a woman in the active phase.

Sometimes symbols X and O can be superimposed (if cervical dilatation is 4 cm and foetal head is represented by 4 fingers above the pelvic brim)



**Slide 2MO-25 Recording the Contractions and Oxytocin**

**Uterine contractions:** Along with cervical dilatation and foetal head descent, uterine contractions also indicate the progress of labour.

In the “Contraction per 10 minutes” line, each vertical cell is one contraction in a 10 minute period; each horizontal cell is 30 minutes.

Contractions are counted in a 10 minute period every 30 minutes.

Contractions intensity and frequency is plotted on the time axis.

If the woman has 3 contractions in 10 minutes, 3 vertical cells must be shaded.

Three types of shading are used on a partograph: dots, diagonal lines and solid colours.

Different shading intensity reflects contraction intensity.

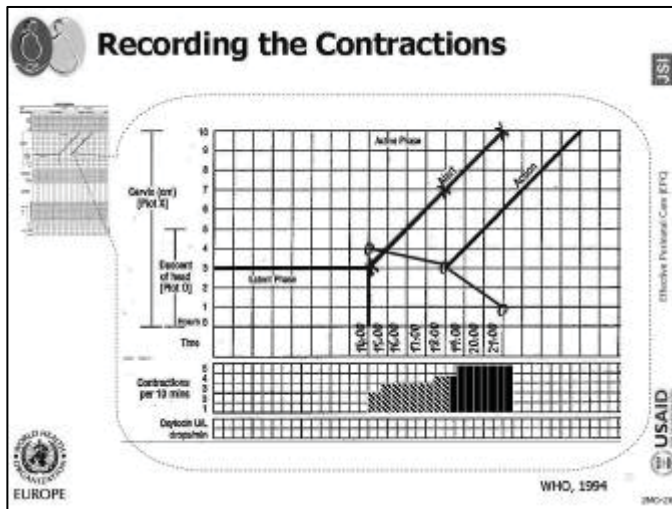
*Essential Antenatal, Perinatal and Postpartum Care. WHO, Copenhagen, 2002*

*Preventing Prolonged Labour: a practical guide. The Partograph, Part 1: Principles and Strategy. WHO, Geneva, 1994.*

**Oxytocin:** If the unsatisfactory progress of labour due to inadequate uterine activity was detected - the use of oxytocin to augment the labour should be considered.

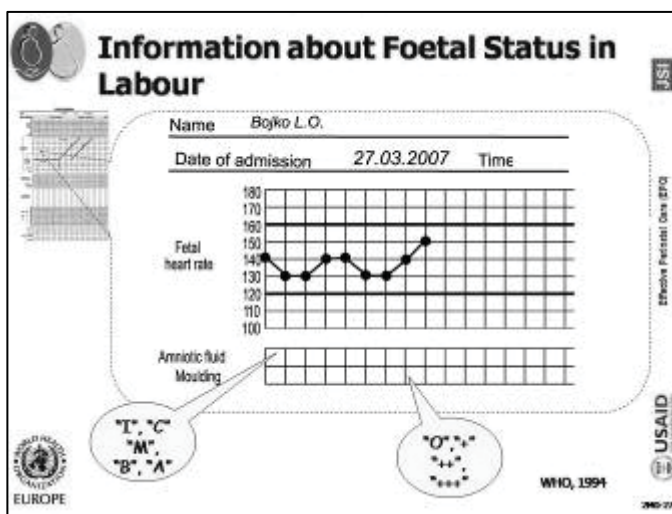
There is a separate area for recording oxytocin titration just below the column for recording contractions frequency and duration.

When oxytocin is used you should record every half-hour the concentration of oxytocin per litre in upper row and number of drops per minute in lower row.



**Slide 2MO-26 Recording the Contractions**

An example of recording contractions on a partograph.



**Slide 2MO-27 Information about Foetal Status in Labour**

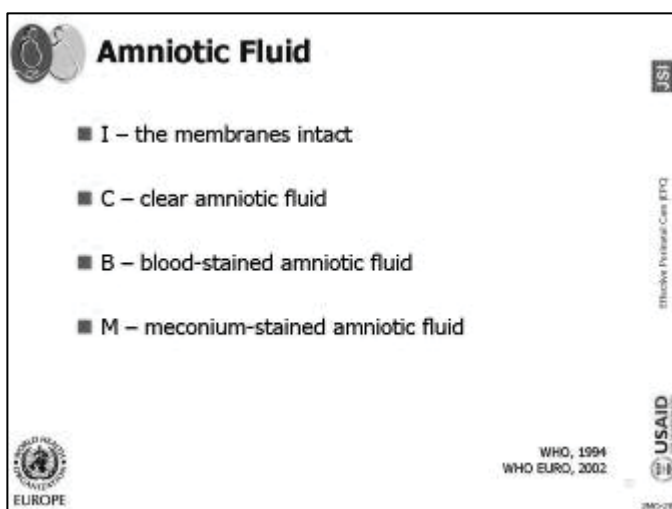
**Foetal heartbeat rate:** Periodical auscultation and recording foetal heartbeat is the safe and way to ensure foetal well-being. The auscultation of FHR should be performed at least every 30 minutes and recorded on the partograph with the dots. Subsequent dots are connected with the line.

**Amniotic fluid:** The colour of amniotic fluid should be recorded: clear (“C”), blood (“B”) or meconium-stained (“M”). If the membranes are intact – “I”.

**Moulding of the foetal skull bones:** Record as follows: bones are separated and the sutures can be felt easily (0); bones are just touching each other (+); bones are overlapping (++); bones are seriously overlapping (+++).

*Essential Antenatal, Perinatal and Postpartum Care. WHO, Copenhagen, 2002*

*Preventing Prolonged Labour: a practical guide. The Partograph, Part 1: Principles and Strategy. WHO, Geneva, 1994.*



**Slide 2MO-28 Amniotic Fluid**

The integrity of membranes and the colour of the amniotic fluid is checked during every vaginal examination and recorded on the partograph.

*Essential Antenatal, Perinatal and Postpartum Care. WHO, Copenhagen, 2002*

*Preventing Prolonged Labour: a practical guide. The Partograph, Part 1: Principles and Strategy. WHO, Geneva, 1994.*

### Head Configuration

- 0 – the bones are separated and sutures can be felt easily
- + the bones slightly adjoin
- ++ the bones overlap
- +++ the bones overlap severely

WHO, 1994  
WHO EURO, 2002

### Slide 2MO-29 Head Configuration

Moulding is an important finding because it shows how well the pelvis can accommodate the foetal head.

Moulding assessment is performed at every vaginal examination and recorded on the partograph.

Significant bones' overlapping is a sign of disproportion.

*Essential Antenatal, Perinatal and Postpartum Care. WHO, Copenhagen, 2002*

*Preventing Prolonged Labour: a practical guide. The Partograph, Part 1: Principles and Strategy. WHO, Geneva, 1994.*

### Information about Maternal Status in Labour

WHO, 1994

### Slide 2MO-30 Information about Maternal Status in Labour

All observations about the condition of the mother are written at the bottom of the partograph on the time line.

**Drugs and IV solutions:** The injections administered are marked in empty fields.

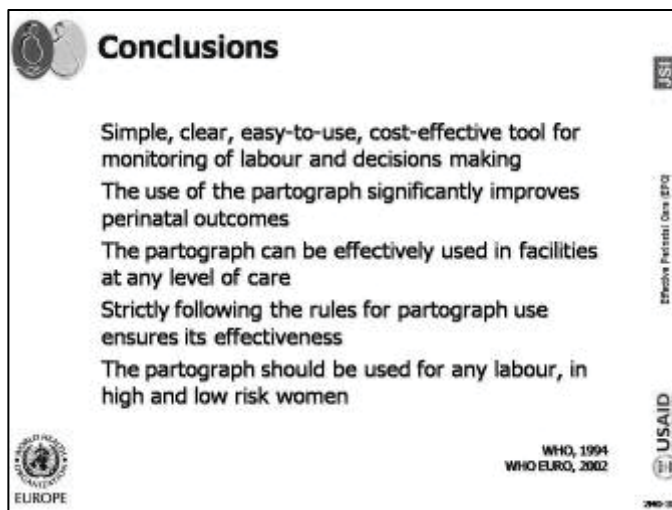
**Pressure, pulse, temperature:** Regularly registered in special cells of the partograph. Pulse (plotted with dots on the partograph) should be taken every half an hour, arterial pressure (reported by a line between systolic and diastolic pressure values) and temperature – every 4 hours (or more often, if necessary).

**Urine:** The volume of urine is registered at every urination (encourage the women to urinate every 4 hours).

Look at the amount of the urine. The protein and acetone should be tested, if necessary.

*Essential Antenatal, Perinatal and Postpartum Care. WHO, Copenhagen, 2002*

*Preventing Prolonged Labour: a practical guide. The Partograph, Part 1: Principles and Strategy. WHO, Geneva, 1994.*



**Conclusions**

- Simple, clear, easy-to-use, cost-effective tool for monitoring of labour and decisions making
- The use of the partograph significantly improves perinatal outcomes
- The partograph can be effectively used in facilities at any level of care
- Strictly following the rules for partograph use ensures its effectiveness
- The partograph should be used for any labour, in high and low risk women

WHO, 1994  
WHO EURO, 2002

USAID

Effective Perinatal Care (EPC)

EUROPE

### Slide 2MO-31 Conclusions

The WHO proposes using the partograph to improve the quality of delivery management and decrease the rate of maternal and neonatal mortality and morbidity.

The partograph is the so called “early warning system” that helps staff make timely decisions regarding interventions, transfers to higher levels of care or caesarean deliveries.

Importantly, the regular use of the partograph provides a high quality of

labour monitoring for mother and foetus in labour.

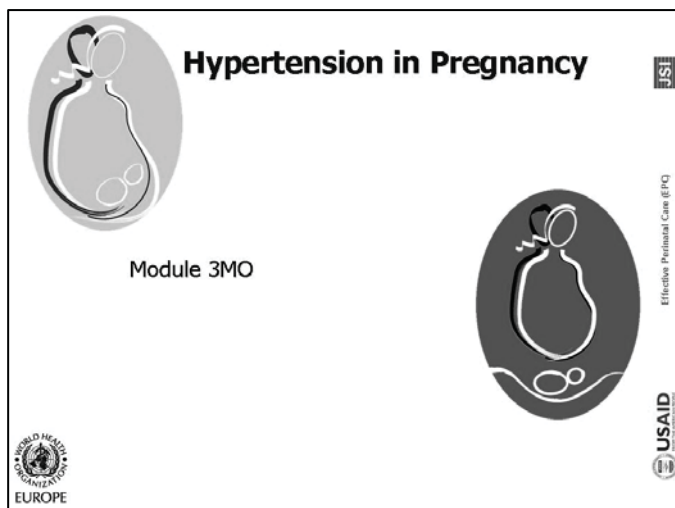
The partograph also detects early warning signs about the status of the maternal and foetal condition .

*Essential Antenatal, Perinatal and Postpartum Care. WHO, Copenhagen, 2002*

*Preventing Prolonged Labour: a practical guide. The Partograph, Part 1: Principles and Strategy. WHO, Geneva, 1994.*

# **Hypertension in Pregnancy**



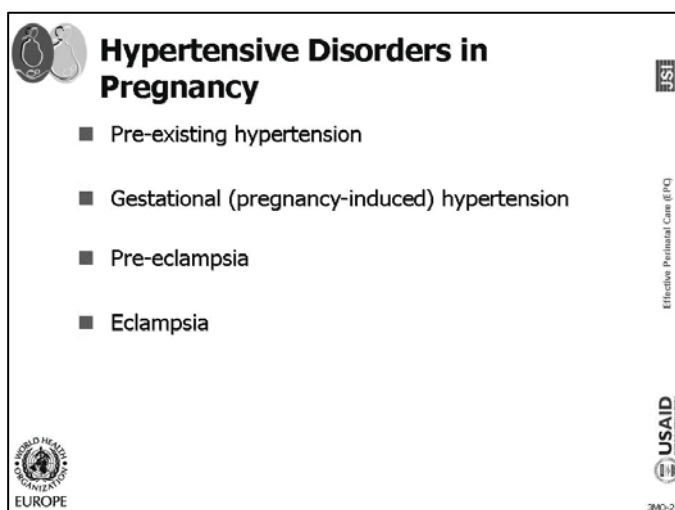


### Slide 3MO-1 Hypertension in Pregnancy

Learning objectives:

- To learn international diagnostic and classification criteria for hypertensive disorders in pregnancy
- To be able to use evidence based management of hypertensive disorders in pregnancy
- To realize the danger of over-diagnosis and over-treatment of hypertensive disorders in pregnant women
- To acknowledge the risks associated

with intubation and fluid overload in patients with severe pre-eclampsia.



### Slide 3MO-2 Hypertensive Disorders in Pregnancy

#### Pre-existing hypertension:

Essential hypertension: blood pressure  $\geq 140$  mmHg systolic and/or  $\geq 90$  mmHg diastolic (K5) pre-conception, or in the first half of pregnancy without an apparent underlying cause. It may also be diagnosed in those women presenting in pregnancy taking antihypertensive medications, again with no apparent underlying cause.

Secondary hypertension: hypertension associated with renal, renovascular and

endocrine disorders and aortic coarctation.

**Gestational (pregnancy-induced) hypertension:** hypertension arising in pregnancy after 20 weeks gestation without any other feature of the multisystem disorder, and which resolves within 3 months postpartum.

**Pre-eclampsia:** usually detected at first by high blood pressure measurement, but features other than hypertension are required to make the diagnosis. It is now recognised that pre-eclampsia is a disorder which affects other organ systems including the foeto-placental unit. Proteinuria is the most commonly recognised feature of pre-eclampsia after hypertension, but should not be considered mandatory to make the clinical diagnosis.

#### Pre-eclampsia superimposed on chronic hypertension:

In women with chronic hypertension, superimposed pre-eclampsia is diagnosed when one or more of the systemic features of pre-eclampsia develop after 20 weeks gestation. In women with chronic renal disease a diagnosis of superimposed pre-eclampsia is often difficult. In such women, sudden increases in proteinuria and hypertension should mean increased surveillance for pre-eclampsia, but the diagnosis is not secure without the development of other features, e.g. abnormal liver function, thrombocytopenia or neurological abnormalities.

**Eclampsia:** generalized convulsions not associated with epilepsy or other known pathology.

WHO lists the following as hypertensive disorders of pregnancy (ICD-10):



- Hypertension during pregnancy may develop as a result of the pregnancy or follow pre-existing hypertension (either essential or secondary). Hypertension arising for the first time after 20 weeks gestation may be an isolated finding, i.e., gestational hypertension, or part of a multisystem disorder, i.e. pre-eclampsia.

*The detection, investigation and management of hypertension in pregnancy: executive summary. Recommendations from the Council of the Australasian Society for the Study of Hypertension in Pregnancy. ASSHP Consensus Statement, Executive Summary, Final edited version, 7/05/00, 1/55.*

*International Classification of Diseases (ICD), 10<sup>th</sup> Edition, 1990.*

**Criteria of Hypertension in Pregnancy**

- Hypertension
  - Systolic blood pressure is  $\geq 140$  mmHg
  - AND/OR
  - Diastolic blood pressure (Korotkoff V) is  $\geq 90$  mmHg
- Severe hypertension
  - Diastolic BP  $\geq 110$  mm Hg on two occasions
  - OR
  - Systolic BP  $\geq 170$  mm Hg on two occasions

ASSHP Consensus Statement, 2000  
RCOG, 2006

USAID

3MO-3

### Slide 3MO-3 Criteria of Hypertension in Pregnancy

Severe pre-eclampsia is variously defined. There is consensus that severe hypertension is confirmed with a diastolic blood pressure  $\geq 110$  mmHg on two occasions or systolic blood pressure  $\geq 170$  mmHg on two occasions.

There is less agreement about the degree of moderate hypertension, which together with other symptoms or signs, constitutes severe pre-eclampsia.

*Royal College of Obstetrician and Gynaecologists. THE MANAGEMENT OF SEVERE PRE-ECLAMPSIA/ECLAMPSIA. Guideline No. 10(A), RCOG Press, March 2006.*

*Fiona Milne et al. The pre-eclampsia community guideline (PRECOG): How to screen for and detect onset of pre-eclampsia in the community. BMJ, 2005, 330, 576-580.*

**Chronic Hypertension**

- Chronic hypertension is a major predisposing factor for pre-eclampsia
- The majority of women with chronic hypertension who do NOT develop pre-eclampsia have a normal perinatal outcome
- Treatment is aimed at preventing the development of severe hypertensive disease
- Anti-hypertensive medication should be administered as dictated by the blood pressure
- Outpatient treatment is preferable

Murray W. Enkin et al, 2000

USAID

3MO-4

### Slide 3MO-4 Chronic Hypertension

Level of blood pressure is influenced by many factors and should be measured in a manner that reduces the likelihood of artefact.

When taking blood pressure, the woman should be rested and sitting at a 45-degree angle. The blood pressure cuff should be of the appropriate size and should be placed at the level of the heart. Multiple readings should be used to confirm the diagnosis. Korotkoff phase 5 is the appropriate measurement of diastolic blood pressure. The method used should

be consistent and documented. [A]

Automated methods need to be used with caution, as they may give inaccurate blood pressure readings in pre-eclampsia. [B]

It has been suggested that mercury sphygmomanometers should be used to establish baseline blood pressure as a reference unless the automated machine has been validated in pregnancy. However, many units no longer have mercury sphygmomanometers and so a baseline check with another validated device would be an alternative.

Royal College of Obstetrician and Gynaecologists. *THE MANAGEMENT OF SEVERE PRE-ECLAMPSIA/ECLAMPSIA*. Guideline No. 10(A), RCOG Press, March 2006.

Murray W. Enkin et al. *A guide to effective care in pregnancy and childbirth*. Oxford University Press, 3<sup>rd</sup> edition, 2000.

**Gestational (Pregnancy-Induced) Hypertension (1)**

- Arises in pregnancy after 20 weeks gestation without any other feature of the multisystem disorder pre-eclampsia and resolves within 3 months postpartum.

ASSHP Consensus Statement, 2000

WORLD HEALTH ORGANIZATION EUROPE

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Effective Perinatal Care (EPC)

3MO-5

### Slide 3MO-5 Gestational (Pregnancy-Induced) Hypertension (1)

Definition of gestational (pregnancy-induced) hypertension.

*The detection, investigation and management of hypertension in pregnancy: executive summary. Recommendations from the Council of the Australasian Society for the Study of Hypertension in Pregnancy. ASSHP Consensus Statement, Executive Summary, Final edited version, 7/05/00, 1/55.*

**Gestational (Pregnancy-Induced) Hypertension (2)**

- In mild or moderate pregnancy-induced hypertension there is:
  - Little risk for the mother or the foetus unless severe hypertension, pre-eclampsia or eclampsia occur
  - Hospitalization and bed-rest – not recommended
  - The use of diuretics has - no effect on the incidence of:
    - Proteinuria
    - Intra-uterine growth restriction
    - Preterm birth
    - Caesarean section
- If proteinuria develops admission to hospital for evaluation and increased surveillance is recommended
  - To detect any deterioration in maternal or foetal condition

Murray W. Enkin, 2000  
RCOG, 2006

WORLD HEALTH ORGANIZATION EUROPE

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Effective Perinatal Care (EPC)

3MO-6

### Slide 3MO-6 Gestational (Pregnancy-Induced) Hypertension (2)

Women with mild or moderate pregnancy-induced hypertension are often advised to rest in bed at home, or they may be admitted to hospital to facilitate bed-rest or to permit closer investigation and surveillance of their pregnancies. The intervention is not innocuous. Both confinement to bed at home, and hospitalization during pregnancy, may result in financial and social costs for pregnant women and their families. To date, there is no good evidence to support a policy of strict bed-rest for women with mild or moderate pregnancy-induced hypertension.

nancy-induced hypertension.

When proteinuria develops in addition to hypertension in pregnancy, the risk for both mother and foetus are substantially increased. Admission to hospital is then considered necessary.

Murray W. Enkin et al. *A guide to effective care in pregnancy and childbirth*. Oxford University Press, 3<sup>rd</sup> edition, 2000.

**Antihypertensive Therapy of the Mild or Moderate Pregnancy-Induced Hypertension**

- Prevents the development of severe hypertension

**BUT**

- No effect on the risk of pre-eclampsia
- No clear effect on the risk of perinatal morbidity and mortality, preterm deliveries or small for gestational age babies

Murray W. Enkin et al, 2000  
Abalos E et al, 2001

**Slide 3MO-7 Antihypertensive Therapy of the Mild or Moderate Pregnancy-Induced Hypertension**

Forty-six studies (4282 women) were included in the review evaluating the effect of antihypertensive drugs in pregnant women with mild or moderate hypertension. Twenty-eight trials compared an antihypertensive drug with placebo/no antihypertensive drug (3200 women). There is a halving in the risk of developing severe hypertension associated with the use of antihypertensive drug(s) [19 trials, 2,409 women; relative risk (RR) 0.50 (95% confidence interval (CI) 0.41 to

0.61); risk difference (RD) -0.10 (-0.12 to -0.07); (NNT) 10 (8 to 13)], but little evidence was detected for a difference in the risk of pre-eclampsia [22 trials, 2,702 women; RR 0.97 (0.83 to 1.13)]. Similarly, there is no clear effect of antihypertensive drugs on the risk of the baby dying [26 trials, 3,081 women; RR 0.73(0.50 to 1.08)], preterm birth [14 trials, 1,992 women; RR 1.02 (0.89 to 1.16)], or small for gestational age babies [19 trials, 2,437women; RR 1.04 (0.84 to 1.27)]. There were no clear differences in any other outcomes.

The conclusion of the review is that from available evidence, it remains unclear whether anti-hypertensive drug therapy for mild to moderate hypertension during pregnancy is worthwhile.

There is no clear evidence that antihypertensive treatment with any of the drugs available may defer or prevent the occurrence of proteinuric pre-eclampsia or of associated problems, such as foetal growth restriction and neonatal morbidity. Nor is there good evidence about the safety of such treatments, in particular with respect to child development. Methyldopa has been the most studied agent. If an antihypertensive agent is to be used, it is probably the agent of choice, except in the context of randomised comparison with other agents.

*Abalos E, Duley L, Steyn DW, Henderson-Smart DJ. Antihypertensive drug therapy for mild to moderate hypertension during pregnancy. The Cochrane Database of Systematic Reviews, 2007, Issue 1.*

*Murray W. Enkin et al. A guide to effective care in pregnancy and childbirth. Oxford University Press, 3<sup>rd</sup> edition, 2000.*

**Pre-eclampsia: Problem**

- Affects 3% of pregnancies
- Reason of death for 100.000 women yearly worldwide
- One of 3 main reasons for maternal deaths
- Leads to 25% of very low birth weight babies (<1500 g) and 15% of preterm births
- Consequences for mother include – eclampsia, renal and liver insufficiency, pulmonary oedema, intracerebral haemorrhages, etc.

Andrew H Shennan, 2003  
RCOG, 2006

**Slide 3MO-8 Pre-eclampsia: Problem**

The most common causes of maternal death in women with pre-eclampsia are intracranial haemorrhages, (which is more often associated with inadequate blood pressure control), pulmonary complications (a consequence of fluid overloading in postpartum period), as well as complications of intubation / extubation.

The detection of hypertension and proteinuria, the defining signs of this syndrome, is the key aim of frequent surveillance in pregnancy. Pre-eclampsia occurs in about 3% of pregnant women and re-

sults in around 100,000 maternal deaths per year worldwide. The foetus is also affected directly


through placental insufficiency, and indirectly through iatrogenic delivery. This accounts for 25% of all infants with a very low birth weight (< 1500 g). The onset and course of pre-eclampsia are unpredictable, and it therefore results in enormous use of health resources. Accurate prediction and targeted preventive measures would have enormous benefit.

Hypertensive disorders are also associated with increased risks of stillbirth and death of the neonate. Relative risk of stillbirths is 9.6 times higher in women with pre-eclampsia versus normotensive women (diastolic hypertension alone increases relative risk by 4.1 times).

*Andrew H Shennan. Recent developments in obstetrics. Clinical review. BMJ 2003, 327, 604-608.*


*Friedman E; Neff R. Pregnancy Hypertension. Massachusetts: PSG Publishing Company Inc., 1977.*

*Royal College of Obstetrician and Gynaecologists. THE MANAGEMENT OF SEVERE PRE-ECLAMPSIA/ECLAMPSIA. Guideline No. 10(A), RCOG Press, March 2006.*



## Pre-eclampsia: Definition

- Pre-eclampsia
  - Hypertension associated with proteinuria (> 0.3 g in 24 hours) ± oedema. Virtually any organ system can be affected
- Severe pre-eclampsia
  - Severe hypertension plus proteinuria, OR
  - Any hypertension plus proteinuria, plus one of following symptoms:
    - Severe headache
    - Visual disturbance
    - Epigastric pain and/or vomiting
    - Signs of clonus
    - Papilloedema
    - Liver tenderness
    - Platelet count falling to below  $100 \times 10^9/l$
    - Abnormal liver enzymes (ALT or AST rising to above 70 iu/l)
    - HELLP syndrome



RCOG, 2006

3MO-9

### Slide 3MO-9 Pre-eclampsia: Definition

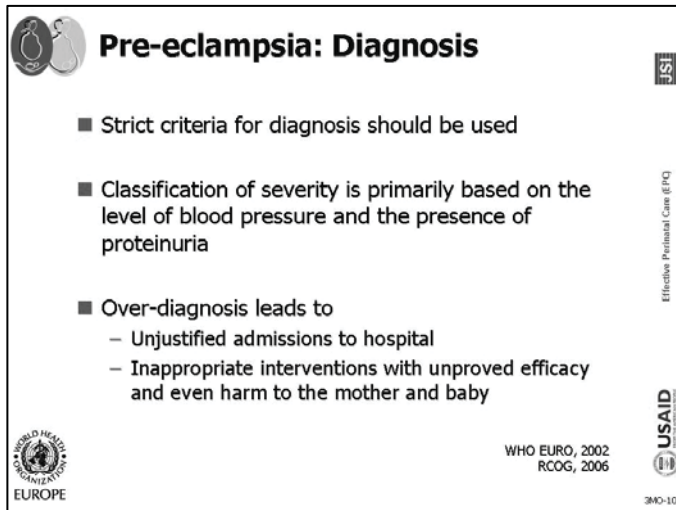
Severe pre-eclampsia is a life threatening stage of the disease and should be considered as an obstetric emergency. In rare cases signs and symptoms of severe pre-eclampsia may develop in the absence of very high blood pressure or proteinuria, especially when women are treated with antihypertensive drugs.

A diastolic blood pressure  $\geq 100$  mmHg on two occasions, and significant proteinuria with at least two signs or symptoms of imminent eclampsia, will include many women with severe pre-eclampsia, al-

though it should be remembered that some women who present with eclampsia have no prodromal signs. An important variant of severe pre-eclampsia is the HELLP syndrome (haemolysis, elevated liver enzymes and low platelet count).

*Royal College of Obstetrician and Gynaecologists. THE MANAGEMENT OF SEVERE PRE-ECLAMPSIA/ECLAMPSIA. Guideline No. 10(A), RCOG Press, March 2006.*

*American College of Obstetricians and Gynecologists (ACOG). Diagnosis and management of pre-eclampsia and eclampsia. Washington (DC): American College of Obstetricians and Gynecologists (ACOG), Jan 2002.*



**Pre-eclampsia: Diagnosis**

- Strict criteria for diagnosis should be used
- Classification of severity is primarily based on the level of blood pressure and the presence of proteinuria
- Over-diagnosis leads to
  - Unjustified admissions to hospital
  - Inappropriate interventions with unproved efficacy and even harm to the mother and baby

WHO EURO, 2002  
RCOG, 2006

USAID

3MO-10

### Slide 3MO-10 Pre-eclampsia: Diagnosis

Although the classification of severity is primarily based on blood pressure levels and the presence of proteinuria, clinicians should be aware of the potential involvement of other organs when assessing maternal risk, including placental disease with foetal manifestations. [C]

Over-diagnosis and over-reaction to mild disease may lead to inappropriate interventions, unnecessary treatment and hospitalization.

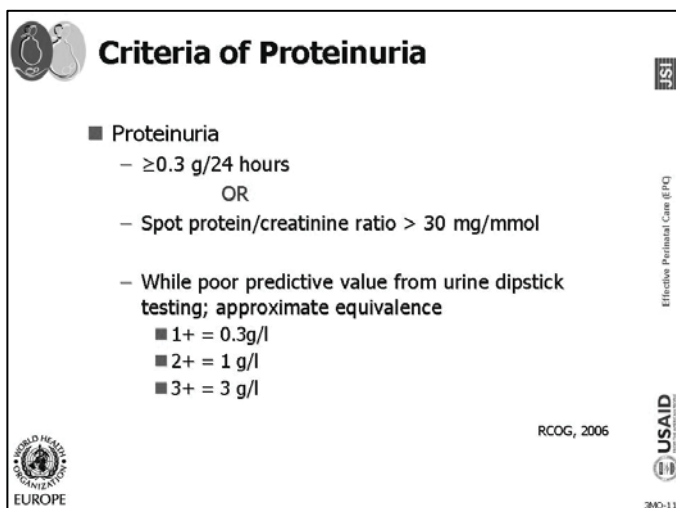
In every case of pre-eclampsia there is the potential for disaster. The condition might progress rapidly to a disastrous outcome for mother and baby, or for both. For this reason, maternity services have developed strategies for protecting women and babies recognized to be at risk. In many countries these have involved low thresholds for diagnosing significant pre-eclampsia and early recourse to prolonged hospitalization.

What is the aim of hospitalization? To monitor cases where pre-eclampsia may develop to a point where delivery of the baby (which will stop the process of the baby's intrauterine development) is mandatory. We now recognize that this can be achieved safely in an outpatient setting, and that our previous approach was over-protective. It evolved from good intentions, but was too aggressive.

*Royal College of Obstetrician and Gynaecologists. THE MANAGEMENT OF SEVERE PRE-ECLAMPSIA/ECLAMPSIA. Guideline No. 10(A), RCOG Press, March 2006.*

*Essential Antenatal, Perinatal and Postpartum Care. WHO EURO, Copenhagen, 2002.*

*Murray W. Enkin et al. A guide to effective care in pregnancy and childbirth. Oxford University Press, 3<sup>rd</sup> edition, 2000P*



**Criteria of Proteinuria**

- Proteinuria
  - $\geq 0.3$  g/24 hours
  - OR
  - Spot protein/creatinine ratio  $> 30$  mg/mmol
- While poor predictive value from urine dipstick testing; approximate equivalence
  - 1+ = 0.3g/l
  - 2+ = 1 g/l
  - 3+ = 3 g/l

RCOG, 2006

USAID

3MO-11

### Slide 3MO-11 Criteria of Proteinuria

The usual proteinuria screening test is visual dipstick assessment. A two plus dipstick measurement can be taken as evidence of proteinuria but ideally a more accurate test (either a spot protein creatinine ratio or ideally a 24-hour urine collection) is required to confirm this [C].


While it has to be acknowledged that there is poor predictive value from urine dipstick testing, approximate equivalence is 1+ = 0.3 g/l, 2+ = 1 g/l and 3+ = 3 g/l. False negative as well as false positive rates are recorded with the use of visual

dipstick assessment. Problems can be reduced by training. An automatic dipstick reader can overcome some of the observer error found with urinary dipsticks but these are not routinely

available. Newer techniques such as protein/creatinine ratios have not been fully evaluated but may be a valid alternative. A level of 0.03 g/mmol appears to be equivalent to 0.3 g/24 hours. In view of the high false positive rates with dipsticks, laboratory testing, usually by 24-hour urine collection, is recommended to confirm significant proteinuria, unless the clinical urgency dictates immediate delivery.

Urinary tract infection should be also excluded.





*Royal College of Obstetrician and Gynaecologists. THE MANAGEMENT OF SEVERE PRE-ECLAMPSIA/ECLAMPSIA. Guideline No. 10(A), RCOG Press, March 2006.*



## Oedema

- Oedema of hands and ankles is frequently a normal physiological response (50-80%) to an increase in circulation and weight gain in pregnancy
- Use of oedema as a criteria to diagnose pre-eclampsia often leads to overdiagnosis
- Only appearance of sudden and/or generalized oedema should be considered when diagnose pre-eclampsia

Murray W. Enkin et al, 2000


### Slide 3MO-12 Oedema

Feature such as oedema above the patient's baseline no longer is a diagnostic criterion.

Increasing oedema is not in itself a sign that should determine management.

*Royal College of Obstetrician and Gynaecologists. THE MANAGEMENT OF SEVERE PRE-ECLAMPSIA/ECLAMPSIA. Guideline No. 10(A), RCOG Press, March 2006.*





*Murray W. Enkin et al. A guide to effective care in pregnancy and childbirth. Oxford University Press, 3<sup>rd</sup> edition, 2000.*



## Prevention of Pre-eclampsia Effective Methods

- Use of antiplatelet agents (low dose aspirin, 75 mg per day)
  - Decreased risk of pre-eclampsia by 19% in high risk groups
  - Can be useful in some high risk groups, such as chronic hypertension, anti-phospholipids syndrome, etc.
- Calcium supplementation (1 g per day)
  - Likely beneficial for women at high risk for hypertension in pregnancy, and
  - Pregnant women living in communities with low calcium intake

Murray W. Enkin et al, 2000  
Duley L et al, 2003  
GJ Hofmeyr et al, 2006

### Slide 3MO-13 Prevention of Pre-eclampsia Effective Methods

Antiplatelet agents cause a small to moderate reduction of the risk of pre-eclampsia and perinatal death. These drugs may be used for prevention of these complications in pregnant women with high risk factor such as chronic hypertension, antiphospholipid syndrome.

A systematic review of 51 trials, involving 36,500 women determined a 19% reduction of the risk of pre-eclampsia associated with the use of antiplatelet agents

((43 trials, 33,439 women; RR 0.81, 95% CI 0.75 to 0.88); NNT 69).

Foetal or neonatal deaths were studied in 38 trials (34,010 women). Reduction in baby deaths by 16% were reported in the antiplatelet group ((RR 0.84, 95% CI 0.74 to 0.96); NNT 227) and reduction of the risk of small-for-gestational age babies by 8% (32 trials, 24310 women, RR 0.92, 95% CI 0.85 to 1.00).

The authors' conclusion was that antiplatelet agents, mostly low-dose aspirin, have small or moderate benefits when used for prevention of pre-eclampsia.

Although the routine widespread use of prophylactic aspirin is not supported by the results of the trials, it would appear that low dose aspirin does have some limited clinical value. Further research is required to determine which women are most likely to benefit.

*Murray W. Enkin et al. A guide to effective care in pregnancy and childbirth. Oxford University Press, 3<sup>rd</sup> edition, 2000.*

*Duley L, Henderson-Smart DJ, Knight M, King JF. Antiplatelet agents for preventing pre-eclampsia and its complications. The Cochrane Database of Systematic Reviews, 2003, Issue 4.*

*Knight M, Duley L, Henderson-Smart DJ, King JF. Antiplatelet agents for preventing and treating pre-eclampsia. The Cochrane Database of Systematic Reviews, 2000, Issue 2.*

Twelve studies of good quality were included in systematic review - randomized trials comparing at least one gram daily of calcium during pregnancy with placebo.

The risk of high blood pressure was reduced with calcium supplementation rather than placebo (11 trials, 14,946 women: relative risk (RR) 0.70, 95% confidence interval (CI) 0.57 to 0.86). There was also a reduction in the risk of pre-eclampsia associated with calcium supplementation (12 trials, 15,206 women: RR 0.48, 95% CI 0.33 to 0.69). The effect was greatest for high-risk women (5 trials, 587 women: RR 0.22, 95% CI 0.12 to 0.42), and those with low baseline calcium intake (7 trials, 10,154 women: RR 0.36, 95% CI 0.18 to 0.70).


The composite outcome maternal death or serious morbidity was reduced (4 trials, 9732 women; RR 0.80, 0.65 to 0.97).

There was no overall effect on the risk of preterm birth (10 trials, 14,751 women: RR 0.81, 95% CI 0.64 to 1.03), or stillbirth or death before discharge from hospital (10 trials 15,141 babies; RR 0.89, 95% CI 0.73 to 1.09).

Authors' conclusions:

Calcium supplementation appears to almost halve the risk of pre-eclampsia, and to reduce the rare occurrence of the composite outcome death or serious morbidity.

*Hofmeyr GJ, Atallah AN, Duley L. Calcium supplementation during pregnancy for preventing hypertensive disorders and related problems. Cochrane Database of Systematic Reviews 2006, Issue 3.*





### Prevention of Pre-eclampsia

#### Ineffective Methods

- Administering diuretics
- Administering antithrombotic agents (Heparin, Warfarin)
- Increasing protein and energy intake generally
- Restricting protein or energy intake for obese women
- Supplementing iron, folate, magnesium, zinc, or fish oil
- Restricting salt and fluid intake

Murray W. Enkin et al, 2000  
Villar J et al, 2003



### Slide 3MO-14 Prevention of Pre-eclampsia Ineffective Methods

There is no evidence that excessive water retention or even frank oedema either causes pre-eclampsia, or defines a group of women at particular risk of developing the condition.

There is no clear evidence that using diuretics is a benefit with respect to the prevention of pre-eclampsia or lowers the risk of perinatal death.

Heparin requires subcutaneous (or intravenous) administration, making it an inconvenient form of prophylaxis, and its use may be associated with dangerous side-effects. Warfarin has also been used prophylactically in an attempt to prevent recurrent pre-eclampsia in multiparous women. Anecdotal reports of its use do not provide any evidence of benefit for either the mother or the baby, and there is some suggestion that it may have serious side-effects.

A recent overview of randomized trials of nutritional interventions during pregnancy reports that nutritional advice on increasing protein and energy intake generally or restricting protein or energy intake for obese women; supplementing iron, folate, magnesium, zinc, or fish oil; and restricting salt and fluid intake are likely to be ineffective.

*Murray W. Enkin et al. A guide to effective care in pregnancy and childbirth. Oxford University Press, 3<sup>rd</sup> edition, 2000.*

*Villar J et al. Nutritional interventions during pregnancy for the prevention or treatment of maternal morbidity and preterm delivery: an overview of randomised controlled trials. J Nutr, 2003, 133, 1S–20S.*

**Monitoring of the Woman with Severe Pre-eclampsia**

- Check blood pressure
- Full blood count
- Liver function tests
- Renal function tests
- Pay close attention to fluid balance by charting of input and output of urine
  - A catheter with an hourly urometer is advisable in the acute situation

RCOG, 2006

USAID  
EFFECTIVE PERINATAL CARE (EPQ)

WHO  
EUROPE

3MO-15

### Slide 3MO-15 Monitoring of the Woman with Severe Pre-eclampsia

Blood pressure should be checked every 15 minutes until the woman is stabilized, and then every 30 minutes in the initial phase of assessment. The blood pressure should be checked every 4 hours if a conservative management plan is in place and the woman is stable and asymptomatic.

Assessment of the woman requires a full blood count, liver function and renal function tests. These should be repeated at least daily when the results are normal, but more often if the clinical condition

changes, or if there are abnormalities.

Clotting studies are not required if the platelet count is over  $100 \times 10^6/l$ .

*Royal College of Obstetrician and Gynaecologists. THE MANAGEMENT OF SEVERE PRE-ECLAMPSIA/ECLAMPSIA. Guideline No. 10(A), RCOG Press, March 2006.*

**Assessing the Foetus**

- Initial assessment with cardiotocography
- Continuous electronic foetal monitoring in labour
- If conservative management is planned
  - Ultrasound measurements of foetal size
  - Umbilical artery Doppler and amniotic fluid volume
    - Serial assessment will allow timing of delivery to be optimised

RCOG, 2006

USAID  
EFFECTIVE PERINATAL CARE (EPQ)

WHO  
EUROPE

3MO-16

### Slide 3MO-16 Assessing the Foetus

In the acute setting, do an initial assessment with cardiotocography. This gives information about fetal wellbeing at that time but does not give any predictive information. [B]

Women in labour with severe pre-eclampsia should have continuous electronic fetal monitoring. [B]

If conservative management is planned, then further assessment of the fetus with ultrasound measurements of fetal size, umbilical artery Doppler and amniotic fluid



volume should be undertaken. Serial assessment will allow timing of delivery to be optimised. [A]

The value of Doppler in other fetal blood vessels has yet to be clarified. [C]

Cardiotocography (non-stress test) is the mainstay of fetal monitoring in most units. It can be repeated regularly and easily without expensive equipment or highly skilled personnel. It gives information concerning fetal wellbeing at that time but has little predictive value. If the woman is in labour, continuous electronic fetal monitoring is appropriate.

*Royal College of Obstetrician and Gynaecologists. THE MANAGEMENT OF SEVERE PRE-ECLAMPSIA/ECLAMPSIA. Guideline No. 10(A), RCOG Press, March 2006.*

**Management of Severe Pre-eclampsia**

- Control of blood pressure
- Prevention of seizures
- Delivery at optimal time for mother and foetus

RCOG, 2006

JSE  
Effective Perinatal Care (EPC)  
USAID  
3MO-17  
WORLD HEALTH ORGANIZATION EUROPE

### Slide 3MO-17 Management of Severe Pre-eclampsia

The management of severe pre-eclampsia is based on careful assessment, stabilization, continued monitoring and delivery at the optimal time for the mother and her baby.

Senior obstetric and anaesthetic staff and experienced midwives should be involved.

Controlling blood pressure, although it does not treat the cause of pre-eclampsia, may reduce the severity of

complications from severe pre-eclampsia.

Prolongation of pregnancy in severe pre-eclampsia may increase the incidence of maternal complications.

*Royal College of Obstetrician and Gynaecologists. THE MANAGEMENT OF SEVERE PRE-ECLAMPSIA/ECLAMPSIA. Guideline No. 10(A), RCOG Press, March 2006.*

**When to Start Antihypertensive Therapy?**

- In women with:
  - Systolic blood pressure over 160 mm Hg
  - Diastolic blood pressure over 110 mm Hg
  - Other markers of potentially severe disease at lower degrees of hypertension
    - Heavy proteinuria
    - Disordered liver enzymes
    - Poor haematological test results

If the blood pressure is below 160/100 mmHg, there is no immediate need for antihypertensive therapy

RCOG, 2006

JSE  
Effective Perinatal Care (EPC)  
USAID  
3MO-18  
WORLD HEALTH ORGANIZATION EUROPE

### Slide 3MO-18 When to Start Antihypertensive Therapy?

Antihypertensive treatment should be started in women with a systolic blood pressure over 160 mm Hg, or a diastolic blood pressure over 110 mmHg. In women with other markers of potentially severe disease, treatment can be considered at lower degrees of hypertension. [C]

There has been a general consensus that blood pressure greater than 170/110 mmHg requires treatment in the maternal interest, although this is not supported by randomised trials. There is, however, a

clear rationale supported by the desire to prevent the known risk of vascular damage due to uncontrolled hypertension. The Confidential Enquiries into Maternal Deaths have suggested a lower threshold of 160 mmHg systolic. There is also a consensus that, if the blood pressure is below 160/100 mmHg, there is no immediate need for antihypertensive therapy. An exception may be if there are markers of potentially more severe disease, such as heavy proteinuria or haematological test results. Since, in this situation, alarming rises in blood pressure may be anticipated, anti-hypertensive treatment at lower blood pressure levels may be justified.

There is continuing debate concerning women with a blood pressure between 100 mmHg and 110 mmHg diastolic.

*Royal College of Obstetrician and Gynaecologists. THE MANAGEMENT OF SEVERE PRE-ECLAMPSIA/ECLAMPSIA. Guideline No. 10(A), RCOG Press, March 2006.*

*Von Dadelszen P et al. Fall in mean arterial pressure and fetal growth restriction in pregnancy hypertension: a meta-analysis. Lancet, 2000 Jan, 355, 87–92.*

**Blood Pressure Control**  
**Rapid Acting Antihypertensive Drugs**

- Hydralazine (dilates arteries reducing resistance to blood flow)
  - Intravenous injection, usually in a saline drip
  - Unpleasant side effects in approximately 50% of cases, including severe headache, palpitations, restlessness and anxiety
  - May mimic the symptoms of impending eclampsia
- Nifedipine (a calcium channel blocker)
  - Reduces blood pressure and can be taken orally
  - Headaches are even more common than with hydralazine
- Labetalol
  - IV infusion is an alternative to nifedipine
  - Fewer side effects
- Sodium Nitroprusside

National High Blood Pressure Education Program, 2000  
RCOG, 2006

### Slide 3MO-19 Blood pressure control Rapid Acting Antihypertensive Drugs

Labetalol, given orally or intravenously, nifedipine given orally or intravenously and hydralazine can be used for the acute management of severe hypertension. [A]

In moderate hypertension, treatment may assist prolongation of the pregnancy. Clinicians should use agents with which they are familiar. [C]

The preferred therapeutic agents are labetalol, nifedipine or hydralazine. Labetalol's advantage is it can be given initially

by mouth in severe hypertension and then, if needed, intravenously.

**Labetalol:** Start with 20 mg intravenously as a bolus. If the effect is suboptimal, then give 40 mg 10 minutes later and 80 mg every 10 minutes for two additional doses to a maximum of 220 mg. If desired blood pressure levels are not achieved, switch to another drug. Avoid giving labetalol to women with asthma or congestive heart failure.

**Nifedipine:** Start with 10 mg orally and repeat in 30 minutes if necessary. Nifedipine should be given orally not sublingually.

An interaction between Nifedipine and magnesium sulphate can produce profound muscle weakness, maternal hypotension and worsening of foetal status.

**Hydralazine:** Start with 5 mg intravenously (IV) or 10 mg intramuscularly (IM). If blood pressure is not controlled, repeat at 20-minute intervals (5 to 10 mg depending on response). Once blood pressure control is achieved, repeat as needed (usually about 3 hours). If no success by 20 mg intravenous or 30 mg intramuscular total, consider another drug.

Hydralazine and IV Labetalol frequently are not available in most NIS countries. Interaction of Nifedipine and magnesium sulphate may produce serious complications. So, other potential antihypertensive drugs such as sodium nitroprusside (or Isoket) should be available and used in refractory cases.

Sodium nitroprusside is rarely needed for treatment of hypertension not responding to the drugs listed above, and/or if there are clinical findings of hypertensive encephalopathy. Start at a rate of 0.25 micrograms/kg/min to a maximum dose of 5 micrograms/kg/min. Foetal cyanide poisoning may occur if used for more than 4 hours.

*Report of the National High Blood Pressure Education Program Working Group on High Blood Pressure in Pregnancy. Am J Obstet Gynecol, 2000, 183(1), S1-22.*

*Duley L, Henderson-Smart DJ. Drugs for treatment of very high blood pressure during pregnancy. In: The Cochrane Library, Issue 4, 2002.*

*Royal College of Obstetrician and Gynaecologists. THE MANAGEMENT OF SEVERE PRE-ECLAMPSIA/ECLAMPSIA. Guideline No. 10(A), RCOG Press, March 2006.*

**Blood Pressure Control**  
**Slow Acting Antihypertensive Drugs**

- Methyldopa
  - Causes extreme sleepiness for the first 48 hours
  - Is the only hypertensive drug known to have little long term effect on the baby after initial sedation
- Clonidine
  - More rapid onset of action than Methyldopa (about 30 min)
- Beta-blockers such as oxprenolol
  - Cause fewer side effects than Methyldopa

National High Blood Pressure Education Program, 2000  
RCOG, 2006

### Slide 3MO-20 Blood Pressure Control Slow Acting Antihypertensive Drugs

Agents for long term control of blood pressure must be effective and safe for the foetus.

Methyldopa is preferred by many physicians as a first-line therapy, on the basis of reports of stable, uteroplacental blood flow and foetal hemodynamic, and on one observation of limited number of infants during 7.5 years showing no long-term adverse effects on development of children exposed to methyldopa in the uterus. At the same time, a systematic

review of 17 trials (1,182 women) show other antihypertensive agents likely to be better than methyldopa for reducing the risk of the baby dying.

*Report of the National High Blood Pressure Education Program. Working Group on High Blood Pressure in Pregnancy. Am J Obstet Gynecol, 2000, 183(1), S1-22.*

*Royal College of Obstetrician and Gynaecologists. THE MANAGEMENT OF SEVERE PRE-ECLAMPSIA/ECLAMPSIA. Guideline No. 10(A), RCOG Press, March 2006.*

**Blood Pressure Control Drugs NOT Recommended**

- The following should be avoided:
  - Atenolol
  - Angiotensin converting enzyme (ACE) inhibitors
  - Angiotensin receptor-blocking drugs (ARB)
  - Diuretics
    - These drugs aggravate hypovolemia, and
    - Side effects may be dangerous

RCOG, 2006

WHO EUROPE

USAID

3MO-21

Effective Perinatal Care (EPC)

JUST

### Slide 3MO-21 Blood Pressure Control Drugs NOT Recommended

Atenolol, angiotensin converting enzyme (ACE) inhibitors, angiotensin receptor-blocking drugs (ARB) and diuretics should be avoided. [B]

Atenolol is associated with an increase in fetal growth restriction.

ACE inhibitors and ARBs would appear to be contraindicated because of unacceptable fetal adverse effects (foetal growth retardation, oligohydramnion, neonatal renal failure and neonatal death).

Diuretics are relatively contraindicated for hypertension and should be reserved for pulmonary oedema.

*Royal College of Obstetrician and Gynaecologists. THE MANAGEMENT OF SEVERE PRE-ECLAMPSIA/ECLAMPSIA. Guideline No. 10(A), RCOG Press, March 2006.*

**Prevention of Seizures (1) Magnesium Sulphate**

- Administer routinely in **severe** pre-eclampsia
- Continue magnesium sulphate for 24 hours after delivery or 24 hours after the last seizure
  - The following should be regularly assessed:
    - Urine output
    - Maternal reflexes
    - Respiratory rate
    - Oxygen saturation
- Decision to use in less severe pre-eclampsia is less clear
  - Each case requires individual assessment

RCOG, 2006

WHO EUROPE

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3MO-22

Effective Perinatal Care (EPC)

JUST

### Slide 3MO-22 Prevention of Seizures (1) Magnesium Sulphate

Magnesium sulphate should be considered for women with pre-eclampsia for whom there is concern about the risk of eclampsia. This is usually in the context of severe pre-eclampsia once a delivery decision has been made and in the immediate postpartum period. In women with less severe disease the decision is less clear and will depend on individual case assessment. [A]

More women need to be treated with magnesium sulphate when pre-eclampsia is not severe to prevent one seizure when compared with severe pre-eclampsia. When conservative management of a woman with severe hypertension and a premature foetus is made, it would be reasonable not to treat until the decision to deliver has been made. If magnesium sulphate is given, it should be continued for 24 hours following delivery or 24 hours after the last seizure, whichever is the latter, unless there is a clinical reason to continue. When magnesium sulphate is given, regular assessment of urine output, maternal reflexes, respiratory rate and oxygen saturation is important.

*Royal College of Obstetrician and Gynaecologists. THE MANAGEMENT OF SEVERE PRE-ECLAMPSIA/ECLAMPSIA. Guideline No. 10(A), RCOG Press, March 2006.*

**Prevention of Seizures (2)**  
**RCT "MAGPIE"**

- Women allocated magnesium sulphate had:
  - A 58% lower risk of eclampsia
  - A tendency for lower maternal mortality
  - A decreased incidence of placental abruption

World Health Organization  
EUROPE

Duley L, 2002

USAID

Effective Perinatal Care (EPC)

3MO-23

**Slide 3MO-23 Prevention of Seizures (2) RCT "MAGPIE"**

RCT "MAGPIE" studied preventive use of magnesium in cases of pre-eclampsia. Eligible women (n=10141) had not given birth or were 24 hours or less postpartum; blood pressure of 140/90 mm Hg or more, with proteinuria of 1+ (30 mg/dL) or more. Women were randomised in 33 countries to either magnesium sulphate (n=5071) or placebo (n=5070). Primary outcomes were eclampsia and, for women randomised before delivery, death of the baby. Women allocated magnesium sulphate

had a 58% lower risk of eclampsia (95% CI 40-71) than those allocated placebo (40, 0.8%, vs 96, 1.9%; 11 fewer women with eclampsia per 1,000 women). Maternal mortality was also lower among women allocated magnesium sulphate (relative risk 0.55, 0.26-1.14). There was no clear difference in the risk of the baby death (576, 12.7%, versus 558, 12.4%; relative risk 1.02, 99% CI 0.92-1.14). The only notable difference in maternal or neonatal morbidity was for placental abruption (relative risk 0.67, 99% CI 0.45-0.89).

*Duley L. Do women with pre-eclampsia, and their babies, benefit from magnesium sulphate? The Magpie trial: a randomised placebo controlled trial. Lancet, 2002, 359, 1877-90.*

**Prevention of Seizures (3)**  
**Intravenous Regimen for Magnesium Sulphate**

- Start with 4 g intravenous loading dose within 20 minutes (20 ml of a 20% solution)
- Then continuous infusion at a rate of 1-2g/hour
- Traditionally, therapy is continued 24 hours either after delivery or the latest convulsion (in cases of eclampsia)
- Monitoring: level of consciousness, a patellar reflex is present, respiration rate exceeds 16 per minute, and urine output is not <20-30 ml per hour
- 10% Calcium gluconate should be available as an antidote for magnesium sulphate toxicity

World Health Organization  
EUROPE

CREST, 2001

USAID

Effective Perinatal Care (EPC)

3MO-24

**Slide 3MO-24 Prevention of Seizures (3) Intravenous Regimen for Magnesium Sulphate**

10% Calcium gluconate (1 ampoule = 1g) should be available at the bedside as an antidote for magnesium sulphate toxicity whenever magnesium sulphate is used.

Examples of magnesium sulphate treatment protocol include:

- General control of treatment with attention to fluid balance
- Urine excretion < 100 ml in 4 hours. If

no clinical signs of magnesium toxicity, decrease rate to 0.5 g/hour

- Absent patellar reflex. Stop MgSO<sub>4</sub> infusion until reflex returns
- Respiratory depression. Stop MgSO<sub>4</sub> infusion

Give oxygen via mask and place in safe position, because of impaired level of consciousness.

Continue careful monitoring

- Respiratory arrest: Stop MgSO<sub>4</sub> infusion. Give IV Calcium gluconate. Intubate and ventilate immediately.
- Cardiac arrest: Start cardio-pulmonary resuscitation. Stop MgSO<sub>4</sub> infusion. Give IV Calcium gluconate. Intubate and ventilate immediately. If women is pregnant deliver immediately.
- Antidote: 10% Calcium gluconate, 10 ml IV over 10 minutes.

*Management of severe pre-eclampsia and eclampsia. Clinical Resource Efficiency Support Team (CREST). August 2001.*

*Zuspan FP. Treatment of severe preeclampsia and eclampsia. Clin Obstet Gynecol 1966;9:954-972*

**Prevention of Seizures (4)  
Intramuscular Regimen for Magnesium Sulphate (Pritchard)**

- Start with 5 g of a 50% solution of magnesium sulphate by deep intramuscular injection to the upper outer quadrant of each buttock (10 g total)
- Thereafter, 5 g of a 50% solution magnesium sulphate intramuscularly every four hours in the upper outer quadrant of alternate buttock
  - May add 1 mL of 2% lignocaine to the IM injections.
- For severe pre-eclampsia, an initial loading dose of 4g of magnesium sulphate intravenously as a 20% solution in saline is recommended before the IM dose

WHO, 2006

**Slide 3MO-25 Prevention of Seizures (4)  
Intramuscular Regimen for Magnesium Sulphate (Pritchard)**

Example of intramuscular route of magnesium sulphate administration.

Due to the fact that intramuscular injections are painful and are complicated by local abscess formation in 0.5% of cases, the intravenous route is preferable.

*Management of severe pre-eclampsia and eclampsia. Clinical Resource Efficiency Support Team (CREST). August 2001.*

*Pritchard, J. A., Cunningham, F. G. and Pritchard, S. A.: The Parkland Memorial Hospital protocol for treatment of eclampsia: Evaluation of 245 cases. Amer. J. Obstet. Gynaecol., 148: 951, 1984*

*IMPC/Pregnancy, Childbirth, Postpartum and Newborn Care: A guide for essential practice, WHO, Geneva, 2006*

**Eclampsia**

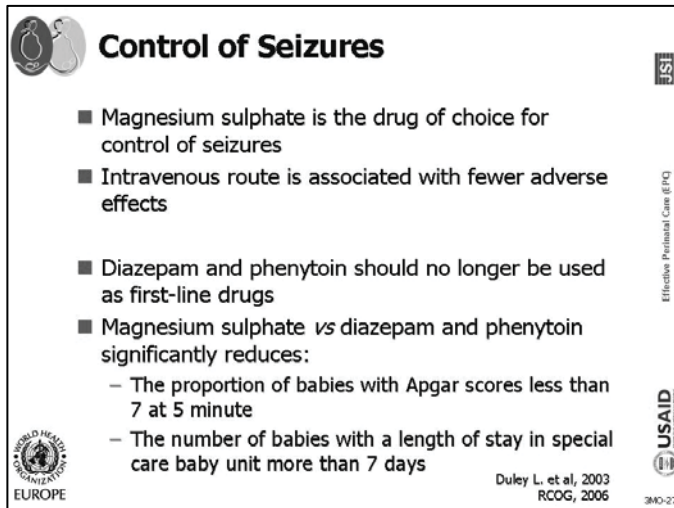
- The occurrence of one or more convulsions in woman with preeclampsia
- 5 out of 10 000 pregnant woman suffer from eclampsia
- Case fatality rate is 1.8%
- Further 35% of women experience a major complication

RCOG, 2006

**Slide 3MO-26 Eclampsia**

Eclampsia is a relatively rare but serious complication of pregnancy, with around 5 out of 10,000 pregnant woman in the UK suffering eclampsia. In eclampsia, the case fatality rate has been reported as 1.8% and a further 35% of women experience a major complication.

*Royal College of Obstetrician and Gynaecologists. THE MANAGEMENT OF SEVERE PRE-ECLAMPSIA/ECLAMPSIA. Guideline No. 10(A), RCOG Press, March 2006.*



**Control of Seizures**

- Magnesium sulphate is the drug of choice for control of seizures
- Intravenous route is associated with fewer adverse effects
- Diazepam and phenytoin should no longer be used as first-line drugs
- Magnesium sulphate vs diazepam and phenytoin significantly reduces:
  - The proportion of babies with Apgar scores less than 7 at 5 minute
  - The number of babies with a length of stay in special care baby unit more than 7 days

Duley L. et al, 2003  
RCOG, 2006

USAID  
Effective Perinatal Care (EPC)

**Slide 3MO-27 Control of Seizures**

The principles of management should follow basic principles of airway, breathing and circulation. [C]

Magnesium sulphate is the therapy of choice to control seizures. A loading dose of 4 g should be given by infusion pump over 5–10 minutes, followed by a further infusion of 1 g/hour maintained for 24 hours after the last seizure. [A]

Do not leave the woman alone but call for help, including appropriate personnel such as the anaesthetist and senior obstetrician.

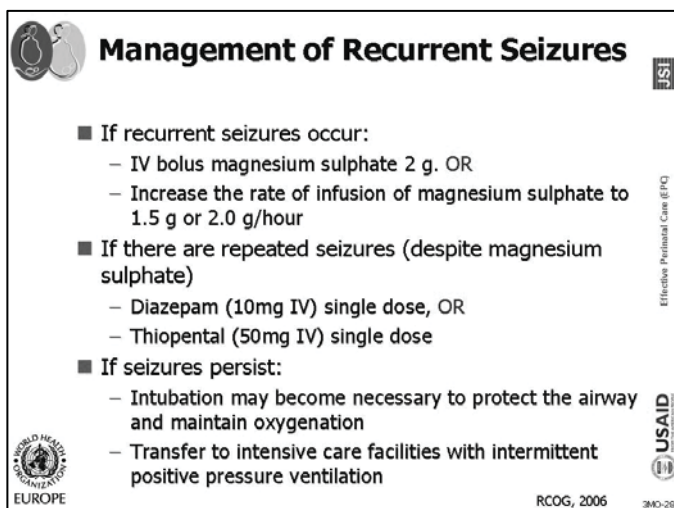
Place the woman in the left lateral position and administer oxygen. Assess the airway and breathing, and check pulse and blood pressure. Pulse oximetry is helpful. Once stabilised, plans should be made to deliver the woman but there is no particular hurry and a delay of several hours to make sure the correct care is in hand is acceptable, assuming that there is no acute fetal concern such as a fetal bradycardia. The woman’s condition always takes priority over the fetal condition.

*Which anticonvulsant for women with eclampsia? Evidence from the Collaborative Eclampsia Trial. Lancet, 1995, 345(8963): 1455–63.*

*Duley L, Henderson-Smart D. Magnesium sulphate versus diazepam for eclampsia. In: The Cochrane Library, Issue 3, 2003.*

*Duley L, Henderson-Smart D. Magnesium sulphate versus phenytoin for eclampsia. In: The Cochrane Library, Issue 3, 2003.*

*Royal College of Obstetrician and Gynaecologists. THE MANAGEMENT OF SEVERE PRE-ECLAMPSIA/ECLAMPSIA. Guideline No. 10(A), RCOG Press, March 2006.*



**Management of Recurrent Seizures**

- If recurrent seizures occur:
  - IV bolus magnesium sulphate 2 g. OR
  - Increase the rate of infusion of magnesium sulphate to 1.5 g or 2.0 g/hour
- If there are repeated seizures (despite magnesium sulphate)
  - Diazepam (10mg IV) single dose, OR
  - Thiopental (50mg IV) single dose
- If seizures persist:
  - Intubation may become necessary to protect the airway and maintain oxygenation
  - Transfer to intensive care facilities with intermittent positive pressure ventilation

RCOG, 2006

USAID  
Effective Perinatal Care (EPC)

**Slide 3MO-28 Management of Recurrent Seizures**

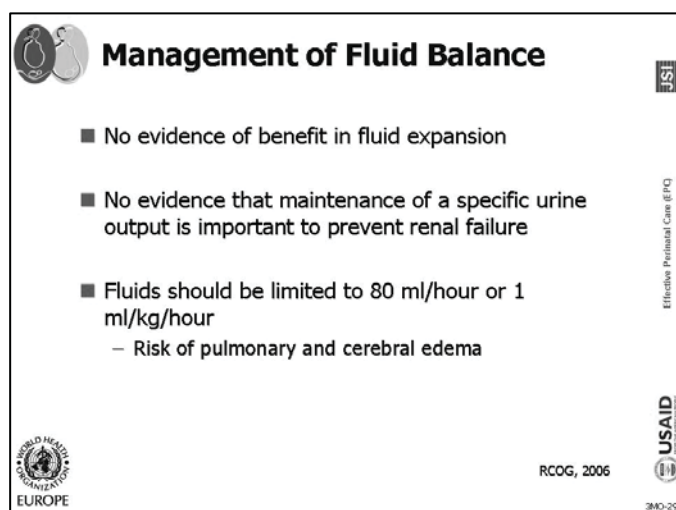
Recurrent seizures should be treated with either a further bolus of 2 g magnesium sulphate, or an increase in the infusion rate to 1.5 g or 2.0 g/hour. [A]

In the collaborative eclampsia trial, a further bolus of 2 g magnesium sulphate was administered for recurrent seizures. An alternative is to increase the rate of infusion of magnesium sulphate to 1.5 g or 2.0 g/hour. If there are repeated seizures then alternative agents such as diazepam or thiopentone may be used, but only as single doses, since

prolonged use of diazepam is associated with an increase in maternal death. If convulsions persist, intubation is likely to be necessary to protect the airway and maintain oxygenation. Transfer to intensive care facilities with intermittent positive pressure ventilation is appropriate in these circumstances.

Once the woman enters the coma stage, ensure she is on her left side with head slightly extended to maintain airway permeability.

Royal College of Obstetrician and Gynaecologists. *THE MANAGEMENT OF SEVERE PRE-ECLAMPSIA/ECLAMPSIA. Guideline No. 10(A), RCOG Press, March 2006.*



**Management of Fluid Balance**

- No evidence of benefit in fluid expansion
- No evidence that maintenance of a specific urine output is important to prevent renal failure
- Fluids should be limited to 80 ml/hour or 1 ml/kg/hour
  - Risk of pulmonary and cerebral edema

RCOG, 2006

USAID  
Effective Perinatal Care (EPIC)

3MO-29

WORLD HEALTH ORGANIZATION EUROPE

### Slide 3MO-29 Management of Fluid Balance

Fluid restriction is advisable to reduce the risk of fluid overload in the intrapartum and postpartum periods. In usual circumstances, total fluids should be limited to 80 ml/hour or 1 ml/kg/hour. [C]

Over the last 20 years, pulmonary oedema has been a significant cause of maternal death. This has often been associated with inappropriate fluid management. There is no evidence of the benefit of fluid expansion and a fluid restriction regimen associated with good maternal outcome.

There is no evidence that maintenance of a specific urine output is important to prevent renal failure, which is rare. The regime of fluid restriction should be maintained until there is a postpartum diuresis, as oliguria is common with severe pre-eclampsia. If there is associated maternal haemorrhage, fluid balance is more difficult and fluid restriction is inappropriate.

One review compared a colloid solution with another solution, which does not lead to plasma volume expansion in the treatment of pre-eclampsia. This review includes 3 trials, which involved 61 women. For every outcome reported, the confidence intervals are very wide and cross the no effect line. The evidence is insufficient for any reliable estimates of the effects of plasma volume expansion in women with pre-eclampsia.

Women with severe pre-eclampsia often have a reduced circulating plasma volume. It has led to a recommendation that plasma volume should be expanded in an attempt to improve the maternal systemic and uteroplacental circulation. Some uncontrolled studies suggested that rapid replenishment of intravascular volume may result in decreased arterial blood pressure in pregnant women with pre-eclampsia. Although blood pressure was not restored to normal by volume expansion, these uncontrolled studies suggest that such treatment may be an effective adjunct to the administration of antihypertensive drugs, and by reducing the drug doses needed, might minimize the risks of maternal and neonatal side-effects.

Intravascular volume expansion carries a serious risk of volume overload, which may lead to pulmonary and perhaps cerebral oedema in preeclamptic women in whom colloid osmotic pressure is usually low. Plasma volume expansion may be particularly dangerous after birth, when venous volume tends to rise. It should not be applied without careful monitoring. Also, the choice of agent may have a major impact on outcome. Recently it has become clear that for critically ill people, plasma expansion with colloid is associated with a higher mortality than either not using any plasma expander or expansion with crystalloid. Although none of these studies included pregnant women, it would seem prudent to avoid colloid solutions until data from randomized trials involving women with pre-eclampsia become available.

Royal College of Obstetrician and Gynaecologists. *THE MANAGEMENT OF SEVERE PRE-ECLAMPSIA/ECLAMPSIA. Guideline No. 10(A), RCOG Press, March 2006.*

Duley L, Williams J, Henderson-Smart DJ. Plasma volume expansion for treatment of pre-eclampsia. *The Cochrane Database of Systematic Reviews*, 1999.



Murray W. Enkin et al, *A guide to effective care in pregnancy and childbirth*. Oxford University Press, 3<sup>rd</sup> edition, 2000.

**Delivery at Optimal Time for Mother and Foetus**

- Decision to deliver should be made once the woman is stable and with appropriate senior personnel present
- Prolongation of pregnancy is to increase chances of foetus' survival only

RCOG, 2006

### Slide 3MO-30 Delivery at Optimal Time for Mother and Foetus

The decision to deliver should be made once the woman is stable and with appropriate senior personnel present. [C]

The delivery should be well planned, done on the best day, performed in the best place, by the best route and with the best support team. A few hours' delay in delivery may be helpful if it allows the neonatal unit to be more organised or to transfer a mother to a place where a cot is available. This assumes the mother is stable before delivery and prior to transfer.

Royal College of Obstetrician and Gynaecologists. *THE MANAGEMENT OF SEVERE PRE-ECLAMPSIA/ECLAMPSIA*. Guideline No. 10(A), RCOG Press, March 2006.

**When Should Pregnancy be Prolonged?**

- At gestation less than 34 weeks
  - Corticosteroids help to reduce foetal respiratory mortality
- At very early gestations
  - May improve the perinatal outcome, but
  - Must be carefully balanced with maternal well-being

Careful monitoring of maternal and foetal well-being is mandatory

RCOG, 2006

### Slide 3MO-31 When Should Pregnancy be Prolonged?

If the foetus is less than 34 weeks of gestation and delivery can be deferred, corticosteroids should be given, although after 24 hours the benefits of conservative management should be reassessed. [A]

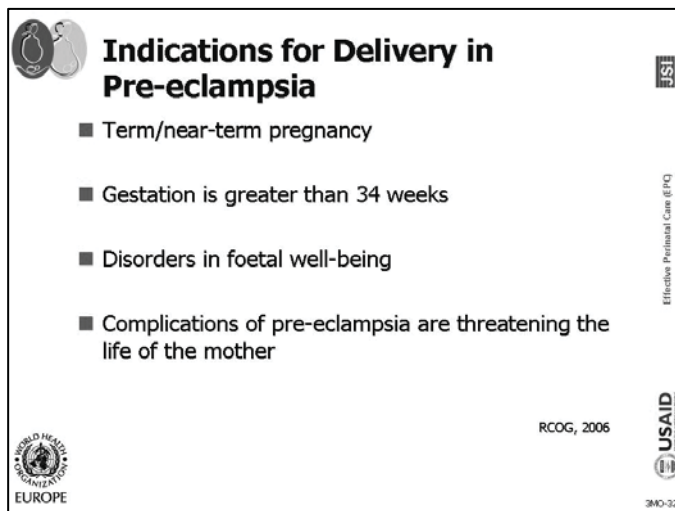
Conservative management at very early gestations may improve the perinatal outcome but must be carefully balanced with maternal wellbeing. [A]

If the gestation is less than 34 weeks and the pregnancy can be prolonged in ex-

cess of 24 hours, steroids help to reduce foetal respiratory mortality. There is probable benefit from steroid therapy even if delivery is less than 24 hours after administration.

Prolonging the pregnancy at very early gestations may improve the outcome for the premature infant but can only be considered if the mother remains stable. Two small randomised controlled trials have reported a reduction in neonatal complications with an expectant approach to management of severe early-onset pre-eclampsia. Pregnancy was prolonged for a mean of 7 days and 15 days, respectively, at gestations of 28–34 weeks and 28–32 weeks, with no increase in maternal complications. Several case series have reported similar outcomes in different settings with gestations as early as 24 weeks.

Royal College of Obstetrician and Gynaecologists. *THE MANAGEMENT OF SEVERE PRE-ECLAMPSIA/ECLAMPSIA*. Guideline No. 10(A), RCOG Press, March 2006.



**Indications for Delivery in Pre-eclampsia**

- Term/near-term pregnancy
- Gestation is greater than 34 weeks
- Disorders in foetal well-being
- Complications of pre-eclampsia are threatening the life of the mother

RCOG, 2006

USAID

Effective Prehospital Care (EPC)

3MO-32

### Slide 3MO-32 Indications for Delivery in Pre-eclampsia

If the gestation is greater than 34 weeks, delivery after stabilisation is recommended.

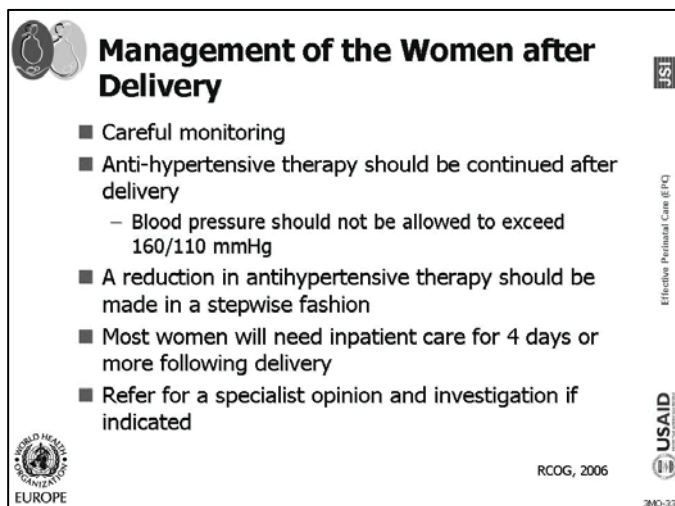
Delivery usually has advantages for both mother and baby unless the baby is very premature.

However, if the complications of pre-eclampsia are threatening the life of the mother, there is no choice, even if immediate delivery means the chances of the baby's survival are low.

The mode of delivery should be determined after considering the presentation of the foetus and the foetal condition, together with the likelihood of success of induction of labour after assessment of the cervix. [C]

In all situations, a carefully planned delivery suiting all professionals is appropriate. Vaginal delivery is generally preferable but, if gestation is below 32 weeks, caesarean section is more likely as the success of induction is reduced. After 34 weeks with a cephalic presentation, vaginal delivery should be considered. The consulting obstetrician should discuss the mode of delivery with the mother. Vaginal prostaglandins will increase the chance of success. Anti-hypertensive treatment should be continued throughout assessment and labour.

*Royal College of Obstetrician and Gynaecologists. THE MANAGEMENT OF SEVERE PRE-ECLAMPSIA/ECLAMPSIA. Guideline No. 10(A), RCOG Press, March 2006.*



**Management of the Women after Delivery**

- Careful monitoring
- Anti-hypertensive therapy should be continued after delivery
  - Blood pressure should not be allowed to exceed 160/110 mmHg
- A reduction in antihypertensive therapy should be made in a stepwise fashion
- Most women will need inpatient care for 4 days or more following delivery
- Refer for a specialist opinion and investigation if indicated

RCOG, 2006

USAID

Effective Prehospital Care (EPC)

3MO-33

### Slide 3MO-33 Management of the Women after Delivery

Clinicians should be aware of the risk of late seizures and ensure that women have a careful review before discharge from hospital. [C]

Anti-hypertensive medication should be continued after delivery as dictated by blood pressure. It may be necessary to maintain treatment for up to 3 months, although most women can stop treatment before this. [C]

Women with persisting hypertension and proteinuria at 6 weeks may have renal disease and should be considered for further investigation. [C]

Clinicians should be aware that up to 44% of eclampsia occurs postpartum, especially at term, so women with signs or symptoms compatible with pre-eclampsia should be carefully assessed.

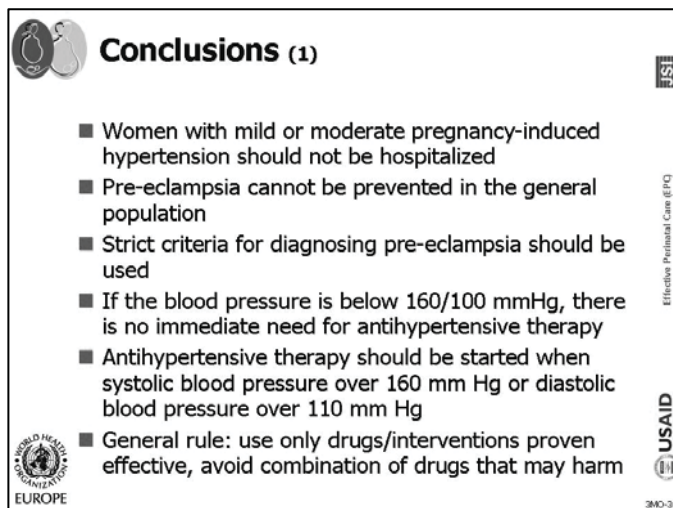
Severe pre-eclampsia or eclampsia can occur in the postpartum period. Up to 44% of eclampsia has been reported to occur postnatally, especially in women presenting at term. Women who develop hypertension or symptoms of pre-eclampsia postnatally (headaches, visual distur-

bances, nausea and vomiting or epigastric pain) should be referred for a specialist opinion and an investigation to exclude pre-eclampsia. Women who deliver with severe pre-eclampsia (or eclampsia) should have continued close observation postnatally. As eclampsia has been reported up to 4 weeks postnatally, the optimum length of inpatient postnatal stay is unclear but the incidence of eclampsia and severe pre-eclampsia falls after the fourth postpartum day. The decision about discharge from hospital needs to take account of the risk of late seizures. Most women with severe pre-eclampsia or eclampsia will need inpatient care for 4 days or more following delivery. Careful review to ensure improving clinical signs is needed before discharge.

Women who develop hypertension or symptoms postnatally (headaches, visual disturbances, nausea and vomiting or epigastric pain) should be referred to a specialist for opinion and investigation.

Anti-hypertensive therapy should be continued after delivery. Although, initially, blood pressure may fall, it usually rises again at around 24 hours postpartum. A reduction in antihypertensive therapy should be made in a stepwise fashion. There is no reason why the woman cannot go home on treatment, to be weaned off therapy as an outpatient. After pre-eclampsia, blood pressure can take up to 3 months to return to normal. During this time, blood pressure should not be allowed to exceed 160/110 mmHg. Currently, there is insufficient evidence to recommend any particular antihypertensive. However, it is good practice to avoid the use of alpha methyl dopa in the postnatal period because of its adverse effect profile, particularly depression. In breastfeeding women, Labetalol, Atenolol, Nifedipine and Enalapril are currently in use, either singly or in combination.

*Royal College of Obstetrician and Gynaecologists. THE MANAGEMENT OF SEVERE PRE-ECLAMPSIA/ECLAMPSIA. Guideline No. 10(A), RCOG Press, March 2006.*



**Conclusions (1)**

- Women with mild or moderate pregnancy-induced hypertension should not be hospitalized
- Pre-eclampsia cannot be prevented in the general population
- Strict criteria for diagnosing pre-eclampsia should be used
- If the blood pressure is below 160/100 mmHg, there is no immediate need for antihypertensive therapy
- Antihypertensive therapy should be started when systolic blood pressure over 160 mm Hg or diastolic blood pressure over 110 mm Hg
- General rule: use only drugs/interventions proven effective, avoid combination of drugs that may harm

Logos: World Health Organization Europe, USAID, Effective Perinatal Care (EPC), 3MO-34

### Slide 3MO-34 Conclusions (1)

Basic conclusions on the subject "Hypertension in pregnancy".

**Conclusions (2)**

- Magnesium sulphate should be considered for women with pre-eclampsia for whom there is concern about the risk of eclampsia
- Magnesium sulphate is the therapy of choice to control seizures in severe pre-eclampsia
- Delivery is the only effective treatment for pre-eclampsia/eclampsia
- The decision to deliver should be made once the woman is stable
- Prolongation of pregnancy should be considered to increase chances of foetus' survival only
- Anti-hypertensive medication should be continued after delivery as dictated by the blood pressure

Logos: WHO EUROPE, USAID, JSE, Effective Perinatal Care (EPQ), 3MO-35

**Slide 3MO-35 Conclusions (2)**

Basic conclusions on the subject "Hypertension in pregnancy".

**Hypertensive Disorders**

Management of severe pre-eclampsia and the postoperative period in women with severe pre-eclampsia/eclampsia

Logos: WHO EUROPE, USAID, JSE, Effective Perinatal Care (EPQ)

**Slide 3MO-36 Hypertensive Disorders**

**Management of severe pre-eclampsia and the postoperative period in women with severe pre-eclampsia/eclampsia**

This material will be presented and discussed during the clinical week.

**The Main Causes of Maternal Death from Pre-eclampsia in Great Britain (1988-1990)**

■ Cerebral complications		14
– Intracerebral haemorrhages	10	
– Subarachnoidal	2	
– Infarction	1	
– Oedema	1	
■ Pulmonary complications		10
– Adult respiratory distress syndrome	9	
– Oedema	1	
■ Other		3

UK Department of Health, 1994

Logos: WHO EUROPE, USAID, JSE, Effective Perinatal Care (EPQ), 3MO-37

**Slide 3MO-37 The Main Causes of Maternal Death from Pre-eclampsia in Great Britain (1988-1990)**

The majority of maternal deaths in case of pre-eclampsia are caused by cerebral haemorrhages and adult respiratory distress-syndrome. The first one is usually caused by inadequate control of blood pressure, and the second by poor management of postpartum/postoperative period, most probably with fluid overload. The risk of uncontrolled blood pressure and pulmonary complications is exacerbated by use of general anaesthesia and intubations during caesarean section.

*Report on confidential enquiries into maternal deaths in the United Kingdom 1988-1990. Department of Health, London: HMSO, 1994.*

**Dangers/Difficulties of Caesarean Section under General Anesthesia**

- Difficult intubation (larynx oedema)
- Intra-cerebral haemorrhages
  - Dramatic increase of medial arterial pressure (MAP) during intubation and extubation / aspiration
  - If MAP > 140 mm Hg – intracerebral blood vessels loose capacity to control tone and may rupture
- Pulmonary oedema
  - Very high pressure in pulmonary vessels

Hood D, 1997

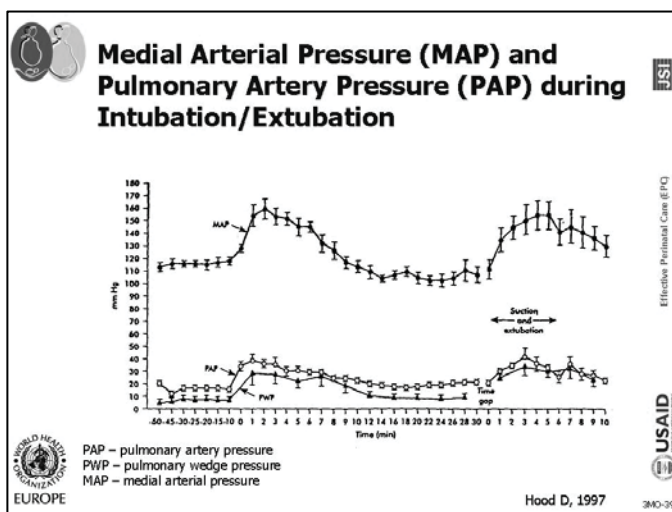
**Slide 3MO-38 Dangers/Difficulties of Caesarean Section under General Anesthesia**

Generalized oedema, particularly facial and mucosal oedema, are often develops in women with pre-eclampsia. Oedema can make visualization of glottis opening impossible. Besides potential mucosal bleeding associated with instrumentation, further complicating tracheal intubation is also more likely in these patients.

Airway manipulations and endotracheal intubation present a particularly dangerous time for the woman with pre-

eclampsia, especially if the intracranial pressure is already elevated or the blood pressure is inadequately controlled. Such pressor reaction may cause intracerebral haemorrhage and/or pulmonary oedema. Ketamine should not be used as part of the rapid sequence induction regimen as it causes further increases in blood pressure

Hood D. "Pre-eclampsia" in book: "Practical Obstetric Anesthesia". W.B. Saunders Company, 1997, p. 211-35.



**Slide 3MO-39 Medial Arterial Pressure (MAP) and Pulmonary Artery Pressure (PAP) during Intubation/Extubation**

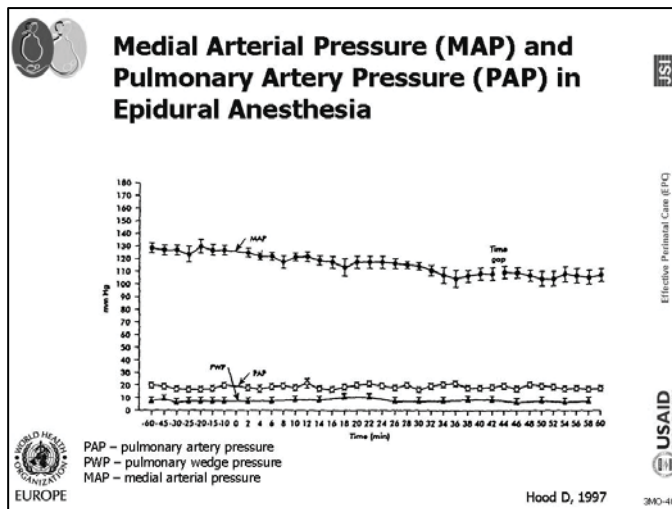
Intubation and extubation of trachea are associated with a dramatic increase of medial arterial pressure and pressure in pulmonary blood vessels. These haemodynamic changes increase the risk of intracranial and pulmonary complications and all efforts should be made to avoid or abolish these pressor reactions on intubation / extubation.

In a classic study, Hodgkinson and colleagues demonstrated the dramatic

haemodynamic reactions accompanying both tracheal intubation and tracheal suction with extubation. These severe haemodynamic changes could potentially produce a cerebro-vascular accident, pulmonary oedema, or cardiac failure. Anticipating and controlling these blood pressure changes when general anaesthesia requires very potent vasodilators for blood pressure control

Drugs used to modify or abolish the pressor reactions to tracheal intubation and laryngoscopy include a combination of parenteral vasodilator timed to take effect at the time of intubation (e.g. nitro-glycerine, sodium nitroprusside), increased doses of induction drugs, intravenous narcotics, magnesium sulphate, parenteral lignocaine and  $\beta$ -adrenoreceptor antagonists, such as esmolol. A combination of alfentanil and magnesium sulphate may prove to be the best prophylaxis against hypertensive reflexory reactions.

Hood D. "Pre-eclampsia" in book: "Practical Obstetric Anesthesia". W.B. Saunders Company. 1997: p. 211-35.



**Slide 3MO-40 Medial Arterial Pressure (MAP) and Pulmonary Artery Pressure (PAP) in Epidural Anesthesia**

Epidural anaesthesia is associated with stable haemodynamic versus haemodynamic changes during intubation/extubation.

Neuraxial techniques (epidural, spinal, and combined spinal-epidural) offer many advantages for labour analgesia and can be safely administered to the women with pre-eclampsia. When neuraxial techniques are used for caesarean delivery, however, there is a possibility of extensive

sympatholysis with profound hypotension, which may lead to decreased cardiac output and further diminished uteroplacental perfusion.

Hypotension can usually be avoided by meticulous attention to anaesthetic technique and careful volume expansion.

Because general anaesthesia poses considerably greater risk for women than regional anaesthesia, the risk of failed intubations must be weighed against the risk of transient hypotension when deciding between general and regional anaesthesia for caesarean section in the severely preeclamptic/eclamptic patient.

*Report of the National High Blood Pressure Education Program. Working Group on High Blood Pressure in Pregnancy. Am J Obstet Gynecol, 2000, 183(1), S1-22.*

**Is Immediate Caesarean Section Delivery Beneficial?**

- Immediate Caesarean section delivery confers no benefit to patients with severe pre-eclampsia
  - Pulmonary complications in the mother and newborn are more common in Caesarean section delivery
  - No complications are decreased by Caesarean section delivery

Coppage KH, Polzin WJ, 2002

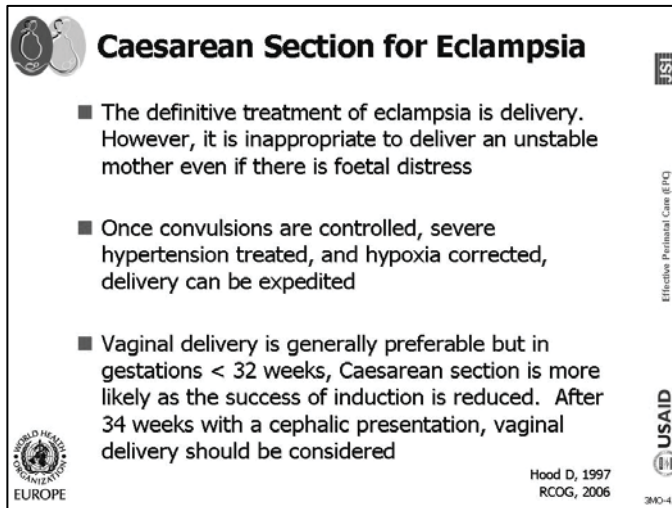
**Slide 3MO-41 Is Immediate Caesarean Section Delivery Beneficial?**

A trial designed to determine whether immediate caesarean section delivery for patients with severe pre-eclampsia is beneficial to the mother or neonate was undertaken. Of 114 included patients, 93 had an option regarding route of delivery. 34 had an immediate caesarean section and 59 had induction of labour. 37 of 59 were delivered vaginally and 22 of 59 underwent caesarean section delivery. Analysis of final data showed that pulmonary complications in mother and neonate were more common in caesarean section

delivery (P <.05). No morbidity was decreased by caesarean section delivery.

The conclusion of this study was that immediate caesarean section delivery confers no benefit to patients.

*Coppage KH, Polzin WJ. Severe pre-eclampsia and delivery outcomes: is immediate caesarean delivery beneficial? Am J Obstet Gynecol, 2002 May, 186(5), 921-3.*



**Caesarean Section for Eclampsia**

- The definitive treatment of eclampsia is delivery. However, it is inappropriate to deliver an unstable mother even if there is foetal distress
- Once convulsions are controlled, severe hypertension treated, and hypoxia corrected, delivery can be expedited
- Vaginal delivery is generally preferable but in gestations < 32 weeks, Caesarean section is more likely as the success of induction is reduced. After 34 weeks with a cephalic presentation, vaginal delivery should be considered

Hood D, 1997  
RCOG, 2006

USAID

3MO-42

### Slide 3MO-42 Caesarean Section for Eclampsia

Caesarean section may be very dangerous if performed in a patient immediately after eclamptic seizures. Maternal outcomes are much better when pregnancy termination is attempted after stabilization of woman.

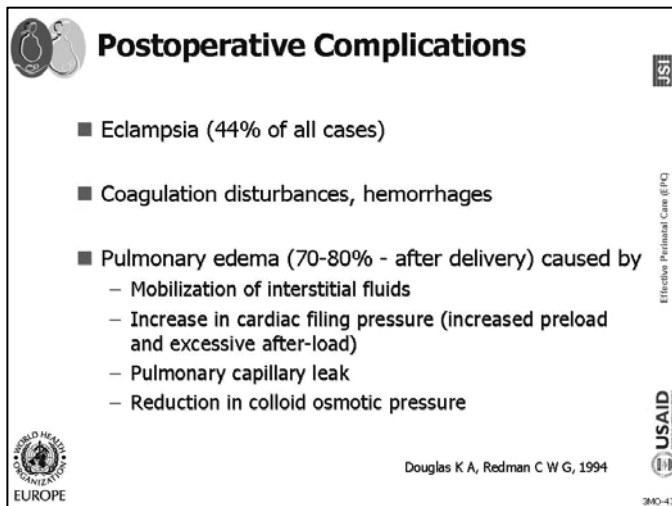
Vaginal delivery is preferable to caesarean section for women with pre-eclampsia, thus avoiding the added stress of surgery to multiple physiologic aberrations. Acute palliative therapy for several hours does not increase maternal risk if

performed appropriately.

*Report of the National High Blood Pressure Education Program Working Group on High Blood Pressure in Pregnancy. Am J Obstet Gynecol, 2000, 183(1), S1-22.*

*Royal College of Obstetrician and Gynaecologists. THE MANAGEMENT OF SEVERE PRE-ECLAMPSIA/ECLAMPSIA. Guideline No. 10(A), RCOG Press, March 2006.*

*Hood D. "Pre-eclampsia" in book: "Practical Obstetric Anesthesia". W.B. Saunders Company, 1997, p. 211-35.*



**Postoperative Complications**

- Eclampsia (44% of all cases)
- Coagulation disturbances, hemorrhages
- Pulmonary edema (70-80% - after delivery) caused by
  - Mobilization of interstitial fluids
  - Increase in cardiac filling pressure (increased preload and excessive after-load)
  - Pulmonary capillary leak
  - Reduction in colloid osmotic pressure

Douglas K A, Redman C W G, 1994

USAID

3MO-43

### Slide 3MO-43 Postoperative Complications

The national incidence of eclampsia in the UK was 4.9/10,000 maternities (95% confidence interval 4.5 to 5.4). Most convulsions occurred despite antenatal care (70%) and within one week of the woman's last visit to a doctor or midwife (85%). Three quarters of first seizures occurred in hospital, of which 38% developed before both proteinuria and hypertension had been documented. 44% of cases occurred postpartum, more than a third (38%) antepartum, and the remainder (18%) intrapartum. Nearly one in 50

women (1.8%) died, and 35% of all women had at least one major complication. The rate of stillbirths and neonatal deaths was 22.2/1,000 and 34.1/1,000, respectively.

*Douglas K A, Redman C W G. Eclampsia in the United Kingdom. Br Med J, 1994, 309, 1395-1400.*

**Fluid Balance after Delivery (Caesarean Section) in Women with Severe Pre-eclampsia**

- Iatrogenic fluid overload is one of the main cause of maternal death in pre-eclampsia/eclampsia
- Fluid intake:
  - The standard intravenous fluid regime is 80 ml/hour

RCOG, 1999  
RCOG, 2006

USAID  
Effective Perinatal Care (EPC)

WHO EUROPE

FSI

3MO-44

### Slide 3MO-44 Fluid Balance after Delivery (Caesarean Section) in Women with Severe Pre-eclampsia

There is a lack of evidence in the results of properly controlled trials about the effects of either volume expansion or diuretic therapy in women with pre-eclampsia/eclampsia. Fluid therapy should be limited to maintenance crystalloid (80ml/h or urine excretion in preceding hour plus 30 ml).

The standard IV fluid regime is 80 ml/hour. It includes the 20 ml of magnesium sulphate each hour (i.e., women

with magnesium sulphate therapy must receive 60 ml crystalloid/hour). Once oral fluids are established the hourly oral intake needs to be subtracted from the IV input (if a woman is drinking 50 ml/hour she needs 30 ml/hour IV)

*Hypertensive Disorders in Pregnancy' in Why Mothers Die. Report on Confidential Enquiries into Maternal Deaths in the United Kingdom 1994-1996. London: RCOG Press, 1999, Chapter 3, pp 36-46.*

*Royal College of Obstetrician and Gynaecologists. THE MANAGEMENT OF SEVERE PRE-ECLAMPSIA/ECLAMPSIA. Guideline No. 10(A), RCOG Press, March 2006.*

**Management of Postoperative Period in Severe Pre-eclampsia**

- Continuation of magnesium sulphate treatment (for decreasing of the risk of eclampsia)
- Strict control of fluid intake (very limited)
- Strict control of blood pressure

USAID  
Effective Perinatal Care (EPC)

WHO EUROPE

FSI

3MO-45

### Slide 3MO-45 Management of Postoperative Period in Severe Pre-eclampsia

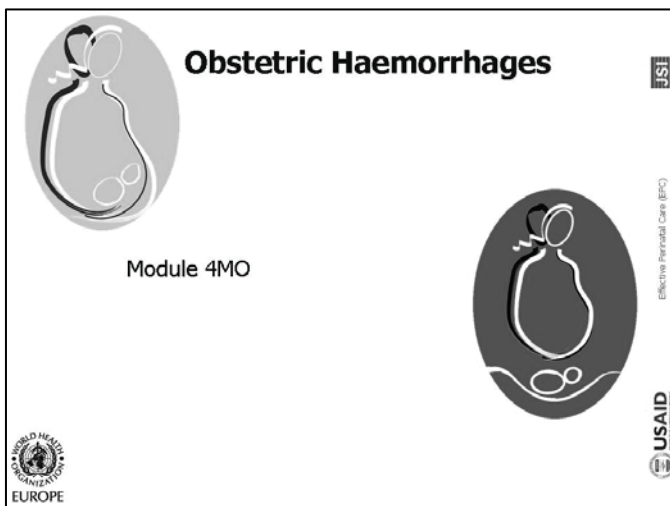
Basic recommendations on postoperative period management in case of severe pre-eclampsia.





# **Obstetrical Haemorrhages**





**Obstetric Haemorrhages**

Module 4MO

WHO EUROPE

ISI

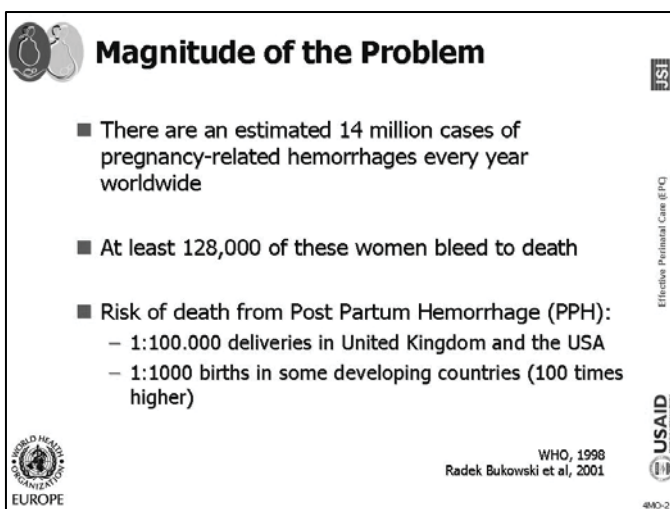
Effective Perinatal Care (EPC)

USAID

### Slide 4MO-1 Obstetrical Haemorrhages

The objective of this module is to help the participants:

- Understand the steps of identification and initiation of early management of postpartum haemorrhage
- Make decisions on comprehensive measures of bleeding arrest and patient resuscitation
- To critically reconsider methods of the surgical treatment of postpartum haemorrhage
- Understand the importance of appropriate local protocol for managing obstetrical haemorrhage



**Magnitude of the Problem**

- There are an estimated 14 million cases of pregnancy-related hemorrhages every year worldwide
- At least 128,000 of these women bleed to death
- Risk of death from Post Partum Hemorrhage (PPH):
  - 1:100,000 deliveries in United Kingdom and the USA
  - 1:1000 births in some developing countries (100 times higher)

WHO, 1998  
Radek Bukowski et al, 2001

WHO EUROPE

ISI

Effective Perinatal Care (EPC)

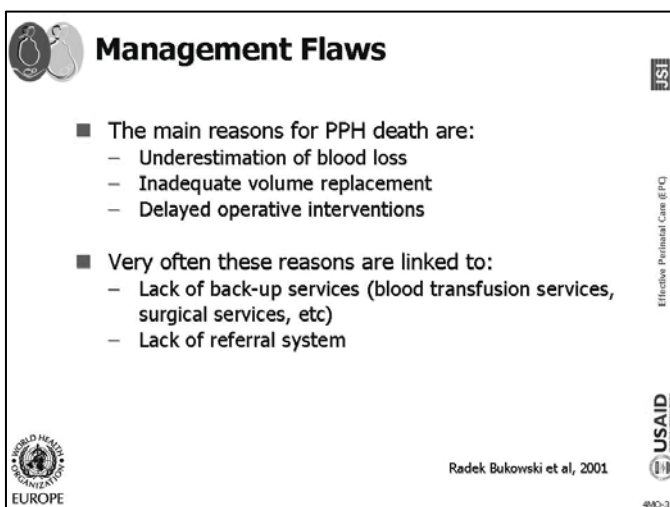
USAID

### Slide 4MO-2 Magnitude of the Problem

Severe bleeding, or haemorrhage, is the single most important cause of maternal death worldwide. At least one-quarter of all maternal deaths are due to haemorrhage; the proportions range from less than 10 percent to nearly 60 percent in various countries. Even if a woman survives postpartum haemorrhage (PPH), she can be severely anaemic and suffer from continuing health problems.

*Mother-Baby Package: Implementing safe motherhood in countries. WHO, 1995.*

*Radek Bukowski, Gary D.V. Hankins, Managing postpartum hemorrhage. Contemporary OB/GYN, Sep 1, 2001*



**Management Flaws**

- The main reasons for PPH death are:
  - Underestimation of blood loss
  - Inadequate volume replacement
  - Delayed operative interventions
- Very often these reasons are linked to:
  - Lack of back-up services (blood transfusion services, surgical services, etc)
  - Lack of referral system

Radek Bukowski et al, 2001

WHO EUROPE

ISI

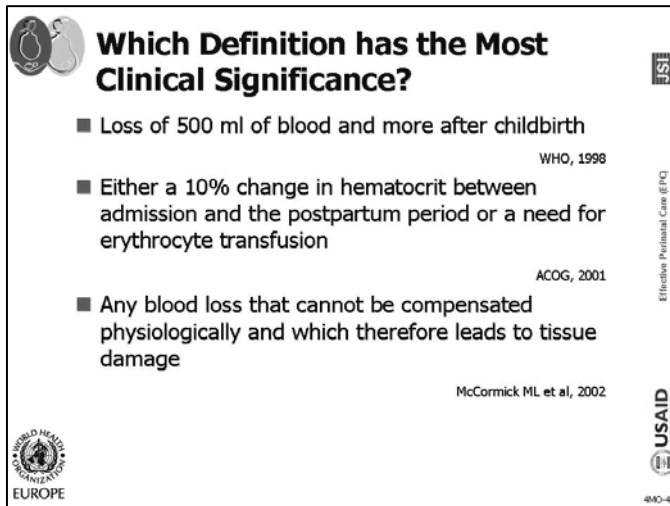
Effective Perinatal Care (EPC)

USAID

### Slide 4MO-3 Management Flaws

Consequences of postpartum haemorrhage can only be reduced when the condition is promptly diagnosed and therapeutic measures performed immediately.

*Radek Bukowski, Gary D.V. Hankins, Managing postpartum hemorrhage. Contemporary OB/GYN, Sep 1, 2001*



**Which Definition has the Most Clinical Significance?**

- Loss of 500 ml of blood and more after childbirth  
WHO, 1998
- Either a 10% change in hematocrit between admission and the postpartum period or a need for erythrocyte transfusion  
ACOG, 2001
- Any blood loss that cannot be compensated physiologically and which therefore leads to tissue damage  
McCormick ML et al, 2002

Logos: WHO, USAID, EUROPE, Effective Perinatal Care (EPC), 4MO-4

**Slide 4MO-4 Which Definition has the Most Clinical Significance?**

PPH is defined as excessive vaginal bleeding (blood loss greater than 500 ml) within 24 hours after delivery.

*Mother-Baby Package: Implementing safe motherhood in countries. WHO, 1995.*

To address difficulties in estimating blood loss, ACOG has proposed to define PPH as "either a 10% change in haematocrit between admission and the postpartum period or a need for erythrocyte transfusion." This is a retrospective approach, which may be useful in research protocols

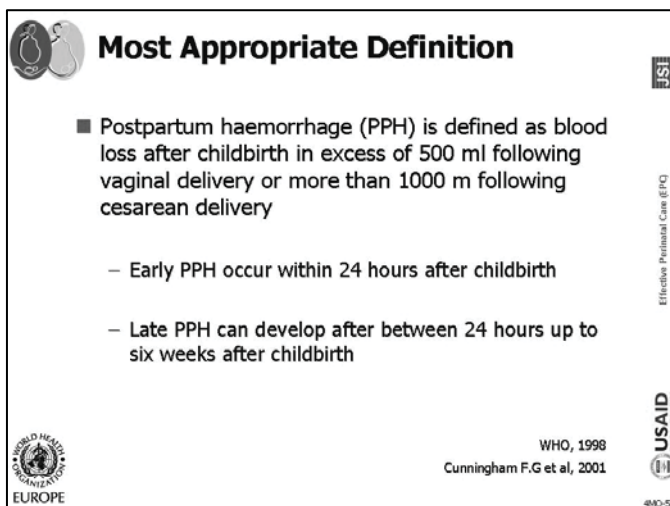
to assess risk factors or compare the effectiveness of treatments, but is not very helpful to a clinician faced with excessive bleeding.

*American College of Obstetricians and Gynecologists: ACOG educational bulletin. Postpartum hemorrhage. Number 243, January 1998 (replaces No. 143, July 1990). American College of Obstetricians and Gynecologists. Int J Gynaecol Obstet 1998 Apr; 61(1): 79-86.*

"A more accurate definition of PPH is any blood loss that causes a physiological change (e.g., low blood pressure) that threatens the woman's life." Unfortunately, waiting until there is a physical change would mean death for most women in developing-country settings, as immediate back up or emergency obstetric care is not available.

*McCormick ML, Sanghvi HCG, Kinzie B, McIntosh N. Averting maternal death and disability: Preventing postpartum hemorrhage in low-resource settings. International Journal of Gynecology and Obstetrics. 2002;77:267-275.*

Secondly, the blood volume expansion that occurs during pregnancy in many situations compensates for normal blood loss at delivery. This expansion occurs to a lesser degree in pre-eclamptic women, who may experience greater blood loss at delivery than do normotensive women. For severely anaemic women, blood loss of even 200 to 250 ml could become fatal. This is an especially important consideration given the prevalence of severe anaemia among women in many developing countries.



**Most Appropriate Definition**

- Postpartum haemorrhage (PPH) is defined as blood loss after childbirth in excess of 500 ml following vaginal delivery or more than 1000 ml following cesarean delivery
  - Early PPH occur within 24 hours after childbirth
  - Late PPH can develop after between 24 hours up to six weeks after childbirth

Logos: WHO, USAID, EUROPE, Effective Perinatal Care (EPC), 4MO-5

**Slide 4MO-5 Definition**

The definition of PPH is somewhat arbitrary and problematic. PPH is defined as blood loss of more than 500 mL following vaginal delivery, or more than 1000 mL following cesarean delivery. A loss of these amounts within 24 hours of delivery is termed early PPH, whereas such losses are termed late if they occur 24 hours after delivery and up to 6 weeks.

Nearly half of the women who deliver vaginally lose 500 ml or more of blood, and those undergoing caesarean section

normally lose 1,000 ml or more. For many women this amount of blood loss does not lead to adverse effects, but effects vary from woman to woman.

In practice, however, it is difficult to measure blood loss accurately: the blood may be mixed with amniotic fluid or urine, and may be dispersed on sponges and linens, in buckets, or on the floor.

Accurate definition is also lacking because our ability to estimate blood loss is imprecise: visual estimation significantly under- or over-estimated blood loss when observers.

*Mother-Baby Package: Implementing safe motherhood in countries.*  
WHO, 1995.

*Cunningham F.G., Gant N.F., Leveno K.J., eds. et al. Williams obstetrics. 21<sup>st</sup> ed. New York, NY: McGraw-Hill, 2001. 407- 687.*

**Prevention of PPH: Active Management of the Third Stage of Labour (1)**

1. Give oxytocin within 1 minute of birth of the baby
2. Deliver the placenta by controlled cord traction
3. Massage the uterus until it is contracted

WHO/MPS Technical Update, 2006

### Slide 4MO-6 Prevention of PPH Active Management of the Third Stage of Labour (1)

#### Steps in the active management of the third stage of labour

##### Give oxytocin:

- Within 1 minute of the birth of the baby, palpate the abdomen to rule out the presence of an additional baby(s) and give oxytocin 10 units intramuscularly.
- Quickly dry and wrap the baby and give to mother if appropriate.

##### Deliver the placenta by controlled cord traction

- Just prior to performing cord traction clamp the cord close to the perineum using sponge forceps. Hold the clamped cord and the forceps with one hand. Keep slight tension on the cord and await a strong uterine contraction (2-3 minutes).
- Place the other hand just above the woman's pubic bone and stabilize the uterus by applying counter traction during controlled cord traction. This helps prevent inversion of the uterus.
- When the uterus becomes rounded or the cord lengthens, very gently pull downwards on the cord to deliver the placenta. Do not wait for a gush of blood before applying traction on the cord. Continue to apply counter traction to the uterus with the other hand.
- If the placenta does not descend during 30-40 sec of controlled cord traction (i.e. there are no signs of placental separation), do not continue to pull on the cord.
- Gently hold the cord and wait until the uterus is well contracted again.
- If necessary, use a sponge forceps to clamp the cord closer to the perineum as it lengthens.
- With the next contraction, repeat controlled cord traction with counter traction. **NEVER PULL ON THE CORD WITHOUT PUSHING THE UTERUS UP WITH THE OTHER HAND.**

- As the placenta delivers, the thin membranes can tear off. Hold the placenta in two hands and gently turn it until the membranes are twisted.
- Slowly pull to complete the delivery. Look carefully at the placenta to be sure none of it is missing. If a portion of the maternal surface is missing or there are torn membranes with vessels, suspect retained placental fragments and manage appropriately.

### Massage the uterus

- Immediately massage the fundus of the uterus through the woman's abdomen until the uterus is contracted.
- Repeat the uterine massage every 15 min for the first two hours.
- Ensure that the uterus remains hard after you stop uterine massage.

### If bleeding continues, check for other causes of PPH (genital lacerations and retained placental fragments) and manage appropriately

*MPS Technical Update - Prevention of Postpartum Haemorrhage by Active Management of Third Stage of Labour # 2 OCTOBER 2006*  
[http://www.who.int/making\\_pregnancy\\_safer/publications/PPH\\_Tech\\_Update2.pdf](http://www.who.int/making_pregnancy_safer/publications/PPH_Tech_Update2.pdf)

*Management of the Third Stage of Labour to Prevent Post-partum Haemorrhage Joint Statement: International Confederation of Midwives (ICM) International Federation of Gynaecologists and Obstetricians (FIGO), 2003.*

**Prevention of PPH: Active Management of the Third Stage of Labour (2)**

- Active management of third stage of labour reduces the risk of post partum haemorrhage by 60%  
Prendiville WJ et al, 2007
- Uterotonic agents with proven effectiveness:
  - Oxytocin 10 IU IM within one minute of the delivery of the baby
  - If oxytocin is not available:
    - Ergometrine 0.2 mg (or Syntometrine 1 ampoule) IM within one minute of the delivery of the baby
    - Misoprostol 600 mcg orally or sublingually after the birth of the baby

FIGO, 2006

WHO EUROPE

USAID

Effective Perinatal Care (EPC)

4MO-7

### Slide 4MO-7 Prevention of PPH Active Management of the Third Stage of Labour (2)

Five studies were included in the systematic review. Four of the trials were of good quality. Compared to expectant management, active management (in the setting of a maternity hospital) was associated with the following reduced risks: maternal blood loss (weighted mean difference - 79.33 millilitres, 95% confidence interval - 94.29 to -64.37); post partum haemorrhage of more than 500 millilitres (relative risk 0.38, 95% confidence interval 0.32 to 0.46); prolonged third stage of labour

(weighted mean difference -9.77 minutes, 95% confidence interval -10.00 to -9.53). Active management was associated with an increased risk of maternal nausea (relative risk 1.83, 95% confidence interval 1.51 to 2.23), vomiting and raised blood pressure (probably due to the use of ergometrine). No advantages or disadvantages were apparent for the baby.

### Authors' Conclusions

Routine 'active management' is superior to 'expectant management' in terms of blood loss, post partum haemorrhage and other serious complications of the third stage of labour. Active management is, however, associated with an increased risk of unpleasant side effects (eg nausea and vomiting), and hypertension, where ergometrine is used. Active management should be the routine management of choice for women expecting to deliver a baby by vaginal delivery in a

maternity hospital. The implications are less clear for other settings including domiciliary practice (in developing and industrialised countries).

*Prendiville WJ, Elbourne D, McDonald S. Active versus expectant management in the third stage of labour. Cochrane Database of Systematic Reviews. 2007, Issue 1.*

HOW TO USE UTEROTONIC AGENTS:

Within one minute of the delivery of the baby, palpate the abdomen to rule out the presence of an additional baby(s) and give oxytocin 10 units IM.

Oxytocin is preferred over other uterotonic drugs because it is effective 2-3 minutes after injection, has minimal side effects and can be used in all women.

If oxytocin is not available, other uterotonics can be used such as: ergometrine 0.2 mg IM, syntometrine (1 ampoule) IM or misoprostol 400-600 mcg orally.


Oral administration of misoprostol should be reserved for situations when safe administration and/or appropriate storage conditions for injectable oxytocin and ergot alkaloids are not possible.

The most common side effects are transient shivering and pyrexia. Education of women and birth attendants in the proper use of misoprostol is essential.

The usual components of giving misoprostol include:


- Administration of 600 micrograms (mcg) misoprostol orally or sublingually after the birth of the baby
- Controlled cord traction ONLY when a skilled attendant is present at the birth
- Uterine massage after the delivery of the placenta as appropriate.


*Prevention and Treatment of Post-partum Haemorrhage: New Advances for Low Resource Settings. Joint Statement. International Confederation of Midwives (ICM) International Federation of Gynaecology and Obstetrics (FIGO), 2006*



### Tasks for Small Group Work

- 1<sup>st</sup> group of midwives: initial steps of early PPH management
- 2<sup>nd</sup> group of midwives: full list of procedures for arresting bleeding before laparotomy, which can be done by a midwife
- 1<sup>st</sup> group of obstetricians: indications and surgical methods of complete arrest of bleeding
- 2<sup>nd</sup> group of obstetricians: basic rules and principles of treatment aimed to restore the circulation blood volume and indications for blood transfusion
- Mixed group: give role to each group member and describe actions of different specialists in case of severe PPH





4MO-8

**Slide 4MO-8 Tasks for Small group Work**



**Principles of Management**

1. Early recognition
2. Initial assessment and treatment
3. Identification of aetiology and direct therapy
4. Replacement of blood loss

WHO EUROPE  
SOGC, 2000  
Postpartum Hemorrhage, 2006  
USAID  
Effective Perinatal Care (EPC)  
4MO-9

### Slide 4MO-9 Principles of Management

In spite of marked improvements in management, early PPH remains a significant contributor to maternal morbidity and mortality both in developing countries and in hospitals equipped with all that modern medicine has to offer. This complication is among the most challenging that a clinician will face. Prevention, early recognition and prompt appropriate intervention are the keys to minimize its impact. Persons providing intrapartum care should routinely take steps to prevent PPH. Practices should be established to facilitate the identification of women who may be at

particularly high risk for PPH and to allow prompt intervention should excessive bleeding occur.

Close monitoring, prompt recognition, rapid arrest of the bleeding and adequate volume resuscitation are all required but when used together, they can reduce mortality from postpartum hemorrhage.

*Schuermans N, MacKinnon C et al. Prevention and management of postpartum haemorrhage. SOGC Clinical Practice Guidelines, № 88, April 2000*

*A Textbook of Postpartum Hemorrhage. Sapiens Publishing, Duncow, UK, 2006.*

**1. Early Recognition**

- Routine observation of woman after delivery
  - Control uterus tonus (uterus should be hard and round)
    - Every 15 min within first hour after delivery
    - At the end of 2<sup>nd</sup>, 3<sup>rd</sup> and 4<sup>th</sup> hour, then every 4 hours after that
  - Estimation of blood loss
    - Clinical methods
    - Quantitative methods

WHO EUROPE  
Postpartum Hemorrhage, 2006  
WHO, 2006  
USAID  
Effective Perinatal Care (EPC)  
4MO-10

### Slide 4MO-10 1. Early Recognition

Early recognition of PPH is a very important factor in management. All women should be carefully observed after birth for signs of excessive bleeding. Standards of care should ensure early detection of atony or haemorrhage.

Clinical methods: Clinical estimation remains the primary means of diagnosing the extent of bleeding and to direct intervention therapy in obstetric practice. Knowing that the blood volume of a pregnant woman is 8.5–9% of her weight, one is able to quickly approximate blood loss

based on changes in pulse, systolic blood pressure and mean arterial pressure. A systolic blood pressure below 100 mmHg and a pulse rate above 100 beats/min are late signs of depleted blood volume and indicate commencing failure of compensatory mechanisms, whereas acute blood loss might not be reflected by a decrease in hematocrit or hemoglobin level for 4 hours or more.

Thus, clinical estimates of blood loss are notoriously unreliable, with a tendency to underestimate the incidence of postpartum hemorrhage by 30–50%.

Quantitative methods: Traditionally, blood loss after delivery is visually estimated, with wide variations in accuracy. The birth attendant grossly makes a quantitative estimate; however, the associated amount of loss is often far greater than appreciated by visual estimation alone.

In the past, quantitative methods for estimating vaginal blood loss included direct collection of blood into bedpans or plastic bags; gravimetric methods wherein pads were weighed before and after use and the difference in the weight used to determine the amount of blood lost; determination of changes in blood indices before and after delivery; the acid hematin method, by which blood in the sponges and pads was mixed with a solution that converted hemoglobin to acid hematin or cyanmethemoglobin, which in turn was measured by a colorimeter.

None of these methods was ever adopted in clinical practice because of their complicated nature or due to the effort, expense and time required to obtain results before beginning interventions.

As a result, numerous authorities have advocated a more objective approach to the diagnosis of postpartum hemorrhage. Although many studies address this issue, accurate measurement of blood loss by an ideal method remains a gray area.

*A Textbook of Postpartum Haemorrhage. Sapiens Publishing, UK, 2006.*

*Pregnancy, childbirth, postpartum and newborn care: a guide for essential practice. WHO, 2006.*

**2. Initial Assessment and Treatment**

- Assess and monitor
  - Respiration, blood pressure, heart rate, skin color, urine output, coagulation screen, ABO type screen and cross-match
- Initiate resuscitation
  - IV line and infusion
- Search for the cause of bleeding
  - Explore uterus (atony, retained placental fragments, rupture)
  - Explore lower genital tract (trauma)
  - Observe clots

Postpartum Hemorrhage, 2006  
WHO, 2006

USAID  
Effective Perinatal Care (EPC)

4MO-11

## Slide 4MO-11 2. Initial Assessment and Treatment

When confronted with excessive ongoing bleeding, the clinician should immediately attempt to determine the cause of the haemorrhage while at the same time instituting resuscitative measures and appropriate investigations. To identify the aetiology, a thorough exploration of the uterus and inspection of the lower genital tract should be performed.

Simultaneously, attention should be directed to the “ABC’s” with the establishment of a large bore intravenous access,

administration of oxygen by mask and monitoring of vital signs including blood pressure, pulse, respiration and urine output.

Crystalloid solutions should be administered through the intravenous site. Consideration may be given to urinary catheter insertion and the use of an oxygen saturation monitor. Blood should be drawn for CBC, coagulation screen and ABO type screen and cross match. It may be helpful for the clinician to retain a red topped tube of blood for observation. Failure to form a clot in seven to ten minutes indicates an impairment of the woman’s clotting system.

*A Textbook of Postpartum Hemorrhage. Sapiens Publishing, Duncow, UK, 2006.*

*Schuermans N, MacKinnon C et al. Prevention and management of postpartum haemorrhage. SOGC Clinical Practice Guidelines, № 88, April 2000*

**Initiate Resuscitation**

- Insert one or two large bore IV line (Size 16 or more)
- Initiate bolus infusion (1 liter in 15 minutes) of crystalloids: 3 ml / 1 ml of blood loss
- If signs of shock, additionally:
  - Tilt the head down
  - Clean the airways
  - Oxygen by mask 6-8 l/min

WHO, 2000

USAID

Effective Perinatal Care (EPC)

4MO-12

### Slide 4MO-12 Initiate Resuscitation

In case of sudden rapid blood loss due to haemorrhage, surgery or complications of delivery, the most urgent measure is usually the rapid replacement of the fluid lost from circulation.

Intravenous replacement of fluid is the first-line treatment in case of hypovolaemia. Initial fluid infusion (crystalloids: normal saline, Ringer solution) may be life-saving and can provide some time to control bleeding and obtain blood for transfusion if it becomes necessary.

Note: If the woman is in shock, avoid using plasma substitutes (e.g. dextran or albumin). There is no evidence that plasma substitutes are better than normal saline in the resuscitation of a shocked woman and besides, dextran can be harmful in large doses.

*Managing Complications in Pregnancy and Childbirth: A Guide for Midwives and Doctors. Geneva: WHO, 2000*

**3. Identification of Aetiology and Direct Therapy**

Causes of primary Postpartum Haemorrhage – 4 “T”s:

- “Tissue”- Retained placental fragments
- “Tonus”- Uterine atony
- “Trauma”- Lacerations of uterus and lower genital tract, uterus inversion
- “Thrombin”- Preexisting or acquired coagulation abnormalities

Postpartum Hemorrhage, 2006  
WHO, 2006

USAID

Effective Perinatal Care (EPC)

4MO-13

### Slide 4MO-13 4. Identification of Aetiology and Direct Therapy

The aetiology of early PPH is most easily understood as an abnormality of one or more of four basic processes. As a memory aid these processes can be thought of as the four T’s; Tone, Tissue, Trauma and Thrombin.

Tone: uterine atony – 70%, birth ways trauma – 20%, tissue – 10%, initial haematological disorders of the clotting cascade and platelet dysfunction – 1%, disseminated intravascular coagulation (rare), uterus inversion (rare). Bleeding

will occur if for some reason the uterus is not able to contract.

Tissue: retained products of conception or blood clots.

Trauma : genital tract lacerations and uterine rupture may cause large blood loss postpartum, especially if not promptly identified.

Thrombin: coagulation abnormalities can cause excessive blood loss alone or when combined with one of the other processes.

Uterine atony and lacerations of the vagina and cervix are the most common causes of postpartum haemorrhage.

The most severe PPH is produced by placental pathology (placenta previa and accrete), coagulation disturbances and uterine rupture and inversion

Schuermans N, MacKinnon C et al. Prevention and management of postpartum haemorrhage. SOGC Clinical Practice Guidelines, № 88, April 2000

A Textbook of Postpartum Hemorrhage. Sapiens Publishing, Duncow, UK, 2006.

**Vaginal Bleeding After Childbirth (1)**

- Placenta not delivered:
  - Give oxytocin 10 units IM if not already done for active management of the third stage
  - Massage the uterus, if the uterus is contracted, attempt controlled cord traction
  - If unsuccessful – perform vaginal examination (check if placenta is in the cervix) - remove it carefully
  - If no placenta in vagina or cervix - remove placenta manually
  - If impossible to remove placenta (placenta accreta) - surgical treatment

WHO, 2006

#### Slide 4MO-14 Vaginal Bleeding After Childbirth (1)

If placenta is not delivered:

- Massage the uterus. If the uterus is hard, deliver placenta by controlled cord traction.
- If unsuccessful, do a vaginal examination and check if the placenta is in the cervix. If placenta is in the cervix or vagina - remove it carefully.
- If there is no placenta in vagina or cervix and bleeding continues remove placenta manually.
- If unable to remove placenta (placenta accrete), surgical treatment needs to be performed.

*Pregnancy, Childbirth, Postpartum and Newborn Care: A guide for essential practice. WHO, Geneva, 2006*

**Vaginal Bleeding After Childbirth (2)**

- Placenta delivered but not complete:
  - Remove placental fragments by hand, ovum forceps or large curette
  - If bleeding continues after fragments removal assess clotting status using a bedside clotting test.
    - Failure of a clot to form after 7 minutes or a soft clot that breaks down easily suggests coagulopathy
  - If impossible to remove placental fragments (placenta accreta) - surgical treatment

WHO, 2006

#### Slide 4MO-15 Vaginal Bleeding after Childbirth (2)

Placenta delivered but not complete:

- Remove placental fragments by hand, ovum forceps or large curette
- If bleeding continues after fragments are removed, assess clotting status using a bedside clotting test.
  - Failure of a clot to form after 7 minutes, or a soft clot that breaks down easily, suggests coagulopathy

- If impossible to remove placental fragments (placenta accreta), use surgery

*Pregnancy, Childbirth, Postpartum and Newborn Care: A guide for essential practice. WHO, Geneva, 2006.*

**Vaginal Bleeding After Childbirth (3)**

- Placenta is delivered and complete:
  - Check for uterine atony
  - Check for trauma

WHO, 2006

### Slide 4MO-16 Vaginal Bleeding After Childbirth (3)

If heavy postpartum bleeding persists after the placenta is delivered and complete

- Check that the uterus is well contracted
- Examine for tears. If one is present, determine the degree

*Pregnancy, Childbirth, Postpartum and Newborn Care: A guide for essential practice. WHO, Geneva, 2006.*

**Bleeding Due to Uterine Atony**

- Massage the uterus until it is well contracted
- Give oxytocin
  - Initial dose:
    - 10 IU IM/IV OR
    - 20 IU IV infusion in 1000 ml of saline, 60 drops per minute
  - Continuing dose:
    - IM/IV repeat 10 IU after 20 minutes if heavy bleeding persists OR
    - 10 IU IV infusion in 1000 ml of saline, 30 drops per minute

Postpartum Hemorrhage, 2006  
WHO, 2006

### Slide 4MO-17 Bleeding Due To Uterine Atony

If heavy postpartum bleeding persists after the placenta is delivered, or the uterus is not well contracted (is soft):

- Place cupped palm on uterine fundus and feel for state of contraction.
- Massage fundus in a circular motion with cupped palm until uterus is well contracted.
- When well contracted, place fingers behind fundus and push down in one swift action to expel

clots.

- Collect blood in a container placed close to the vulva. Measure or estimate blood loss, and record.

Give oxytocin

Initial dose:

- IM/IV: 10 IU
- IV infusion: 20 IU in 1 litre at 60 drops/min

Continuing dose:

- IM/IV: repeat 10 IU after 20 minutes if heavy bleeding persists
- IV infusion: 10 IU in 1 litre at 30 drops/min

Maximum dose: Not more than 3 litres of IV fluids containing oxytocin. IV bolus of 5 ml of oxytocin may cause maternal hypertension.

*Pregnancy, Childbirth, Postpartum and Newborn Care: guide for essential practice. WHO, Geneva, 2006.*

Oxytocin stimulates the upper uterine segment to contract in a rhythmical fashion. Owing to its short plasma half-life (mean 3 min), a continuous intravenous infusion is required in order to maintain the uterus in a contracted state. The usual dose is 20 IU in 500 ml of crystalloid solution, with the dosage rate adjusted according to response (typical infusion rate 250 ml/h). When administered intravenously, the onset of action is almost instantaneous and plateau concentration is achieved after 30 min.

By contrast, intramuscular administration results in a slower onset of action (3–7 min) but a longer lasting clinical effect (up to 60 min). Metabolism of oxytocin is via the renal and hepatic routes. Its antidiuretic effect, which amounts to 5% of the antidiuretic effect of vasopressin, can result in water toxicity if given. This degree of water overload can manifest itself with headache, vomiting, drowsiness and convulsions. Furthermore, rapid intravenous bolus administration of undiluted oxytocin results in relaxation of vascular smooth muscle, which can lead to hypotension. It is therefore best given intramuscularly or by dilute intravenous infusion.

Oxytocin is stable at temperatures up to 25°C but refrigeration may prolong its shelf-life. A disadvantage of oxytocin is its short half-life. The long-acting oxytocin analogue carbetocin has been studied in this context because of more sustained action, similar to that of ergometrine but without its associated side-effects, may offer advantages over standard oxytocin therapy. Comparative studies of carbetocin for the prevention of postpartum haemorrhage have identified enhanced effectiveness of this analogue when compared with an oxytocin infusion.

*A Textbook of Postpartum Haemorrhage. Sapiens Publishing, Duncow, UK, 2006.*

**Management of Uterine Atony Unresponsive to Oxytocin**

- Ergot alkaloids:
  - Ergometrine
- Prostaglandins:
  - Carboprost (15-methyl PG F<sub>2α</sub>)
  - Misoprostol (PG E<sub>1</sub>)

WHO, 2000  
Postpartum Hemorrhage, 2006

USAID  
EUROPE

#### Slide 4MO-18 Management of Uterine Atony Unresponsive to Oxytocin

Ergometrine and prostaglandins should be used in attempts to arrest PPH unresponsive to oxytocin.

*Managing Complications in Pregnancy and Childbirth: A Guide for Midwives and Doctors. Geneva: WHO, 2000*

**Ergometrine for Treatment of PPH**

- Ergometrine is a first-line treatment of uterine atony irresponsive to oxytocin
- Rapid onset of action after IM injection (2–5 min)
- Clinical effect persists for approximately 3 hours
- Give Ergometrine
  - Initial dose: 0,2 mg IM/IV slowly
  - Continuing dose: 0.2 mg IM after 15 minutes if bleeding persists, up to 5 doses (total 1.0 mg)

Postpartum Hemorrhage, 2006  
WHO, 2006

USAID  
EUROPE

#### Slide 4MO-19 Ergometrine for Treatment of PPH

In contrast to oxytocin, the administration of ergometrine results in a sustained tonic uterine contraction via stimulation of myometrial  $\alpha$ -adrenergic receptors. Both upper and lower uterine segments are thus stimulated to contract in a tetanic manner. Intramuscular injection of the standard 0.25 mg dose results in an onset of action of 2–5 min. Metabolism is via the hepatic route and the mean plasma half-life is 30 min. Nonetheless, the clinical effect of ergometrine persists for approximately 3 hours. The co-

administration of ergometrine and oxytocin therefore results in a complementary effect, with oxytocin achieving an immediate response and ergometrine a more sustained action.

Common side-effects include nausea, vomiting and dizziness and these are more striking when given via the intravenous route. As a result of its vasoconstrictive effect via stimulation of  $\alpha$ -

adrenergic receptors, hypertension can occur. Contraindications to use of ergometrine therefore include hypertension (including pre-eclampsia), heart disease and peripheral vascular disease. If given intravenously, careful monitoring of pulse and blood pressure should be done.

Relevant to the developing world in particular, is it is both heat- and light-sensitive and should be stored at temperatures below 8°C and away from light.

The product Syntometrine (5 units oxytocin and 0.5 mg ergometrine) combines the rapid onset of oxytocin with the prolonged effect of ergometrine. The mild vasodilatory property of oxytocin may counterbalance the vasopressor effect of ergometrine.

First-line treatment of uterine atony, therefore, involves administration of oxytocin or ergometrine as an intramuscular or diluted intravenous bolus, followed by repeat dosage if no effect is observed after 5 min and complemented by continuous intravenous oxytocin infusion. Atony that is refractory to these first-line oxytocics will warrant prostaglandin therapy.

*A Textbook of Postpartum Haemorrhage. Sapiens Publishing, Duncow, UK, 2006.*

Initial dose: IM/IV: 0.2 mg slowly

Continuing dose: repeat 0.2 mg IM after 15 minutes if heavy bleeding persists

Maximum dose: Not more than 5 doses (total 1.0 mg)

*Pregnancy, Childbirth, Postpartum and Newborn Care: A guide for essential practice. WHO, Geneva, 2006.*

**Prostaglandins for Treatment of PPH**

- Carboprost is second-line agent for management of uterine atony unresponsive to oxytocin/ergometrine
- The majority of women required a single dose only
- The success rate for controlling bleeding was between 86% and 96%
- Give Carboprost:
  - Initial dose: 0.25 mg, by deep intramuscular injection or direct intramyometrial injection
  - Continuing dose: 0.25 mg every 15 min if bleeding persists up to 2 mg (eight doses)

Postpartum Hemorrhage, 2006  
WHO, 2000

USAID  
EPC

#### Slide 4MO-20 Prostaglandins for Treatment of PPH

Carboprost (15-methyl PGF<sub>2</sub>α) acts as a smooth muscle stimulant and is a recognized second-line agent for use in the management of postpartum uterine atony unresponsive to oxytocin/ergometrine. It is an analogue of PGF<sub>2</sub>α (dinoprost) with a longer duration of action than its parent compound, attributed to its resistance to inactivation by oxidation at the 15-position. Available in single-dose vials of 0.25 mg, it may be administered by deep intramuscular injection or, alternatively, by direct intramyometrial injection. The latter

route of administration is achieved either during caesarean section or transabdominally or transvaginally following vaginal delivery and has the advantage of a significantly quicker onset of action. Peripheral intramuscular injection yields peak plasma concentrations at 15 min in contrast to less than 5 min for the intramyometrial route. Using a 20-gauge spinal needle, intravascular injection can be avoided by pre-injection aspiration, and intramyometrial rather than intracavitary placement of the needle can be confirmed by observing resistance on injection, as described by Bigrigg and colleagues. The dose may be repeated every 15 min up to a maximum cumulative dose of 2 mg (eight doses), although, in reported case series, the majority of patients require no more than one dose.

Reported efficacy is high. Successful arrest of atonic hemorrhage is reported in 13/14 patients by Bigrigg and colleagues. The largest case series to date involved a multicenter surveillance study of 237 cases of postpartum hemorrhage refractory to standard oxytocics and reported an efficacy of 88%. The majority of women in this study required a single dose only.

Owing to its vasoconstrictive and bronchoconstrictive effects, carboprost can result in nausea, vomiting, diarrhea, pyrexia and bronchospasm. Contraindications therefore include cardiac and pulmonary disease. The cost of carboprost makes it unsuitable for consideration in low-resource settings. Furthermore, it is both light- and heat-sensitive and must be kept refrigerated at 4°C.

Dinoprost (prostaglandin F2 $\alpha$ ) has a shorter duration of activity than carboprost and indeed has been unavailable in the US since the 1980s where its withdrawal was attributed to financial reasons.

Prostaglandin E2 (dinoprostone) is unsuitable for use in the hypotensive or hypovolemic due to vasodilatory effect.

*A Textbook of Postpartum Haemorrhage. Sapiens Publishing, Duncow, UK, 2006.*

*Managing Complications in Pregnancy and Childbirth: A Guide for Midwives and Doctors. Geneva: WHO, 2000*

**Misoprostol for Treatment of PPH: Disadvantages**

- Misoprostol is not associated with reduction of:
  - Maternal mortality
  - Hysterectomy
  - Additional use of uterotonics
  - Blood transfusion
  - Evacuation of retained products
- Misoprostol is associated with increase of:
  - Maternal pyrexia
  - Maternal shivering

Mousa HA et al, 2007

### Slide 4MO-21 Misoprostol for Treatment of PPH Disadvantages

Misoprostol in the Treatment of Postpartum Haemorrhage.

Three studies (462 participants) were included. Two placebo-controlled randomised trials compared misoprostol (dose 600 to 1000 mcg) with a placebo and showed that misoprostol use was not associated with any significant reduction of maternal mortality (two trials, 398 women; relative risk (RR) 7.24, 95% confidence interval (CI) 0.38 to 138.6), hysterectomy

(two trials, 398 women; RR 1.24, 95% CI 0.04 to 40.78), the additional use of uterotonics (two trials, 398 women; RR 0.98, 95% CI 0.78 to 1.24), blood transfusion (two trials, 394 women; RR 1.33, 95% CI 0.81 to 2.18), or evacuation of retained products (one trial, 238 women; RR 5.17, 95% CI 0.25 to 107). Misoprostol use was associated with a significant increase of maternal pyrexia (two trials, 392 women; RR 6.40, 95% CI 1.71 to 23.96) and shivering (two trials, 394 women; RR 2.31, 95% CI 1.68 to 3.18).

One trial showed better clinical response to misoprostol administered rectally compared with a combination of syntometrine and oxytocin. We did not identify any trial dealing with surgical techniques, radiological interventions or haemostatic drugs for women with primary PPH unresponsive to uterotonics.

There is insufficient evidence to show that the addition of misoprostol is superior to the combination of oxytocin and ergometrine alone for the treatment of primary PPH. Large multi-centre, double-blind, randomised controlled trials are required to identify the best drug combinations, route, and dose of uterotonics for the treatment of primary PPH. Further work is required to assess the best way to manage women who fail to respond to uterotonics therapy.

*Mousa HA, Alfirevic Z. Treatment for primary postpartum haemorrhage (Cochrane Review). Cochrane Database of Systematic Reviews 2007, Issue 1.*



**Misoprostol for Treatment of PPH: Advantages**

- Low cost
- Easy to storage: does not need refrigerating
- Easy of administration
- May be appropriate for use in low resource settings where injectable uterotonics are not available

Blanchard K, 2002  
Postpartum Hemorrhage, 2006

WHO EUROPE  
USAID  
EPC

### Slide 4MO-22 Misoprostol for Treatment of PPH: Advantages

#### Advantages of Misoprostol

- Does not cause myocardial infarct and bronchospasm
- Safe in hypertension and pre-eclampsia
- Low cost: approximately \$1 per 1 tablet 200 mcg
- Does not need refrigerator
- Easy to use: can administer rectally

Rapid action: clinical studies showed that uterus tonus increased 3 minutes after

use.

*Blanchard K, Clark S, et al. Misoprostol for Women's Health: a Review. Obstetrics & Gynecol, 2002, 99,316-332.*

While there is less information about the effect of misoprostol for treatment of PPH, it may be appropriate for use in low resource settings and has been used alone, and in combination with oxytocin, and as a last resort for PPH treatment. In the published literature, a variety of doses and routes of administration have shown promising results. In home births without a skilled attendant, misoprostol may be the only technology available to control PPH. An optimal treatment regimen has not yet been determined.

One published study on treatment of PPH found that 1000 mcg rectally significantly reduces the need for additional interventions. Studies are ongoing to determine the most effective and safe dose for the treatment of PPH. A rare case of non-fatal hyperpyrexia has been reported after 800 mcg of oral misoprostol.

Misoprostol, although less effective, may be considered in situations where injectable uterotonics are not available.

*A Textbook of Postpartum Hemorrhage. Sapiens Publishing, Duncow, UK, 2006*

**Refractory Haemorrhages (1)**

- When there is a failure of respond to initial treatment following actions need to be done:
  - Call for help
  - Inform the Blood Bank and Intensive Care Unit
- One midwife monitors and records the findings
- Another person is responsible for delivery and preparation of blood
- Another physician is responsible for blood transfusion

WHO, 2000

WHO EUROPE  
USAID  
EPC

### Slide 4MO-23 Refractory Haemorrhages (1)

A small number of women fail to respond to initial management steps. Next steps include:

- Summon the help of experienced obstetrician and anaesthesiologist
- Notify blood Bank and ICU, if it was not done
- Prepare for surgery (SOONER THAN LATER).


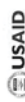
- Continued administration of large quantities of crystalloid and blood products intravenously may be required to maintain blood pressure, urine output and coagulation.

*Managing Complications in Pregnancy and Childbirth: A Guide for Midwives and Doctors. Geneva: WHO, 2000*

**Refractory Haemorrhages (2)**

- Continue IV infusion of crystalloids
- Prepare for surgery (BETTER SOONER THAN LATER)
- Temporary arrest of bleeding :
  - Compression of aorta
  - Bimanual compression of the uterus

WHO, 2000

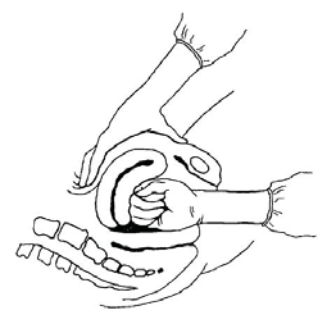
**Slide 4MO-24 Refractory Haemorrhages (2)**

Until arrangements for surgery are in place, methods to temporary arrest bleeding are applied. The most commonly used are manual compression of the uterus and compression of the aorta.


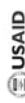
Packing the uterus, as well as other techniques to temporary arrest bleeding are ineffective and waste precious time.

*Managing Complications in Pregnancy and Childbirth: A Guide for Midwives and Doctors. Geneva: WHO, 2000*

**Bimanual Compression**



WHO, 2000

**Slide 4MO-25 Bimanual Compression**

Technique:

- Wear sterile gloves, insert a hand into the vagina and form a fist.
- Place the fist into the anterior fornix and apply pressure against the anterior wall of the uterus.
- With the other hand, press deeply into the abdomen behind the uterus, applying pressure against the posterior wall of the uterus.
- Maintain compression until bleeding is arrested and the uterus contracts.

*Managing Complications in Pregnancy and Childbirth: A Guide for Midwives and Doctors. Geneva: WHO, 2000*

Bimanual compression versus internal massage – theoretical considerations

**Compression**

**Advantages**

Uterus is empty  
Bleeding site is compressed

No risk of infection  
No tromboplastines  
Can be done without anaesthesia

**Disadvantage**

No possibility to check for retained tissue or uterine rupture

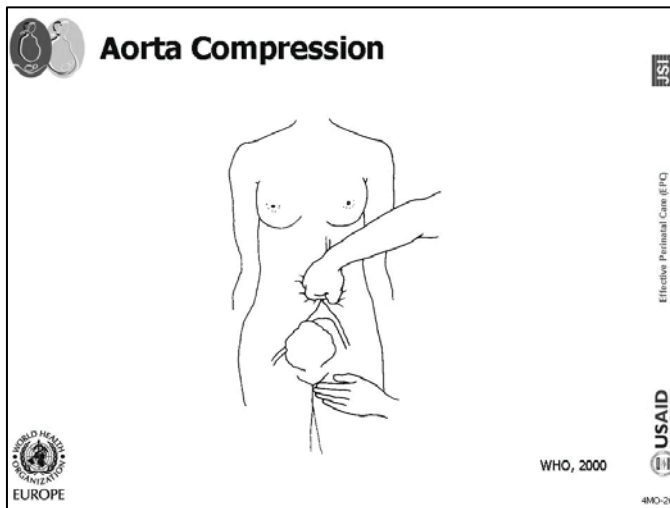
**Massage**

**Disadvantages**

Uterus is not empty  
Uterus is forced to contract with a foreign body inside  
Risk of infection  
Tromboplastines are expelled  
Anaesthesia is necessary

**Advantage**

Possible to check for retained tissue or uterine rupture



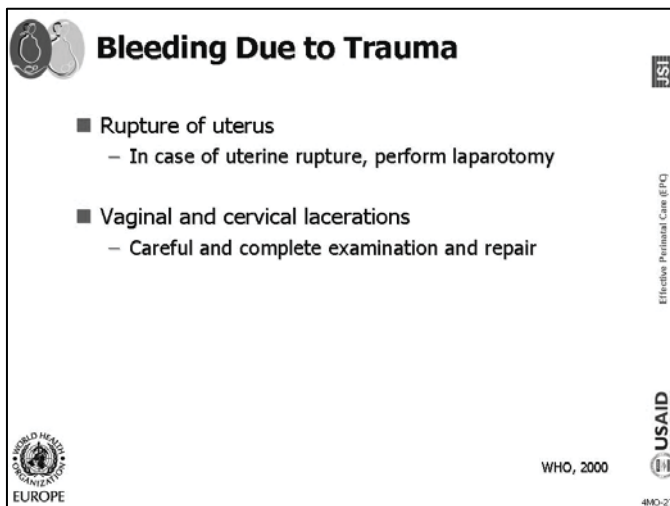
### Slide 4MO-26 Aorta Compression

Apply downward pressure with a closed fist over the abdominal aorta directly through the abdominal wall:

- The point of compression is just above the umbilicus and slightly to the left.
- Aorta pulsations can be felt easily through the anterior abdominal wall in the immediate postpartum period.
- With the other hand, palpate the femoral pulse to check the adequacy of compression.
- If the pulse is palpable during compression, the pressure exerted by the fist hand is inadequate.

- If the femoral pulse is not palpable, the pressure exerted is adequate.
- Maintain compression until bleeding is arrested.

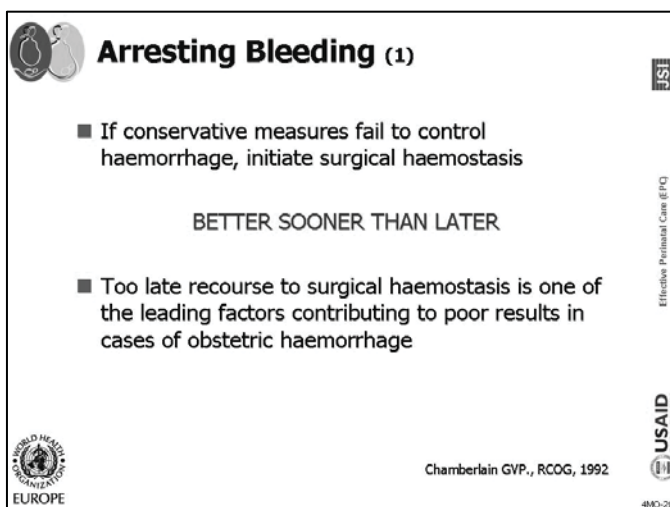
*Managing Complications in Pregnancy and Childbirth: A Guide for Midwives and Doctors. Geneva: WHO, 2000.*



### Slide 4MO-27 Bleeding due to Trauma

Unnecessary hysterectomies are frequently performed because the birth canal is often not examined for trauma.

*Managing Complications in Pregnancy and Childbirth: A Guide for Midwives and Doctors. Geneva: WHO, 2000.*



### Slide 4MO-28 Arresting Bleeding(1)

If conservative measures fail to control haemorrhage, initiate surgical haemostasis SOONER RATHER THAN LATER.

Early recourse to hysterectomy is recommended, especially where bleeding is associated with placenta accreta or uterine rupture, and where available staff is experienced with the procedure.

Hysterectomy should not be delayed until the patient is in extremis, or while the surgeon attempts less definitive procedures they have little experience with.

Chamberlain GVP. *The clinical aspects of massive haemorrhage*. In: Patel N, ed. *Maternal mortality: the way forward*. London: RCOG, 1992, 54-62.

**Arresting Bleeding (2)**

- The following interventions are effective and should be undertaken until the bleeding stops:
  - Haemostatic uterine suturing (e.g. B-Lynch' suture)
  - Bilateral ligation of uterine arteries
  - Bilateral ligation of internal iliac arteries
  - Hysterectomy

Postpartum Hemorrhage, 2006

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4MO-29

### Slide 4MO-29 Arresting Bleeding (2)

The type of surgical intervention depends upon several factors, paramount of which is the experience of the surgeon. Other factors include parity and desire for future children, the extent of the haemorrhage, the general condition of the patient and place of confinement. Women at high risk of postpartum haemorrhage should not be delivered in isolated units or units ill-equipped to manage sudden, life-threatening emergencies. Immediate access to specialist consultant care, blood products and intensive care are essential.

In the past, the surgical management of postpartum haemorrhage included ligation of uterine arteries, ligation of internal iliac artery, stepwise devascularization and, finally, subtotal or total abdominal hysterectomy.

A more conservative procedure, now colloquially known as the Brace suture technique, was first described by B-Lynch and colleagues in 1997. Along with later modifications by Hayman and colleagues and Cho and colleagues, this may prove more effective than radical surgery for the control of life-threatening postpartum haemorrhage.

Although subtotal and total abdominal hysterectomy are still available and indeed useful in their own right, they should be considered as a last resort.

*A Textbook of Postpartum Hemorrhage*. Sapiens Publishing, Duncow, UK, 2006

**Surgical Compression Sutures: B-Lynch' Suture (1)**

- The most popular is the B-Lynch' suture, firstly described in 1997
- More than 1300 cases reported, in most of them hysterectomy was prevented
- Any serious complication were not reported
- Subsequently, many women had uncomplicated pregnancies and normal deliveries

EI-Hamamy E, B-Lynch C, 2005

EUROPE

USAID

Effective Perinatal Care (EPC)

4MO-30

### Slide 4MO-30 Surgical Compression Sutures: B-Lynch' Suture (1)

The procedure was first performed and described by Mr Christopher B. Lynch, a consultant obstetrician, gynaecological surgeon, Fellow of the Royal College of Obstetricians and Gynaecologists of the UK, Fellow of the Royal College of Surgeons of Edinburgh and based at Milton Keynes General Hospital National Health Service (NHS) Trust (Oxford Deanery, UK), during the management of a patient with a massive postpartum haemorrhage in November 1989. The patient had refused consent to an emergency hysterectomy.

tomy.

The suture aims to exert continuous vertical compression on the vascular system. In the case of postpartum haemorrhage from placenta previa, a transverse lower segment compression suture is effective.

The current level of application of the B-Lynch suture world-wide includes over 1,300 successful cases; of these, there are only 19 failures. The Indian subcontinent has the largest number of reported successful applications, over 250, followed by Africa, South America and North America, Europe and other countries. The 17 reported failures were because of delay in application, poor technique, defibrination and inappropriate material.

Various suture materials have been used. However, the monocryl suture (code WC3709) is recommended because it is user- and tissue-friendly with uniform tension distribution and is easy to handle. Holtsema and colleague, in a recent review, stated that the B-Lynch technique for postpartum hemorrhage should be an option for every gynecologist. Wohlmuth and colleagues published an outcome of a large study with a 91% success rate (world-wide cumulative success rate 98%).

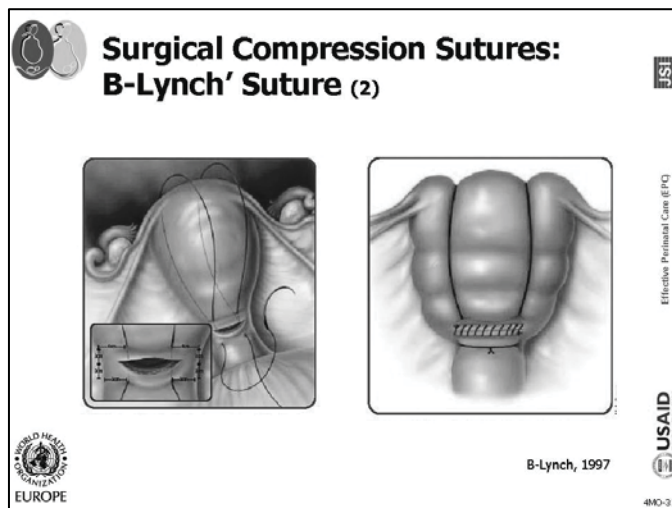
To date, no serious adverse outcomes have been associated with the B-Lynch surgical technique.

The latest 2000–2002 Triennial Confidential Enquiry states that no deaths were reported in women who had interventional radiology or B-Lynch suture in the management of postpartum hemorrhage.

More than 20 cases of successful births in women with such operations in anamnesis were reported.

*B-Lynch C, Coker A, Lawal AH, et al. The B-Lynch surgical technique for the control of massive postpartum haemorrhage: an alternative to hysterectomy? Five cases reported. Br J Obstet Gynaecol, 1997, 104,372-375.*

*El-Hamamy E, B-Lynch C. A worldwide review of the uses of the uterine compression suture techniques as alternative to hysterectomy in the management of severe post-partum haemorrhage. J Obstet Gynaecol. 2005, 25(2),143-149.*



#### Slide 4MO-31 Surgical Compression Sutures: B-Lynch' Suture (2)

A woman meets the criteria for the B-Lynch compression suture if bimanual compression decreases the amount of uterine bleeding by abdominal and perineal inspection. The first step is low transverse hysterotomy. With the bladder displaced anteriorly, the first stitch is placed 3 cm below the lower C/S incision on the patient's left side and threaded through the uterine cavity, emerging about 4 cm from the lateral border of the uterus. Next the suture is carried on the uterus over the anterior uterine surface to the posterior side and inserted through the posterior uterine wall. The suture is tied as the assistant tightly compresses the uterus. The last step is to close hysterectomy incision.

*B-Lynch C, Coker A, Lawal AH, et al. The B-Lynch surgical technique for the control of massive postpartum haemorrhage: an alternative to hysterectomy? Five cases reported. Br J Obstet Gynaecol, 1997, 104,372-375.*

**Ligation of Uterine Arteries**

- First report: Waters et al, 1952; effectiveness 80-90%
- The largest trial: O'Leary: 265 patients, effectiveness 96%
- Another large trial: 103 patients, effectiveness 100%
- No serious complications were noted and subsequent pregnancies have been described

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SOGC, 2000  
EUROPE

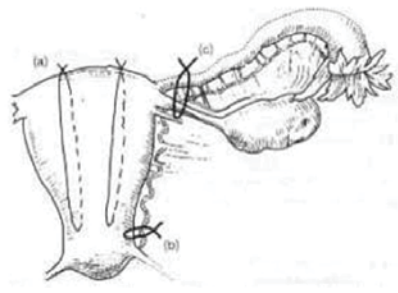
### Slide 4MO-32 Ligation of uterine arteries

The largest study, reported in the literature is O'Leary's report of experience with 265 patients, with 96% success rate.

Another large study reports 100% effectiveness in 103 patients with intractable PPH using a stepwise approach to uterine devascularization

*Schuermans N, MacKinnon C et al. Prevention and management of postpartum haemorrhage. SOGC Clinical Practice Guidelines, № 88, April 2000*

**Compressive Sutures and Ligature of Uterine Vessels**



Effective Perinatal Care (EPC)  
USAID  
Hayman RG et al ACOG, 2002  
WHO, 2000  
EUROPE

### Slide 4MO-33 Compressive Sutures and Ligature of Uterine Vessels

The Hayman uterine compression suture: clinical points (a):

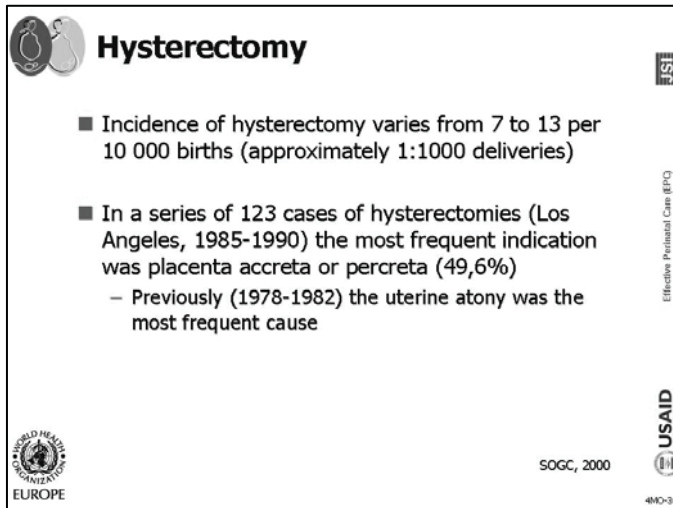
- Lower uterine segment or uterine cavity not opened
- Uterine cavity not explored under direct vision
- Probably quicker to apply
- No feed back data on fertility outcome
- Morbidity feed-back data limited
- Unequal tension leads to segmental ischemia secondary to slippage of suture – “shouldering” with venous obstruction

Technique of uterine and utero-ovarian artery ligation (b,c):

- Pull on the uterus to expose the lower part of the broad ligament.
- Feel for pulsations of the uterine artery near the junction of the uterus and cervix.
- Using 0 chromic catgut (or polyglycolic) suture on a large needle, pass the needle around the artery and through 2–3 cm of myometrium (uterine muscle) at the level where a transverse lower uterine segment incision would be made. Tie the suture securely.
- Place the sutures as close to the uterus as possible, as the urethra is generally only 1 cm lateral to the uterine artery. Repeat on the other side.
- If the **artery has been torn**, clamp and tie the bleeding ends.
  - Ligate the utero-ovarian artery just below the point where the ovarian suspensor ligament joins the uterus.
  - Repeat on the other side.
- Observe for continued bleeding or formation of haematoma and close the abdomen.

*Hayman RG et al, Uterine compression sutures: surgical management of postpartum haemorrhage. Obstet Gynecol., 2002, 99,502-506.*

*Managing Complications in Pregnancy and Childbirth: A Guide for Midwives and Doctors. Geneva: WHO, 2000.*



**Hysterectomy**

- Incidence of hysterectomy varies from 7 to 13 per 10 000 births (approximately 1:1000 deliveries)
- In a series of 123 cases of hysterectomies (Los Angeles, 1985-1990) the most frequent indication was placenta accreta or percreta (49,6%)
  - Previously (1978-1982) the uterine atony was the most frequent cause

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4MO-34

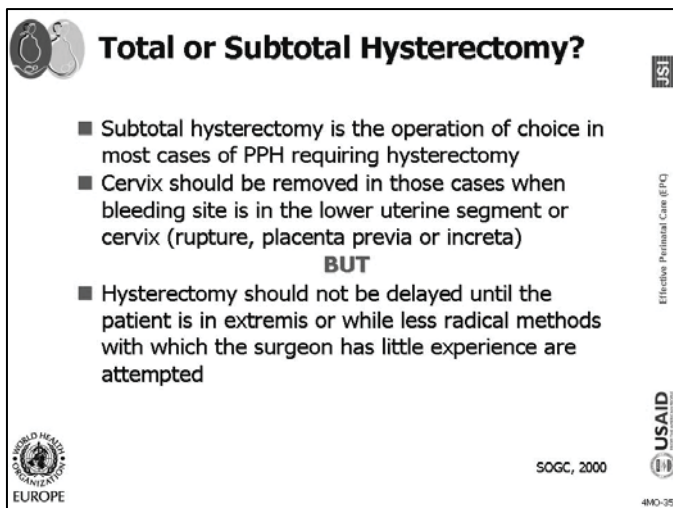
### Slide 4MO-34 Hysterectomy

Emergency hysterectomy is the most common treatment modality when massive postpartum haemorrhage requires surgical intervention. The incidence of emergency peripartum hysterectomy reported in the literature varies from 7 to 13 per 10,000 births and is much higher after caesarean section than vaginal delivery.

In a retrospective review of 123 cases of emergency peripartum hysterectomy from 1985-1990 in Los Angeles County, the most common indication for the procedure was placenta accreta or percreta

(49.6%). This was a change from a similar review from the same centre for 1978 to 1982, when uterine atony was the most frequent cause. This change was likely caused by newer or more effective prostaglandins for use with uterine atony, and an increase in the number of labouring patients with prior caesarean delivery. The association of placenta previa and prior caesarean section with placenta accreta and risk of hysterectomy is well documented in the literature. Other frequently cited indications for emergency hysterectomy are rupture of the uterus, severe extension of caesarean section on incision, broad ligament haematoma after forceps, lacerated cervix/vagina after forceps or ventouse, and chorioamnionitis.

*Schuurmans N, MacKinnon C et al. Prevention and management of postpartum haemorrhage. SOGC Clinical Practice Guidelines, № 88, April 2000.*



**Total or Subtotal Hysterectomy?**

- Subtotal hysterectomy is the operation of choice in most cases of PPH requiring hysterectomy
- Cervix should be removed in those cases when bleeding site is in the lower uterine segment or cervix (rupture, placenta previa or increta)

**BUT**

- Hysterectomy should not be delayed until the patient is in extremis or while less radical methods with which the surgeon has little experience are attempted

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4MO-35

### Slide 4MO-35 Total or Subtotal Hysterectomy?

Subtotal hysterectomy has been advocated to reduce operative time and blood loss. It is difficult to find data which supports this, because subtotal hysterectomy is often performed in the worst cases which already have larger blood loss and longer operating time.

Leaving the cervix in place would appear to be a reasonable option if the bleeding is controlled (uterine atony). If the bleeding site is in the lower uterine segment or cervix (placenta previa or abnormal placenta)

bleeding can not be arrested because it is caused by the cervical branches of the uterine arteries. In this case total hysterectomy is required.

*Schuurmans N, MacKinnon C et al. Prevention and management of postpartum haemorrhage. SOGC Clinical Practice Guidelines, № 88, April 2000.*

**Surgical Treatment: Conclusions (1)**

- "No lethal outcomes in women with B-Lynch' suture or ligation of uterus vessels were reported. No evidence for comparison and interpretation exists, but these procedures are likely to be more effective than heroism in surgery"

Report "Why Mothers Die 2000-2002", RCOG, 2004

Logos: WHO EUROPE, USAID, Effective Perinatal Care (EPC)

**Slide 4MO-36 Surgical Treatment: Conclusions (1)**

Extract from the Report on confidential enquiries into maternal deaths in the United Kingdom 2000-2002.

*Why Mothers Die 2000-2002 – Report on confidential enquiries into maternal deaths in the United Kingdom. Confidential Enquiry into Maternal Deaths. RCOG Press, Nov 2004*

**Surgical Treatment: Conclusions (2)**

- Surgical treatment should not be delayed

BETTER SOONER THAN LATER!!!

- Laparotomy does not always mean hysterectomy
- Hysterectomy does not need to be total in each case

Logos: WHO EUROPE, USAID, Effective Perinatal Care (EPC)

**Slide 4MO-37 Surgical Treatment: Conclusions (2)**

Though there are many effective alternatives to hysterectomy (prostaglandins, uterine artery ligation, compression sutures) it is important not to delay decision about surgical treatment (laparotomy) that could be vital in the most severe cases.

**Replacement of Blood Loss**

- Best option is a normal saline (ratio 3:1)
- Colloids have no advantages over crystalloids
- There are very strict indications for use of red cells and fresh frozen plasma transfusion

WHO, 2000

Logos: WHO EUROPE, USAID, Effective Perinatal Care (EPC)

**Slide 4MO-38 4. Replacement of Blood Loss**

It is well known that a human being can survive even if they lose 85% of renal function, 75% of liver function and 75% of erythrocytes, but he/she cannot survive in a case of uncompensated loss of more than 30% of blood plasma.

Crystalloid replacement fluids:

- contain concentration of sodium similar to plasma
- can not enter cells because the cell membrane is impermeable to sodium

- pass from the vascular compartment to the extracellular space (normally only a quarter of the volume of crystalloid infused remains in the vascular compartment)
- 

To restore circulating blood volume (intravascular volume), infuse crystalloids in a volume at least 3 times the volume lost.

Dextrose (glucose) solutions are poor replacement fluids. Do not use them to treat hypovolaemia unless there is no other alternative.



Only normal saline (sodium chloride 0.9%) or balanced salt solutions that have a similar concentration of sodium to plasma are effective replacement fluids. These should be available in all hospitals where IV replacement fluids are used

*Managing Complications in Pregnancy and Childbirth: A Guide for Midwives and Doctors. Geneva: WHO, 2000*

**Colloids Versus Crystalloids for Fluid Resuscitation (1)**

- Albumin or protein fraction of plasma
  - 19 trials including 7576 patients
  - Relative risk of mortality was 1.02
- Hydroxyethyl starch
  - 10 randomised trials including 374 patients
  - Relative risk of mortality was 1.16
- Modified gelatine
  - 7 trials including 346 patients
  - Relative risk of mortality was 0.54
- Dextran
  - 9 trials including 834 patients
  - Relative risk of mortality was 1.24

Roberts I, Alderson P et al, 2004

WHO EUROPE

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**Slide 4MO-39 Colloids Versus Crystalloids for Fluid Resuscitation (1)**

Colloid solutions are composed of a suspension of particles larger than crystalloids. Colloids tend to remain in the blood where they mimic plasma proteins to maintain or raise the colloid osmotic pressure of blood.

Colloids are usually given in a volume equal to the blood volume lost.

*Roberts I, Alderson P, Bunn F, Chinnock P, Ker K, Schierhout G. Colloids versus crystalloids for fluid resuscitation in critically ill patients. The Cochrane Database of Systematic Reviews 2004, Issue 4*

*1,632 cases of death from 8,452 women involved into the trials were reported. Relative risk of death after use of albumin is 1.01 (95% CI 0.92, 1.10) in hypovolemia. In case of burn, the relative risk was 2.40 (1.11, 5.19) and in hypoalbuminemia - 1.38 (0.94, 2.03).*

Disadvantages of colloids:

- cause anaphylactic reaction
- lead to prolongation of the partial thromboplastin time (hydroxyethyl starch, dextran)
- interfere with cross-matching of blood (dextran)
- decrease calcium level
- are less available and more expensive.

Blood volume replacement should be done with crystalloids. Important is not so called “quality”, but completeness and speed (in due time).

Conclusion: there is no evidence that use of albumin reduces mortality in patients with hypovolemia versus cheaper alternative – saline solutions.

*Alderson P, Bunn F, Lefebvre C, Li Wan Po A, Li L, Roberts I, Schierhout G. Human albumin solution for resuscitation and volume expansion in critically ill patients. The Cochrane Database of Systematic Reviews 2004, Issue 4.*

**Colloids Versus Crystalloids for Fluid Resuscitation (2)**

■ "As colloids are not associated with an improvement in survival, and they are more expensive than crystalloids, it is difficult to understand how their continued use in these patients can be justified outside the context of randomised controlled trials..."

Roberts I, Alderson P., 2004

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4MO-40

### Slide 4MO-40 Colloids Versus Crystalloids for Fluid Resuscitation (2)

There is no evidence from randomised controlled trials that resuscitation with colloids reduces the risk of death, compared to resuscitation with crystalloids, in patients with trauma, burns or following surgery. As colloids are not associated with an improvement in survival, and as they are more expensive than crystalloids, it is hard to see how their continued use in these patients can be justified outside the context of randomised controlled trials.

*Roberts I, Alderson P, Bunn F, Chinnock P, Ker K, Schierhout G. Colloids versus crystalloids for fluid resuscitation in critically ill patients. Cochrane Database of Systematic Reviews 2004, Issue 4.*

#### Points to Remember

- There is no evidence that colloid solutions (albumin, dextrans, gelatins, hydroxyethyl starch solutions) have advantages over normal saline or balanced salt solutions for resuscitation.
- There is evidence that colloid solutions may have an adverse effect on survival.
- Colloid solutions are much more expensive than normal saline and balanced salt solutions.
- Human plasma should not be used as a replacement fluid.
- All forms of plasma carry a similar risk as whole blood of transmitting infection, such as HIV and hepatitis.
- There is a very limited role for colloids in resuscitation.

*Managing Complications in Pregnancy and Childbirth: A Guide for Midwives and Doctors. Geneva: WHO, 2000*

**Indications for Red-cell Transfusion**

■ Only decreased capacity of blood to transport oxygen, e.g. clinic of hypoxia

■ Transfusion threshold must be individually determined for each patient:

- level of haematocrit and haemoglobin (critical level 70 g/l) should be considered BUT
- clinical signs of anemia and hypoxia are also important

■ If blood loss is 1000 ml and continue, red-cells for transfusion should be readily available

Postpartum Hemorrhage, 2006

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4MO-41

### Slide 4MO-41 Indications for Red-cell Transfusion

Transfusion of red cells may be vital to restore the oxygen-carrying capacity of the blood. The level of Hb < 70 g/l is an indication in most cases of continued bleeding. Red-cell transfusion might be necessary at a higher threshold if the patient has cardiac or pulmonary symptoms (tachycardia, dyspnoea, and decreased pO<sub>2</sub>).

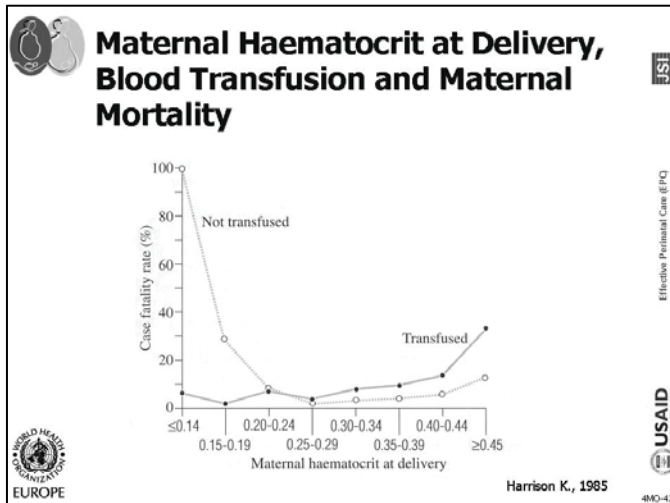
#### Points to Remember

- The woman's haemoglobin level, although important, should not be the sole deciding factor in starting red-cell transfusion. The decision to transfuse should be supported by the need to relieve clinical signs and symptoms and prevent significant morbidity and mortality.
- The clinician should be aware of the risks of transfusion by transmissible infection in the blood products available.

- Transfusions of whole blood, red cells or plasma are often given to prepare a woman quickly for planned surgery, or to allow earlier discharge from the hospital. Other treatments, such as the infusion of IV fluids, are often cheaper, safer and equally effective
- Transfusion should be prescribed only when the benefits to the woman are likely to outweigh the risks.

*A Textbook of Postpartum Hemorrhage. Sapiens Publishing, Duncow, UK, 2006*

*WHO. Managing Complications in Pregnancy and Childbirth: A Guide for Midwives and Doctors. Geneva: WHO, 2000*



### Slide 4MO-42 Maternal Haematocrit at Delivery, Blood Transfusion and Maternal Mortality

Before prescribing blood or blood products to a woman, it is essential to consider the risks of transfusing against the risks of not transfusing and the risks of whole blood or red cell transfusion.

hepatitis C, syphilis, malaria and Chagas disease to the recipient.

- Any blood product can become bacterially contaminated and very dangerous if it is manufactured or stored incorrectly.

- The transfusion of red cell products carries a risk of incompatible transfusion and serious haemolytic transfusion reactions.
- Blood products can transmit infectious agents - including HIV, hepatitis B,

*WHO. Managing Complications in Pregnancy and Childbirth: A Guide for Midwives and Doctors. Geneva: WHO, 2000*

*Harrison K et al. "Childbearing, Health and Social Priorities. A Survey of 22,774 Consecutive Births in Zaria, Northern Nigeria". British Journal of Obstetrics and Gynaecology, 1985, 5, 61-71.*

**Fresh-frozen Plasma**

- The only clear indication is the replacement of coagulation factors in clotting disorders
- Should be given if the PT (prothrombin time) and APTT (activated partial thromboplastin time) exceed 1.5 times the control level in the presence of continuous bleeding

### Slide 4MO-43 Fresh-frozen Plasma

Fresh frozen plasma (FFP) maintains the viability of all clotting factors. The only clear indication for FFP is the replacement of coagulation factors in clotting disorders. FFP should be given if the PT and APTT exceed 1.5 times the control level in the presence of continuous bleeding.

In situations with massive bleeding, however, it may be necessary to give FFP even before clotting results are available. The dose required is 12-15 ml/kg or normally 4 units for an adult, and the objective should be to aim for a PT and APTT


less than 1.5 control level. FFP requires a thawing time of 20 min, and hence early anticipation of a potential requirement is helpful.

*A Textbook of Postpartum Hemorrhage. Sapiens Publishing, Duncow, UK, 2006*

#### Plasma transfusion risks



- Plasma can transmit most of the infections present in whole blood.
- Plasma can also cause transfusion reactions.

*WHO. Managing Complications in Pregnancy and Childbirth: A Guide for Midwives and Doctors. Geneva: WHO, 2000*



### Conclusions (1)


- Each health facility should have local protocols for prevention and treatment of PPH
- Routine active management of third stage of labour reduces the risk of PPH by 60%
- Ensure the availability of appropriate equipment, drugs and personnel in case of PPH
- Early recognition and initiation of resuscitation measures for arresting bleeding are vital in management of PPH

#### Slide 4MO-44 Conclusions (1)



Early recognition and timely initiation of measures to stop bleeding are first-line for managing postpartum haemorrhage.

Each health facility should have a local clinical protocol for prevention and treatment of postpartum haemorrhage. This protocol should be based on scientific evidence.



### Conclusions (2)

- Oxytocin in doses up to 40 IU and prostaglandins are effective in many difficult cases of uterine atony
- External and internal bimanual compression of uterus and compression of the aorta are methods recommended for temporary atonic bleeding arrest
- Surgical interventions should be performed without delay
- Hysterectomy is not the only method of complete bleeding arrest
- Hysterectomy doesn't need to be total in each case


#### Slide 4MO-45 Conclusions (2)

Hysterectomy is not the only method for arresting full bleeding. There are many other effective methods that are simpler and less traumatic.

Uterine atony is a rare indication for hysterectomy. Hysterectomy is indicated mostly in placenta accreta/increta, uterine rupture, haematoma of the broad ligament and other cervical/uterine trauma.



Hysterectomy does not need to be total every time: subtotal hysterectomy is the operation of choice in most instances of

postpartum haemorrhage requiring hysterectomy.



### Conclusions (3)

- First line option for blood volume replacement therapy are crystalloids
- The use of colloids leads to many side effects and has no advantages
- Blood transfusion is vital in the majority of severe PPH cases; at the same time, inappropriate use or over-use may lead to many complications
- Indications for red-cell and fresh-frozen plasma transfusion should be very strict



4MO-46

## **Prelabour Rupture of Membranes (PROM)**



**Prelabour Rupture of Membranes**

Module 5MO

WHO EUROPE

JSI

Effective Perinatal Care (EPC)

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**Slide 5MO-1 Prelabour Rupture of Membranes**

Module objectives:

- To learn the recommendations regarding the diagnosis, investigation and management of women with prelabour rupture of membranes
- To learn the role of prophylactic antibiotics, steroids and tocolytic agents, and the appropriate time to deliver women with prelabour rupture of membranes
- To learn the techniques to improve perinatal outcomes in women with

prelabour rupture of membranes

- To learn to critically assess the evidence of advantages and disadvantages in active and expectant management of prelabour rupture of membranes at or near term

**Prelabour Rupture of Membranes**

- Preterm Prelabour Rupture of Membranes (PPROM)
  - Occurred at 24 – 37 weeks of gestation
- Prelabour Rupture of Membranes at or near term (PROM)
  - Occurred at 37 full weeks of gestation or after

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5MO-2

**Slide 5MO-2 Prelabour Rupture of Membranes**

Two definitions of prelabour rupture of membranes are presented.

**Preterm Prelabour Rupture of Membranes: Problem**

- Complicates only 2% of pregnancies

BUT

- Is associated with
  - 40% of preterm deliveries
  - Ascending infection from the lower genital tract
  - Maternal chorioamnionitis
  - Significant neonatal morbidity and mortality
    - Sepsis
    - Prematurity
    - Pulmonary hypoplasia

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5MO-3

**Slide 5MO-3 Preterm Prelabour Rupture of Membranes: Problem**

The three causes of neonatal death associated with PPRM are prematurity, sepsis and pulmonary hypoplasia. Women with intrauterine infection deliver earlier than non-infected women, and infants born with sepsis have a mortality rate four times higher than those without sepsis. In addition, there are maternal risks associated with chorioamnionitis.

There is evidence demonstrating an association between infection ascending from the lower genital tract and PPRM.

In women with PPRM about one-third of pregnancies have positive amniotic fluid cultures and studies have shown that bacteria have the ability to cross intact membranes.



Maxwell GL. Preterm premature rupture of membranes. *Obstet Gynecol Surv*, 1993, 48, 576–83.

Merenstein GB, Weisman LE. Premature rupture of the membranes: neonatal consequences. *Semin Perinatol*, 1996, 20, 375–80.

Royal College of Obstetricians and Gynaecologists (RCOG). *Preterm Prelabour Rupture of Membranes. Guideline No. 44*, RCOG Press, November 2006.

**Preterm Prelabour Rupture of Membranes: Diagnosis**

- Best achieved by maternal history followed by a sterile speculum examination
  - Pooling of fluid in the posterior vaginal fornix or clear fluid passing from the cervical canal
  - Nitrazine test is not necessary
- Ultrasound examination
  - Helps to confirm the diagnosis – oligohydramnios
  - Assessment of foetal presentation and gestational age
- It is crucial to accurately determine the gestational age

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EUROPE  
RCOG, 2006  
5MO-4  
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### Slide 5MO-4 Preterm Prelabour Rupture of Membranes: Diagnosis

The diagnosis is made by a history suggestive of spontaneous rupture of membranes (SROM) followed by a sterile speculum examination showing fluid pooling in the posterior vaginal fornix; a Nitrazine test is not necessary. Ultrasound examination demonstrating oligohydramnios is also used to help confirm the diagnosis of spontaneous rupture of the membranes.

Digital vaginal examination is best avoided unless there is a strong suspicion

that the woman may be in labour. This is because micro-organisms may be transported from the vagina into the cervix, leading to intrauterine infection, prostaglandin release and preterm labour. A retrospective study reported that the latency interval between SROM and delivery in those who had a digital vaginal examination was significantly shorter than if a sterile speculum examination only was performed.

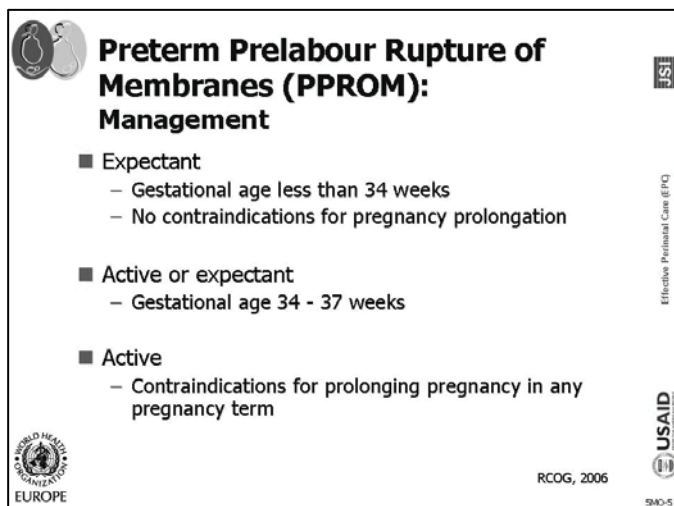
A series of tests have been used to confirm membrane rupture; the most widely used is the Nitrazine test, which detects pH change, which has a sensitivity of 90% and a false positive rate of 17%. More recently, other tests have been evaluated in the diagnosis of ruptured membranes. Foetal fibronectin and raised insulin-like growth factor binding protein-1 in cervical/vaginal secretions have reported sensitivities of 94% and 75% and specificities of 97%, respectively.

Lewis DF et al. Effects of digital vaginal examination on latency period in preterm premature rupture of membranes. *Am J Obstet Gynecol*, 1992, 80, 630–4.

Rutanen EM, Pekonen F, Karkkainen T. Measurement of insulin-like growth factor binding protein-1 in cervical/vaginal secretions: comparison with the ROM-check Membrane Immunoassay in the diagnosis of ruptured fetal membranes. *Clin Chim Acta*, 1993, 214, 73–81.

Gaucherand P et al. Comparative study of three amniotic fluid markers in premature of membranes: fetal fibronectin, alpha-fetoprotein, diaminooxydase. *Acta Obstet Gynecol Scand*, 1995, 74, 118–21.

Royal College of Obstetricians and Gynaecologists (RCOG). *Preterm Prelabour Rupture of Membranes. Guideline No. 44*, RCOG Press, November 2006.



**Preterm Prelabour Rupture of Membranes (PPROM): Management**

- Expectant
  - Gestational age less than 34 weeks
  - No contraindications for pregnancy prolongation
- Active or expectant
  - Gestational age 34 - 37 weeks
- Active
  - Contraindications for prolonging pregnancy in any pregnancy term

RCOG, 2006

### Slide 5MO-5 Preterm Prelabour Rupture of Membranes (PPROM): Management

Prelabour administration of 24 mg of Betamethasone or 24 mg of Dexamethasone during 48 hours to pregnant women with the risk of preterm delivery leads to significant decrease of perinatal mortality (RR 0,60; 95% CI from 0,48 to 0,75), the rate of respiratory distress-syndrome (RR 0,53; 95% CI from 0,44 to 0,63) and intra-ventricular haemorrhages in preterm infants.

Another effective intervention to improve the outcome in case of such complications is referral of the pregnant woman with PPROM to a higher level of care, with appropriate facilities for preterm infant care.

Tocolysis is indicated only in two situations: to administer a full course of corticosteroids and to transfer the mother to a perinatal centre.

Many studies have demonstrated benefits in conservative management for gestations of less than 34 weeks, whereas the management of pregnancies complicated by PPROM between 34 and 37 weeks of gestation continues to be a contentious issue.

A retrospective series examining neonatal outcome following cases with PPROM between 32 weeks and 36 weeks showed that the specific gestation for reduced morbidity was 34 weeks. The incidence of respiratory distress syndrome and the length of hospital stay were reduced in infants delivered after 34 weeks of gestation. The incidence of respiratory distress syndrome was 22.5% and 5.8% at 33 and 34 weeks, respectively. Although the incidence beyond 34 weeks was relatively low, the condition affected infants into the 36th week, with incidences of 10.4% and 1.5% at 35 and 36 weeks, respectively.

Data from existing studies call for further research to elucidate the optimal delivery gestational age for women with PPROM between 34 weeks and 37 weeks of gestation.

*Royal College of Obstetricians and Gynaecologists (RCOG). Preterm Prelabour Rupture of Membranes. Guideline No. 44, RCOG Press, November 2006.*

*Crowley P. Prophylactic corticosteroids for preterm birth. The Cochrane Database of Systematic Reviews, Issue 3, 2005*

*Murray W. Enkin et al, A guide to effective care in pregnancy and childbirth, 3-rd ed, 2000*

**Preterm Prelabour Rupture of Membranes: Digital Vaginal Examination**

- Should be avoided, where expectant management is considered
  - Increases risk of intrauterine infection
  - Leads to prostaglandin release and preterm labour
  - Interval between rupture of membranes and delivery is shorter than if a sterile speculum examination only was performed
- Should be performed, where:
  - There is a strong suspicion that the woman may be in labour
  - Active management is considered

WHO EUROPE, RCOG, 2006, USAID, ICSI, Effective Perinatal Care (EPC)

### Slide 5MO-6 Preterm Prelabour Rupture of Membranes: Digital Vaginal Examination

Digital vaginal examination is best avoided unless there is a strong suspicion that the woman may be in labour. This is because micro-organisms may be transported from the vagina into the cervix, leading to intrauterine infection, prostaglandin release and preterm labour.

A retrospective study reported that the latency interval between SRM and delivery in those who had a digital vaginal examination was significantly shorter than

if a sterile speculum examination only was performed.

*Royal College of Obstetricians and Gynaecologists (RCOG). Preterm Prelabour Rupture of Membranes. Guideline No. 44, RCOG Press, November 2006.*

**Expectant Management of PPROM Antenatal Tests (1)**

- Examination for signs of clinical chorioamnionitis at least every 12 hours
  - Maternal pyrexia, tachycardia, leucocytosis, uterine tenderness and offensive vaginal discharge
  - Foetal tachycardia
- High vaginal swab weekly
  - Indicates Group B Streptococcus and an opportunity for intrapartum antibiotic therapy
- Maternal full blood count at least weekly
- Cardiotocography where regular foetal surveillance is required

WHO EUROPE, ACOG, 2004, RCOG, 2006, USAID, ICSI, Effective Perinatal Care (EPC)

### Slide 5MO-7 Expectant Management of PPROM Antenatal Tests (1)

The criteria for the diagnosis of clinical chorioamnionitis include maternal pyrexia, tachycardia, leucocytosis, uterine tenderness, offensive vaginal discharge and fetal tachycardia. During inpatient observation, the woman should be regularly examined for such signs of intrauterine infection and an abnormal parameter, or a combination of them may indicate intrauterine infection. The frequency of maternal temperature, pulse and foetal heart rate auscultation should be every 4 - 8

hours.


Maternal pyrexia (above 37.8°C), offensive vaginal discharge and fetal tachycardia (rate above 160 beats/minute) indicate clinical chorioamnionitis. There is a variation in the literature regarding the accuracy of the laboratory tests of leucocytosis and raised C-reactive protein in the prediction of chorioamnionitis. The sensitivities and false positive rates for leucocytosis in the detection of clinical chorioamnionitis range from 29–47% and 5–18%, respectively. The specificity of C-reactive protein is 38–55%. Although a weekly culture of swabs from the vagina are often taken as part of the clinical management of women with PPROM, the data evaluating this practice do not show conclusively that it is beneficial.

It has been shown that positive genital tract cultures predict 53% of positive amniotic fluid cultures with a false-positive rate of 25%. However, the presence of leucocytosis may be useful clinically in cases where there is doubt about the diagnosis of chorioamnionitis. Furthermore, high vaginal swabs may indicate group B streptococcus, which provides the opportunity for intrapartum antibiotic therapy.

Fetal monitoring using cardiotocography should be considered where regular fetal surveillance is required. [C]

Royal College of Obstetricians and Gynaecologists (RCOG). *Preterm Prelabour Rupture of Membranes. Guideline No. 44*, RCOG Press, November 2006.

American College of Obstetricians and Gynecologists (ACOG). *Premature rupture of membranes. Washington (DC): American College of Obstetricians and Gynecologists (ACOG), 1998 Jun., 10 p. (ACOG practice bulletin; no. 1). Current as of December 2004.*



### Expectant Management of PPROM Antenatal Tests (2)

- Biophysical profile (BPP) scoring or Doppler velocimetry
  - Should not be considered as first-line surveillance or a diagnostic tests for foetal infection
    - Did not provide accurate distinction between infected and noninfected cases
- Routine amniocentesis is not recommended
  - Has the potential to detect subclinical infection
    - Before the onset of maternal signs of chorioamnionitis
    - Before the onset of foetal sepsis

BUT

- Role of amniocentesis in improving outcome remains to be determined

ACOG, 2004  
RCOG, 2006

Effective Perinatal Care (EPC)  
USAID

### Slide 5MO-8 Expectant Management of PPROM Antenatal Tests (2)

Biophysical profile scoring, or Doppler velocimetry, should not be considered as first-line surveillance or diagnostic tests for fetal infection. [B]

Abnormal biophysical profile scores and increased systolic/diastolic ratios in the umbilical artery have been shown to be markers of intrauterine infection. The true and false positive rates for an abnormal biophysical profile score in the prediction of clinical chorioamnionitis range from 25–

80% and 2–9%, respectively.

Another dataset using positive amniotic fluid and positive foetal blood cultures as endpoints for infection found that the biophysical profile score, or Doppler studies, of the placental or fetal circulation did not provide accurate distinction between infected and noninfected cases.

Foetal tachycardia predicts 20–40% of cases of intrauterine infection with a false-positive rate of about 3%.

Cardiotocography is useful because a fetal tachycardia, if present, may represent a late sign of infection and is frequently used in the clinical definition of chorioamnionitis in studies.

There are no randomised controlled trials to support the premise that pregnancy outcome is improved by the use of frequent biophysical or Doppler assessment. The disparity in the literature evaluating these noninvasive tests of foetal wellbeing suggests that, although some studies have shown benefit, overall the tests are of limited value in differentiating between foetuses with and without infection.

*Blackwell SC, Berry SM. Role of amniocentesis for the diagnosis of subclinical intra-amniotic infection in preterm premature rupture of the membranes. Curr Opin Obstet Gynecol, 1999, 11, 541–47.*

Royal College of Obstetricians and Gynaecologists (RCOG). *Preterm Prelabour Rupture of Membranes. Guideline No. 44*, RCOG Press, November 2006.

American College of Obstetricians and Gynecologists (ACOG). *Premature rupture of membranes. Washington (DC): American College of Obstetricians and Gynecologists (ACOG), 1998 Jun., 10 p. (ACOG practice bulletin; no. 1). Current as of December 2004.*

**Expectant Management of PPROM Prophylactic Antibiotics**

- Statistically significant reduction in rates of:
  - Chorioamnionitis
  - Babies born within 48 hours and 7 days
  - Neonatal infection
  - Babies with abnormal cerebral ultrasound scan prior to discharge from hospital
- No significant reduction in perinatal mortality
- Erythromycin should be given to all women
  - 250 mg orally 6 hourly x 10 days following diagnosis

**OR**

  - 250 mg orally 3 times/day for seven days **PLUS**
  - Amoxicillin 500mg orally three times a day for 7 days
- Penicillin should be administered after the onset of labour if GBS positive

ACOG, 2004  
RCOG, 2006  
WHO, 2005

**Slide 5MO-9 Expectant Management of PPROM Prophylactic Antibiotics**

Twenty-two trials involving over 6,000 women with PPROM before 37 weeks were included in a meta-analysis. The use of antibiotics following PPROM was associated with a statistically significant reduction in chorioamnionitis (RR 0.57; 95% CI 0.37–0.86). There was a significant reduction in the number of babies born within 48 hours (RR 0.71; 95% CI 0.58–0.87) and seven days (RR 0.80; 95% CI 0.71–0.90). Neonatal infection was significantly reduced in the babies

whose mothers received antibiotics (RR 0.68; 95% CI 0.53–0.87). There was also a significant reduction in the number of babies with an abnormal cerebral ultrasound scan prior to discharge from hospital (RR 0.82; 95% CI 0.68–0.98). There was no significant reduction in perinatal mortality although there was a trend for reduction in the treatment group.

There was a variation in the choice of antibiotics used and the duration of therapy in the studies examined in the meta-analysis. Ten trials tested broad-spectrum penicillin, either alone or in combination, five tested macrolide antibiotics (erythromycin) either alone or in combination and one trial tested clindamycin and gentamycin. The duration of treatment varied between two doses and 10 days. Any penicillin (except co-amoxiclav) or erythromycin versus placebo was associated with a significant reduction in the numbers of babies born within 48 hours and who had positive blood cultures. Co-amoxiclav versus placebo was associated with an increase in the numbers of babies born with necrotising enterocolitis. The use of Augmentin increases the risk of necrotising enterocolitis almost 5 times (RR 4,60; 95% CI 1,98 – 10,72)

If erythromycin cannot be used the following prophylactic antibiotics can be used:

- Intravenous Ampicillin followed by oral Amoxicillin
- Intravenous Ampicillin/Sulbactam followed by oral Amoxicillin/Clavulanate

If Group B streptococcus is isolated in cases of PPROM, antibiotics should be given in line with the local recommendation for routine intrapartum prophylaxis.

*Kenyon S. et al. Antibiotics for preterm premature rupture of membranes (Cochrane Review), Cochrane Library, Issue 3, 2002.*

*American College of Obstetricians and Gynecologists (ACOG). Premature rupture of membranes. Washington (DC): American College of Obstetricians and Gynecologists (ACOG), 1998 Jun., 10 p. (ACOG practice bulletin; no. 1). Current as of December 2004.*

*Royal College of Obstetricians and Gynaecologists (RCOG). Preterm Prelabour Rupture of Membranes. Guideline No. 44, RCOG Press, November 2006*

*IMPAC/Managing Complications in Pregnancy and Childbirth. A guide for midwives and doctors. WHO, 2005, p.S-138.*

**Expectant Management of PPROM  
Antenatal Corticosteroids**

- Should be administered between 24 and 34 weeks of gestation
- Statistically significant reduction in rates of:
  - Respiratory distress syndrome
  - Intraventricular haemorrhage
  - Necrotising enterocolitis
- Did not increase the risk of infection in either mother or baby

ACOG, 2004  
RCOG, 2006

USAID  
5MO-10

### Slide 5MO-10 Expectant Management of PPROM: Antenatal Corticosteroids

Antenatal corticosteroids should be administered in women with PPROM. [A]

A meta-analysis of 15 randomised controlled trials involving more than 1,400 women with preterm rupture of the membranes demonstrated that antenatal corticosteroids reduced the risks of respiratory distress syndrome (RR 0.56; 95% CI 0.46–0.70), intraventricular haemorrhage (RR 0.47; 95% CI 0.31–0.70) and necrotising enterocolitis (RR 0.21; 95% CI

0.05–0.82). They do not appear to increase the risk of infection in either mother (RR 0.86; 95% CI 0.61–1.20) or baby (RR 1.05; 95% CI 0.66–1.68).

Indications for antenatal corticosteroid therapy include women with PPROM between 24 and 34 weeks of gestation.

*American College of Obstetricians and Gynecologists (ACOG). Premature rupture of membranes. Washington (DC): American College of Obstetricians and Gynecologists (ACOG), 1998 Jun., 10 p. (ACOG practice bulletin; no. 1). Current as of December 2004.*

*Crowley P. Prophylactic corticosteroids for preterm birth. The Cochrane Database of Systematic Reviews, Issue 3, 2005*

*Royal College of Obstetricians and Gynaecologists (RCOG). Preterm Prelabour Rupture of Membranes. Guideline No. 44, RCOG Press, November 2006.*

**Expectant Management of PPROM  
Prophylactic Tocolysis**

- Recommended in women with contractions ONLY for
  - Transfer to higher level facility
  - Antenatal corticosteroids
- Not recommended in women without contractions
  - Does not increase interval between membrane rupture and delivery
  - Does not reduce neonatal morbidity

RCOG, 2006

USAID  
5MO-11

### Slide 5MO-11 Expectant Management of PPROM Prophylactic Tocolysis

Prophylactic tocolysis in women with PPROM without uterine activity is not recommended. [A]

Women with PPROM and uterine activity who require intrauterine transfer or antenatal corticosteroids should be considered for tocolysis.

Three randomised studies of a total of 235 women with PPROM, reported that the proportion of women remaining unde-

livered 10 days after membrane rupture was not significantly higher in those receiving tocolysis compared with those receiving none.

A recent retrospective case–control study showed that tocolysis after PPROM did not increase the interval between membrane rupture and delivery or reduce neonatal morbidity.

**Expectant Management of PPROM Therapeutic Tocolysis**

- Not recommended
  - After 24 hours because there is no difference in the duration of pregnancy
  - Does not improve neonatal outcomes
  - For preterm labour with onset of regular contractions after 28 weeks of gestation
    - Does not prolong the interval to delivery
    - Does not reduce perinatal morbidity or mortality
- Aggressive tocolysis versus limited tocolysis or no tocolysis at all
  - Does not increase latency
  - Does not decrease neonatal morbidity

RCOG, 2006

**Slide 5MO-12 Expectant Management of PPROM Therapeutic Tocolysis**

A randomised trial involving 30 women demonstrated that delivery can be inhibited for 24 hours by intravenous ritodrine. After 24 hours there was no difference in the duration of pregnancy in either group.

A randomised study involving 109 women showed that, for preterm labour associated with preterm rupture of the membranes after 28 weeks of gestation, there were no significant differences between treatment groups in intrauterine time after

the onset of regular contractions.

The results of another randomised study of 79 women with contractions following PPROM did not suggest a benefit to tocolysis in terms of prolonging the interval to delivery or in reducing perinatal morbidity or mortality.

A recent case–control study involving 193 women found that aggressive tocolysis after PPROM did not increase latency or decrease neonatal morbidity when compared with either limited tocolysis or no tocolysis at all.

In the absence of clear evidence that tocolysis improves neonatal outcome following PPROM, it is reasonable not to use it. It is possible that tocolysis could have adverse effects, such as delaying delivery from an infected environment, since there is an association between intrauterine infection, prostaglandin and cytokine release and delivery. However, the benefits of antenatal steroids apply equally to women with PPROM and, in some clinical circumstances, the risk–benefit ratio may lead to consideration of tocolysis for this purpose. Similarly it would seem wise to consider tocolysis for transfer of women, depending on individual circumstances.

**Expectant Management of PPROM Amnioinfusion**

- Not recommended
  - Transvaginal amnioinfusion
    - No significant differences for caesarean section, low Apgar scores and neonatal death vs no amnioinfusion
  - Transabdominal amnioinfusion
    - Risk of postnatal death from pulmonary hypoplasia is similar to no amnioinfusion
    - Percentage of intrauterine foetal survival is higher before 26 weeks

RCOG, 2006

**Slide 5MO-13 Expectant Management of PPROM Amnioinfusion**

Transvaginal amnioinfusion in labour is not recommended for women with preterm rupture of membranes. [A]

Transabdominal amnioinfusion is not recommended as a method of preventing pulmonary hypoplasia in very preterm PROM. [B]

trial involving 66 women with SRM between 26 and 35 weeks of gestation, who also received

amnioinfusion during labour, was examined. The results showed no significant differences between amnioinfusion and no amnioinfusion for caesarean section, low Apgar scores and neonatal death. The implication for practice is that there is insufficient evidence to guide clinical practice concerning the use of amnioinfusion.

A recently published trial of 65 women with PPRM between 24 and 33 weeks of gestation who were randomised to transabdominal amnioinfusion or expectant management showed that the risk of postnatal death from pulmonary hypoplasia was similar in both groups.

Another case–control study involving 24 women reported no difference in the incidence of pulmonary hypoplasia between controls and treated women.

One other recent study involving 71 women with PPRM before 26 weeks of gestation demonstrated that the percentage of intrauterine fetal survival was higher in treated than in untreated controlled groups (64.8% versus 32.3%,  $P < 0.01$ ).

At present, there is insufficient evidence to recommend this treatment outside randomised trials. There is presently a randomised controlled trial comparing expectant management with serial amnioinfusions in women with early second trimester PPRM.


*Jazayeri A et al. Tocolysis does not improve neonatal outcome in patients with preterm rupture of membranes. Am J Perinatol, 2003, 20, 189–93.*

*De Santis M et al. Transabdominal amnioinfusion treatment of severe oligohydramnios in preterm premature rupture of membranes at less than 26 gestational weeks. Fetal Diagn Ther, 2003, 18, 412–17.*

*How HY et al. Preterm premature rupture of membranes: aggressive tocolysis versus expectant management. J Matern Fetal Med, 1998, 7, 8–12.*


*Tranquilli AL et al. Transabdominal amnioinfusion in preterm premature rupture of membranes: a randomised controlled trial. BJOG, 2005, 112, 759–63.*



*Royal College of Obstetricians and Gynaecologists (RCOG). Preterm Prelabour Rupture of Membranes. Guideline No. 44, RCOG Press, November 2006.*



### Expectant Management of PPRM Outpatient Monitoring

- Could be considered only after
  - Rigorous **INDIVIDUAL** selection by consulting obstetrician
  - Period of 48–72 hours of inpatient observation
- Women should be advised of the following:
  - Signs and symptoms of chorioamnionitis
  - Under what circumstances they should seek the advice of a specialist
  - Frequency of outpatient visits and what should be done at these visits
  - They should take their temperature twice daily
- No significant differences in frequencies of
  - Chorioamnionitis
  - Respiratory distress syndrome
  - Neonatal sepsis



Effective Perinatal Care (EPC)

RCOG, 2006

5MO-14

### Slide 5MO-14 Expectant Management of PPRM Outpatient Monitoring

Women should be considered for outpatient monitoring of PPRM only after rigorous individual selection by a consulting obstetrician. [B]

Outpatient monitoring should be considered only after a period of 48–72 hours of inpatient observation.

Women should be advised of the signs and symptoms of chorioamnionitis and under what circumstances they should seek the advice of a specialist.



Women being monitored at home for PPROM should take their temperature twice daily and should be advised of the symptoms associated with infection.

There should be clearly described local arrangements for the frequency of outpatient visits and for what should happen at these visits.

In a randomised study of home versus hospital management outcomes, the two groups were comparable with a similar latency period and gestational age at delivery. There were no significant differences in the frequencies of chorioamnionitis, respiratory distress syndrome or neonatal sepsis. The women were randomised after 72 hours in hospital and 57–74%, respectively, in the home and the hospital groups had an amniocentesis for Gram stain and culture. This study does not support routine home management in women with PPROM but supports rigorous individual selection of women for this treatment.

There is insufficient data to make recommendations of home, day-care and outpatient monitoring rather than continued hospital admission for women with PPROM. It would be considered reasonable to maintain the woman in hospital for at least 48 hours before a decision is made to allow her to go home. This method of management should be individualised and restricted to certain groups of women. Women should be instructed to take regular temperature recordings at home every 12 hours or to be aware of the symptoms associated with infection.

*Carlan SJ et al. Preterm premature rupture of membranes: a randomised study of home versus hospital management. Obstet Gynecol, 1993, 81, 61–4.*

*Royal College of Obstetricians and Gynaecologists (RCOG). Preterm Prelabour Rupture of Membranes. Guideline No. 44, RCOG Press, November 2006.*

**Management of PPROM at 34 – 37 Weeks of Gestation**

- Delivery should be considered at 34 full weeks of gestation
- If expectant management is considered
  - Women should be counseled about
    - Increased risk of chorioamnionitis and its consequences

versus

- Decreased risk of serious respiratory problems in the neonate, admission for neonatal intensive care and caesarean section

RCOG, 2006

### Slide 5MO-15 Management of PPROM at 34 – 37 Weeks of Gestation

Delivery should be considered at 34 weeks of gestation. [B]

Where expectant management is considered beyond 34 weeks of gestation, women should be counselled about the increased risk of chorioamnionitis and its consequences versus the decreased risk of serious respiratory problems in the neonate, admission for neonatal intensive care and caesarean section. [B]

Many studies have demonstrated the benefits of conservative management for gestations of less than 34 weeks, whereas the management of pregnancies complicated by PPROM between 34 and 37 weeks of gestation continues to be a contentious issue.

A recent retrospective study examining 430 women with PPROM demonstrated that composite neonatal minor morbidity such as hyperbilirubinaemia and transient tachypnoea of the newborn was significantly higher among pregnancies delivered at 34 weeks gestation or less as compared with those delivered at 36 weeks. Composite major neonatal morbidity, including respiratory distress syndrome and intraventricular haemorrhage, was significantly higher among pregnancies delivered at 33 weeks of gestation or less as compared with those delivered at 36 weeks. There was no difference in the major morbidity rates for those pregnancies delivered

beyond 34 weeks. The authors' conclusion was that expectant management at 34 weeks and beyond is of limited benefit.

In a prospective randomised study women with PPROM between 34 weeks and 37 weeks of gestation, the expectantly managed group had a higher incidence of chorioamnionitis (16%) compared with the immediate delivery group (2%,  $P < 0.05$ ). The incidence of sepsis was 5% in the expectantly managed group and 0% in the immediate delivery group but this was not statistically significant. There was no difference in the risk of respiratory distress syndrome.

A retrospective series examining neonatal outcome following cases with PPROM between 32 weeks and 36 weeks showed that the specific gestation for reduced morbidity was 34 weeks. The incidence of respiratory distress syndrome and the length of hospital stay were reduced in infants delivered after 34 weeks of gestation. The incidence of respiratory distress syndrome was 22.5% and 5.8% at 33 and 34 weeks, respectively. Although the incidence beyond 34 weeks was relatively low, the condition affected infants into the 36th week, with incidences of 10.4–1.5% at 35 and 36 weeks, respectively.

Data from existing studies call for further research to elucidate the optimal delivery gestational age for women with PPROM between 34 weeks and 37 weeks of gestation. There are currently two ongoing randomized controlled trials comparing intentional delivery versus conservative management in women with PPROM between 32 weeks and 35 weeks.

Until then, published data question the benefit of continued expectant management beyond 34 weeks of gestation. There is little evidence that intentional delivery after 34 weeks adversely affects neonatal outcome. There is a suggestion from these studies that expectant management beyond 34 weeks is associated with an increased risk of chorioamnionitis.

*Royal College of Obstetricians and Gynaecologists (RCOG). Preterm Prelabour Rupture of Membranes. Guideline No. 44, RCOG Press, November 2006.*

**Prelabour Rupture of Membranes At or Near Term: Problem**

- Occurs in 6 - 19% of pregnancies
- Associated with
  - Maternal and neonatal infection
  - Prolapsed cord
  - Foetal distress resulting in operative delivery
  - Low five-minute Apgar score

Logos: WHO EUROPE, RCOG, 2006, USAID, Effective Perinatal Care (EPC), FAS, 5MO-16

### Slide 5MO-16 Prelabour Rupture of Membranes At or Near Term: Problem

Prelabour rupture of the membranes (PROM) occurs in 6–19% of term pregnancies. The risks of PROM at term relate to maternal and neonatal infection, prolapsed cord and fetal distress resulting in operative delivery or low five-minute Apgar score. Fetal distress may be caused by any of the complications listed.

*Royal College of Obstetricians and Gynaecologists (RCOG) Induction of Labour. Evidence-based Clinical Guideline Number 9. 2001.*

**Management of PROM**

- Labour may be induced at the time of presentation or patients may be observed for up to 24 to 72 hours for the onset of spontaneous labour ACOG, 1998
- Women should be offered a choice of immediate induction of labour **or** expectant management
  - Appropriate counseling on the advantages and disadvantages of proposed management modes
- Expectant management should not exceed 96 hours following membrane rupture
  - Increased risk of maternal and foetal infection

WHO EUROPE USAID RCOG, 2001 5MO-17

**Slide 5MO-17 Management of PROM**

With term premature rupture of membranes (PROM), labour may be induced at the time of presentation or patients may be observed for up to 24 to 72 hours for the onset of spontaneous labour. [A]

*American College of Obstetricians and Gynecologists (ACOG). Premature rupture of membranes. 1998. (ACOG practice bulletin; no. 1).*

Women with prelabour rupture of the membranes at term (over 37 weeks) should be offered a choice of immediate induction of labour or expectant management. [A]

Expectant management of women with prelabour rupture of the membranes at term should not exceed 96 hours following membrane rupture. [A]

*Royal College of Obstetricians and Gynaecologists (RCOG) Induction of Labour. Evidence-based Clinical Guideline Number 9. 2001.*

**Prelabour Rupture of Membranes At or Near Term: Onset of Spontaneous Labour**

- 86% of women will labour within 12–23 hours
- 91% will labour within 24–47 hours
- 94% will labour within 48–95 hours
- 6% of women will not be in spontaneous labour within 96 hours of PROM

WHO EUROPE USAID RCOG, 2001 5MO-18

**Slide 5MO-18 Prelabour Rupture of Membranes At or Near Term: Onset of Spontaneous Labour**

Epidemiological data on time interval from term PROM to spontaneous labour demonstrates that most women go into spontaneous labour within 24 hours of rupturing their membranes.

- 86% of women will labour within 12–23 hours
- 91% will labour within 24–47 hours
- 94% will labour within 48–95 hours.
- 6% of women will not be in spontaneous labour within 96 hours of PROM.

As the time between the rupture of the membranes and the onset of labour increases, so may the risks of maternal and fetal infection. Induction of labour may reduce these risks

*Royal College of Obstetricians and Gynaecologists (RCOG) Induction of Labour. Evidence-based Clinical Guideline Number 9. 2001.*

**Prelabour Rupture of Membranes At or Near Term**  
**Digital Vaginal Examination**

- Associated with increased rates of
  - Maternal endometritis and chorioamnionitis
  - Infected neonates (28% vs 0% in the group of mothers who were not given a digital examination)
- Should be avoided
  - Until the onset of labour
  - Then only when the results are necessary to guide or alter management
- The number of examinations is more predictive of maternal infection than the duration of membrane rupture

Seaward PG et al, 1997  
 Mozurekewich E., Wolf F., 1997  
 Wagner MV et al, 1989

WORLD HEALTH ORGANIZATION EUROPE

USAID

Effective Perinatal Care (EPC)

5MO-19

**Slide 5MO-19 Prelabour Rupture of Membranes At or Near Term Digital Vaginal Examination**

The analysis of different tactics of PROM at term showed that digital cervical examination is the key factor in post-partum endometritis rate. Early induction is associated with higher risk of endometritis than expectant management, as vaginal examination is not performed before labour in expectant management (RR = 2.8; 95% CI 1.02 to 7.7).

*Mozurekewich E., Wolf F. Premature rupture of membranes at term: A meta-analysis of three management strategies. Obstet Gynecol 1997;89:1035-43.*

In the trial by M.V. Wagner et al, in expectant management 28% of neonates (5 out of 18) born to mothers performed vaginal examination at admission, but none of 78 babies were infected in the group whose mothers did not receive digital cervical examination before labour.

*MV Wagner, et al. A comparison of early and delayed induction of labour with spontaneous rupture of membranes at term. Obstetrics & Gynaecology. 1989;74:93-97*

**Number of Digital Vaginal Examinations and Rate of Chorioamnionitis**

The number of digital examinations	Odds Ratio
0-2	~1.2
3-4	~2.2
5-6	~2.8
7-8	~4.2
> 8	~5.2

Seaward PG et al, 1997

WORLD HEALTH ORGANIZATION EUROPE

USAID

Effective Perinatal Care (EPC)

5MO-20

**Slide 5MO-20 Number of Digital Vaginal Examinations and Rate of Chorioamnionitis**

There is a direct connection between the number of vaginal examination and the risk of chorioamnionitis. The risk of such complication increases 5 times when 8 or more vaginal examinations are performed.

*Seaward PG et al International Multicentre Term Prelabor Rupture of Membranes Study: evaluation of predictors of clinical chorioamnionitis and postpartum fever in patients with prelabor rupture of membranes at term. Am J Obstet Gynecol. 1997 Nov;177(5):1024-9.*

**Management of PROM**  
**Antimicrobial Prophylaxis for GBS**

- Antibiotic prophylaxis for GBS should be given only after the onset of labour
- Give to all pregnant women identified as Group B streptococcus (GBS) carriers
- When Group B streptococcus status is unknown
  - Recommended when the membranes have been ruptured for 18 hours
- In Group B streptococcus negative
  - Not recommended regardless of the duration of rupture and intrapartum risk factors

CDC, 2002

WORLD HEALTH ORGANIZATION EUROPE

USAID

Effective Perinatal Care (EPC)

5MO-21

**Slide 5MO-21 Management of PROM Antimicrobial Prophylaxis for GBS**

Antenatal treatment with penicillin is not recommended. [B]  
 Antenatal prophylaxis with oral penicillin does not reduce the likelihood of GBS colonisation at the time of delivery and so is not indicated in this situation.

Antibiotic prophylaxis for GBS is unnecessary for women with preterm rupture of membranes unless they are in established labour. [C]

Antibiotic administration specifically for GBS colonisation is not necessary prior to labour. If these women are known to be colonised with GBS, antibiotic prophylaxis should be considered, especially if labour occurs prior to 37 weeks.

*Royal College of Obstetricians and Gynaecologists (RCOG) PREVENTION OF EARLY ONSET NEONATAL GROUP B STREPTOCOCCAL DISEASE. Guideline No. 36. November 2003.*

### Intrapartum prophylaxis indicated

- Previous infant with invasive GBS disease
- GBS bacteriuria during current pregnancy
- Positive GBS screening culture during current pregnancy (unless a planned cesarean delivery, in the absence of labour or amniotic membrane rupture, is performed)
- Unknown GBS status (culture not done, incomplete, or results unknown) and any of the following:
  - Delivery at <37 weeks' gestation
  - Amniotic membrane rupture >18 hours
  - Intrapartum temperature >38.0°C.

### Intrapartum prophylaxis not indicated

- Previous pregnancy with a positive GBS screening culture (unless a culture was also positive during the current pregnancy)
- Planned cesarean delivery performed in the absence of labour or membrane rupture (regardless of maternal GBS culture status)
- Negative vaginal and rectal GBS screening culture in late gestation during the current pregnancy, regardless of intrapartum risk.

*Centers for Disease Control and Prevention. Prevention of Perinatal Group B Streptococcal Disease. Morbidity and Mortality Weekly Report (MMWR) Revised Guidelines from CDC 2002;51.*

**Management of PROM: Antimicrobial Prophylaxis for Non-GBS Infection**

- Statistically significant reduction in maternal infectious morbidity
  - Chorioamnionitis
  - Endometritis
- No statistically significant differences for neonatal morbidity
- Not justifiable routinely
  - Possible adverse effects should be considered
  - Can be restricted to those who develop clinical indications for antibiotic treatment

Flenady V et al, 2002

### Slide 5MO-22 Management of PROM: Antimicrobial Prophylaxis for Non-GBS Infection

It is not clear if antibiotics should be given routinely for prevention of chorioamnionitis, postpartum endometritis, and neonatal infections that are caused by organisms other than Group B streptococcus.

In practice however, many providers routinely give antibiotics to women with PROM at term. In addition, many women receive antibiotics when membranes rupture after labor has begun, if their providers

feel that the duration of rupture is too long. The timing of and stated reason for using antibiotics varies and is generally based more on tradition than evidence. Eighteen hours after rupture is a common time for antibiotics, regardless of Group B streptococcus status or whether the rupture occurred before labor. A policy of routine antibiotics for all women for Group B streptococcus prevention after 18 hours of rupture is not evidence-based and not recommended if Group B streptococcus status is known to be negative.

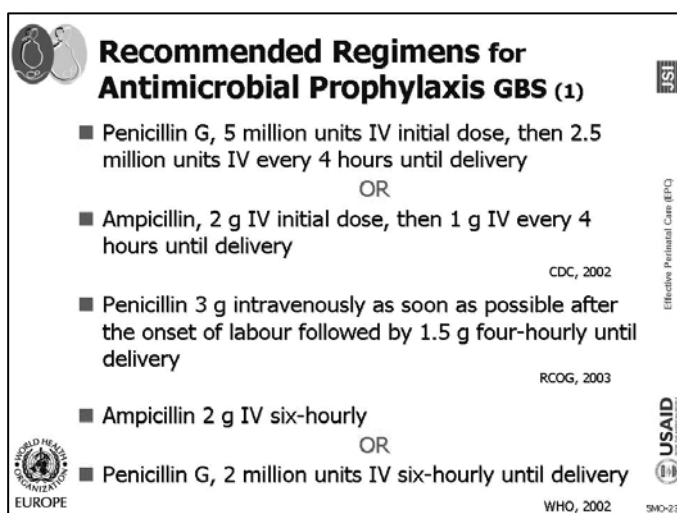
*Amy Marowitz, CNM; Heather Hunter, SNM Management of Ruptured Membranes at Term Journal of Midwifery & Women's Health 2004*

Prelabour rupture of the membranes at or near term (term PROM) increases the risk of infection for the woman and her baby. The routine use of antibiotics for women at the time of term PROM may reduce this risk. However, due to increasing problems with bacterial resistance and the risk of maternal anaphylaxis with antibiotic use, it is important to assess the evidence addressing risks and benefits in order to ensure judicious use of antibiotics. This review was undertaken to assess the balance of risks and benefits to the mother and infant of antibiotic prophylaxis for prelabour rupture of the membranes at or near term.

The results of two trials, involving a total of 838 women, are included in this review. The use of antibiotics resulted in a statistically significant reduction in maternal infectious morbidity (chorioamnionitis or endometritis): RR 0.43 (95% CI 0.23-0.82), NNT 25 (95% CI 14 -100). No statistically significant differences were shown for outcomes of neonatal morbidity.

Conclusions: No clear practice recommendations can be drawn from the results of this review on this clinically important question, related to a paucity of reliable data. Further, well designed randomised controlled trials are needed to assess the effects of routine use of maternal antibiotics for women with prelabour rupture of the membranes at or near term.

*Flenady V, King J. Antibiotics for prelabour rupture of membranes at or near term The Cochrane Database of Systematic Reviews. 2007, Issue 1.*



**Recommended Regimens for Antimicrobial Prophylaxis GBS (1)**

- Penicillin G, 5 million units IV initial dose, then 2.5 million units IV every 4 hours until delivery
- OR
- Ampicillin, 2 g IV initial dose, then 1 g IV every 4 hours until delivery

CDC, 2002

- Penicillin 3 g intravenously as soon as possible after the onset of labour followed by 1.5 g four-hourly until delivery

RCOG, 2003

- Ampicillin 2 g IV six-hourly
- OR
- Penicillin G, 2 million units IV six-hourly until delivery

WHO, 2002

### Slide 5MO-23 Recommended Regimens for Antimicrobial Prophylaxis GBS (1)

**Recommended** Penicillin G, 5 million units IV initial dose, then 2.5 million units IV every 4 hours until delivery

**Alternative** Ampicillin, 2 g IV initial dose, then 1 g IV every 4 hours until delivery

Broader-spectrum agents, including an agent active against GBS, may be necessary for treatment of chorioamnionitis.

History of penicillin allergy should be assessed to determine whether a high risk for anaphylaxis is present. Penicillin-allergic patients at high risk for anaphylaxis are those who have experienced immediate hypersensitivity to penicillin including a history of penicillin-related anaphylaxis; other high-risk patients are those with asthma or other diseases that would make anaphylaxis more dangerous or difficult to treat, such as persons being treated with beta-adrenergic-blocking agents.

If laboratory facilities are adequate, clindamycin and erythromycin susceptibility testing should be performed on prenatal GBS isolates from penicillin-allergic women at high risk for anaphylaxis.

Resistance to erythromycin is often but not always associated with clindamycin resistance. If a strain is resistant to erythromycin but appears susceptible to clindamycin, it may still have inducible resistance to clindamycin.

Cefazolin is preferred over vancomycin for women with a history of penicillin allergy other than immediate hypersensitivity reactions, and pharmacologic data suggest it achieves effective intraamniotic concentrations. Vancomycin should be reserved for penicillin-allergic women at high risk for anaphylaxis.

Centers for Disease Control and Prevention. Prevention of Perinatal Group B Streptococcal Disease. Morbidity and Mortality Weekly Report (MMWR) Revised Guidelines from CDC 2002;51.

It is recommended that intravenous penicillin 3 g be given as soon as possible after the onset of labour and 1.5 g four-hourly until delivery.

Royal College of Obstetricians and Gynaecologists (RCOG)  
PREVENTION OF EARLY ONSET NEONATAL GROUP B  
STREPTOCOCCAL DISEASE. Guideline No. 36. November 2003

If there is no sign of infection and the pregnancy is 37 weeks or more:

- If the membranes have been ruptured for more than 18 hours, give prophylactic antibiotics in order to help reduce Group B streptococcus infection in the neonate:
  - ampicillin 2 g IV every 6 hours
  - OR penicillin G 2 million units IV every 6 hours until delivery
- If there are no signs of infection after delivery, discontinue antibiotics.

Managing Complications in Pregnancy and Childbirth A guide for midwives and doctors. WHO, 2005

**Recommended Regimens for Antimicrobial Prophylaxis GBS (2)**

- If the patient is penicillin allergic
  - Patient not at high risk for anaphylaxis
    - Cefazolin, 2 g IV initial dose, then 1 g IV every 8 hours until delivery
  - Patients at high risk for anaphylaxis GBS susceptible
    - Clindamycin, 900 mg IV every 8 hours until delivery
    - OR
    - Erythromycin, 500 mg IV every 6 hours until delivery
- GBS resistant to clindamycin or erythromycin OR susceptibility unknown
  - Vancomycin, 1 g IV every 12 hours until delivery

CDC, 2002  
RCOG, 2003  
5MO-24

**Slide 5MO-24 Recommended Regimens for Antimicrobial Prophylaxis GBS (2)**

**If penicillin allergic**

- Patients not at high risk for anaphylaxis
  - Cefazolin, 2 g IV initial dose, then 1 g IV every 8 hours until delivery
- Patients at high risk for anaphylaxis GBS susceptible to clindamycin and erythromycin
  - Clindamycin, 900 mg IV every 8 hours until delivery

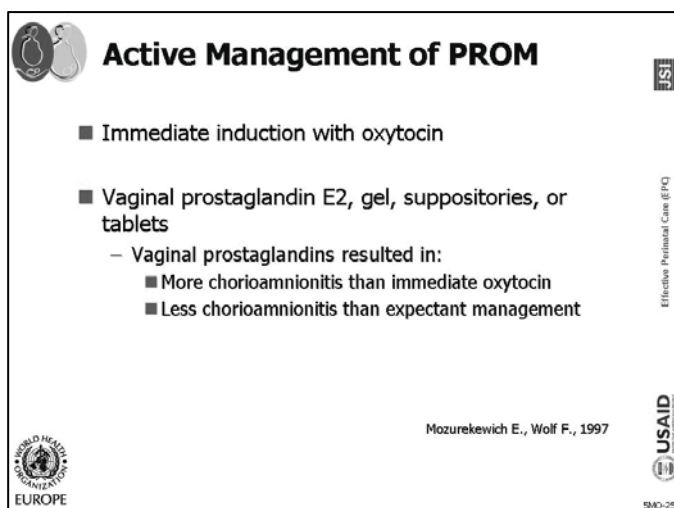
**OR**

- Erythromycin, 500 mg IV every 6 hours until delivery
- GBS resistant to clindamycin or erythromycin or susceptibility unknown
  - Vancomycin, 1 g IV every 12 hours until delivery

Centers for Disease Control and Prevention. Prevention of Perinatal Group B Streptococcal Disease. Morbidity and Mortality Weekly Report (MMWR) Revised Guidelines from CDC 2002;51.

Clindamycin 900 mg should be given intravenously every eight hours to those allergic to penicillin. It should be noted that these doses are based on tradition rather than good evidence.

Royal College of Obstetricians and Gynaecologists (RCOG)  
PREVENTION OF EARLY ONSET NEONATAL GROUP B STREPTOCOCCAL DISEASE. Guideline No. 36. November 2003



**Active Management of PROM**

- Immediate induction with oxytocin
- Vaginal prostaglandin E2, gel, suppositories, or tablets
  - Vaginal prostaglandins resulted in:
    - More chorioamnionitis than immediate oxytocin
    - Less chorioamnionitis than expectant management

Mozurekewich E., Wolf F., 1997

WORLD HEALTH ORGANIZATION EUROPE

USAID

Effective Perinatal Care (EPC)

5MO-25

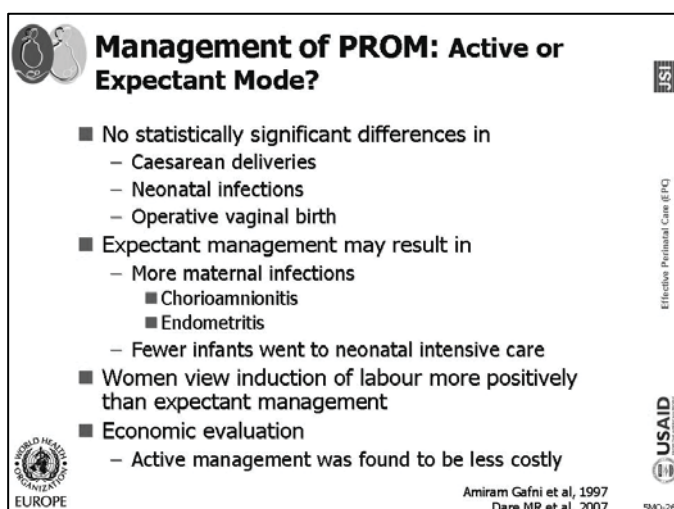
### Slide 5MO-25 Active Management of PROM

PROM at term can be managed by immediate oxytocin induction, by conservative management (or delayed oxytocin induction), or by vaginal (or endocervical) prostaglandin E2, gel, suppositories, or tablets.

Vaginal prostaglandins resulted in more chorioamnionitis than immediate oxytocin (OR 1.55, 95% confidence interval [CI] 1.09, 2.21), but less chorioamnionitis than conservative management (OR 0.68, 95% CI 0.51, 0.91). Immediate oxytocin induc-

tion resulted in fewer cases of chorioamnionitis (OR 0.67, 95% CI 0.52, 0.85) and endometritis (OR 0.71, 95% CI 0.51, 0.99)

*Mazurekewich E., Wolf F. Premature rupture of membranes at term: A meta-analysis of three management strategies. Obstet Gynecol 1997;89:1035-43.*



**Management of PROM: Active or Expectant Mode?**

- No statistically significant differences in
  - Caesarean deliveries
  - Neonatal infections
  - Operative vaginal birth
- Expectant management may result in
  - More maternal infections
    - Chorioamnionitis
    - Endometritis
  - Fewer infants went to neonatal intensive care
- Women view induction of labour more positively than expectant management
- Economic evaluation
  - Active management was found to be less costly

Amiram Gafni et al, 1997  
Dare MR et al, 2007

WORLD HEALTH ORGANIZATION EUROPE

USAID

Effective Perinatal Care (EPC)

5MO-26

### Slide 5MO-26 Management of PROM: Active or Expectant Mode?

Meta-analysis of three management schemes

**OBJECTIVE:** To compare rates of cesarean birth, endometritis, chorioamnionitis, and serious neonatal infections among pregnancies complicated by premature rupture of membranes (PROM) at term and managed by immediate oxytocin induction, by conservative management (or delayed oxytocin induction), or by vaginal (or endocervical) prostaglandin E2, gel, suppositories, or tablets.

**TABULATION, INTEGRATION, AND RESULTS:** Twenty-three studies with a total of 7,493 subjects met the inclusion criteria and were included for analysis. Data regarding chorioamnionitis, endometritis, neonatal infections and cesarean delivery were extracted. Meta-analyses were performed for the three interventions for these outcomes of interest using the Der-Simonian and Laird and Mantel-Haenszel techniques to estimate the pooled odds ratios (ORs). No statistically significant differences in cesarean deliveries or neonatal infections were noted among management schemes.

Vaginal prostaglandins resulted in more chorioamnionitis than immediate oxytocin (OR 1.55, 95% confidence interval [CI] 1.09, 2.21), but less chorioamnionitis than conservative management (OR 0.68, 95% CI 0.51, 0.91). Immediate oxytocin induction resulted in fewer cases of chorioamnionitis (OR 0.67, 95% CI 0.52, 0.85) and endometritis (OR 0.71, 95% CI 0.51, 0.99).

**CONCLUSION:** Conservative management may result in more maternal infections than immediate induction with oxytocin or prostaglandins.



Mazurekewich E., Wolf F. *Premature rupture of membranes at term: A meta-analysis of three management strategies. Obstet Gynecol 1997;89:1035-43.*

The recent systematic review of Cochrane Database is presented below.

Twelve trials (total of 6,814 women) were included. Planned management was generally induction with oxytocin or prostaglandin, with one trial using homoeopathic caulophyllum.

Overall, no differences were detected for mode of birth between planned and expectant groups: relative risk (RR) of caesarean section 0.94, 95% confidence interval (CI) 0.82 to 1.08 (12 trials, 6,814 women); RR of operative vaginal birth 0.98, 95% 0.84 to 1.16 (7 trials, 5,511 women). Significantly fewer women in the planned compared with expectant management groups had chorioamnionitis (RR 0.74, 95% CI 0.56 to 0.97; 9 trials, 6,611 women) or endometritis (RR 0.30, 95% CI 0.12 to 0.74; 4 trials, 445 women). No difference was seen for neonatal infection (RR 0.83, 95% CI 0.61 to 1.12; 9 trials, 6,406 infants). However, fewer infants under planned management went to neonatal intensive or special care compared with expectant management (RR 0.72, 95% CI 0.57 to 0.92, number needed to treat 20; 5 trials, 5,679 infants). In a single trial, significantly more women with planned management viewed their care more positively than those expectantly managed (RR of "nothing liked" 0.45, 95% CI 0.37 to 0.54; 5031 women).

Authors' conclusions:

Planned management (with methods such as oxytocin or prostaglandin) reduces the risk of some maternal infectious morbidity without increasing caesarean sections and operative vaginal births. Fewer infants went to neonatal intensive care under planned management although no differences were seen in neonatal infection rates. Since planned or expectant management may not be very different, women need to have appropriate information to make informed choices.

*Dare MR, Middleton P, Crowther CA, Flenady VJ, Varatharaju B. Planned early birth versus expectant management (waiting) for prelabour rupture of membranes at term (37 weeks or more). Cochrane Database of Systematic Reviews 2006, Issue 1.*

The Term Prelabor Rupture of the Membranes (**TERMPROM**) Study, a large, multicentre, international randomized controlled trial.

5,041 women were studied with prelabor rupture of the membranes at term. The women were randomly assigned to induction of labor with intravenous oxytocin; induction of labor with vaginal prostaglandin E2 gel; or expectant management for up to four days, with labor induced with either intravenous oxytocin or vaginal prostaglandin E2 gel if complications developed. The primary outcome was neonatal infection. Secondary outcomes were the need for cesarean section and women's evaluations of their treatment.

**RESULTS.** The rates of neonatal infection and cesarean section were not significantly different among the study groups. The rates of neonatal infection were 2.0 percent for the induction-with-oxytocin group, 3.0 percent for the induction-with-prostaglandin group, 2.8 percent for the expectant-management (oxytocin) group, and 2.7 percent for the expectant-management (prostaglandin) group. The rates of cesarean section ranged from 9.6 to 10.9 percent. Clinical chorioamnionitis was less likely to develop in the women in the induction-with-oxytocin group than in those in the expectant-management (oxytocin) group (4.0 percent vs. 8.6 percent,  $P < 0.001$ ), as was postpartum fever (1.9 percent vs. 3.6 percent,  $P = 0.008$ ). Women in the induction groups were less likely to say they liked "nothing" about their treatment than those in the expectant-management groups.

**CONCLUSIONS.** In women with prelabor rupture of the membranes at term, induction of labor with oxytocin or prostaglandin E2 and expectant management, result in similar rates of neonatal infection and cesarean section. Induction of labor with intravenous oxytocin results in a lower risk of maternal infection than does expectant management. Women view induction of labor more positively than expectant management.

Hannah ME, Ohlsson A, Farine D, Hewson SA, Hodnett ED, Myhr TL, Wang EE, Weston JA, Willan AR. Induction of labour compared with expectant management for prelabour rupture of the membranes at term. TERMPROM Study Group. N Engl J Med. 1996 Apr 18;334(16):1005-10.

The Economic Evaluation:

The difference in cost between induction with oxytocin and the other management options was statistically significant. Induction with oxytocin found it to be less costly compared to the other treatment alternatives.

Amiram Gafni, Ron Goeree, Terri L. Myhr et al. Induction of labour versus expectant management for prelabour rupture of the membranes at term: an economic evaluation. Canadian Medical Association Journal DEC. 1, 1997; 157:11.

**Conclusions: PPRM (1)**

- Expectant management is recommended if gestational age less than 34 weeks and no contraindications for pregnancy prolongation
- Digital cervical examination should not be performed in patients who are not in labour and in whom immediate induction of labour is not planned. Speculum examination is preferred
- Antibiotics prolong the latency period and improve perinatal outcome and should be administered according to the published protocol

Logos: WHO, USAID, JSI, Effective Perinatal Care (EPC), EUROPE, 5MO-27

**Slide 5MO-27 Conclusions: PPRM (1)**

Key recommendations on management of PPRM.

**Conclusions: PPRM (2)**

- Antenatal corticosteroids should be administered if gestational age 24 to 34 weeks
- Short-term tocolysis may be considered to facilitate maternal transportation and the administration of antenatal corticosteroids and antibiotics
- Long-term tocolysis is not indicated

Logos: WHO, USAID, JSI, Effective Perinatal Care (EPC), EUROPE, 5MO-28

**Slide 5MO-28 Conclusions: PPRM (2)**

Key recommendations on management of PPRM.

**Conclusions: PROM At or Near Term (1)**

- Labour may be induced at the time of presentation or patients may be observed for up to 24 to 72 hours for the onset of spontaneous labour
- Digital cervical examination should not be performed in patients who are not in labour and in whom immediate induction of labour is not planned. Speculum examination is preferred

**Slide 5MO-29 Conclusions: PROM At or Near Term (1)**

Key recommendations on management of PROM at term.

**Conclusions: PROM At or Near Term (2)**

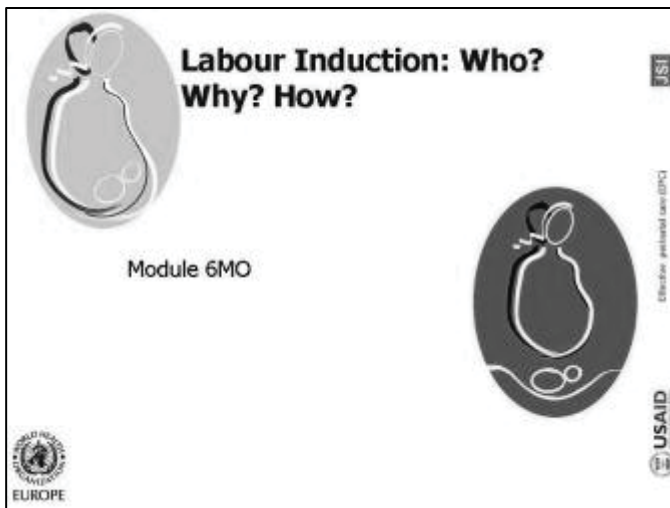
- Antimicrobial prophylaxis for GBS should be given only after the onset of labour
- Antimicrobial prophylaxis for non-GBS infection can be restricted to those who develop clinical indications for antibiotic treatment
- Immediate induction with oxytocin associated with fewer rate of chorioamnionitis than both vaginal prostaglandins and expectant management

**Slide 5MO-30 Conclusions: PROM At or Near Term (2)**

Key recommendations on management of PROM at term.

## **Labour Induction: Who? Why? How?**





## Slide 6MO-1 Labor Induction: Who? Why? How?

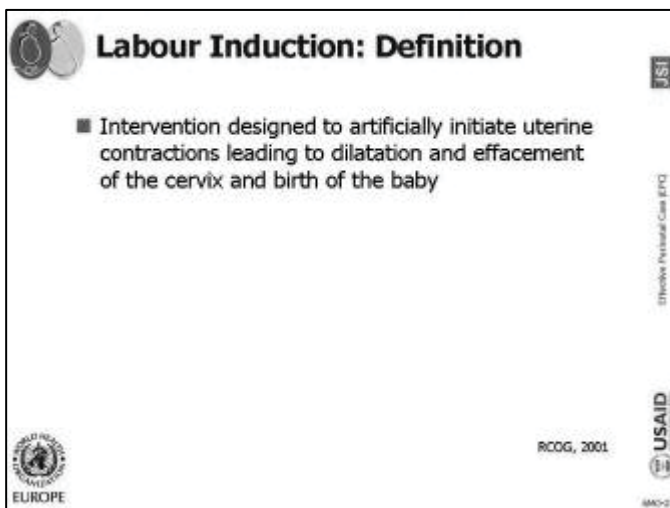
Learning objectives:

At the end of the module the participants should:

- Understand that inducing labour represents a complex series of interventions to artificially induce contractions before they begin spontaneously.
- Understand that labour should only be induced when vaginal delivery is possible, because inducing labour can

prolong delivery.

- Understand the potential complications of induced labour.
- Be aware of the main indications for labour induction.
- Understand that the main methods of labour induction depend on the state of the cervix.
- Be aware that there are special cases where inducing labour requires the utmost caution because of the possible effects of induction on mother and foetus.



## Slide 6MO-2 Labour Induction Definition

Inducing means stimulating the uterus to start labour in order to deliver the foetus at a particular time when it will be safer for the baby to be outside the uterus. This includes women with intact membranes, as well as women with spontaneous rupture of the membranes, who are not in labour. As with any other intervention, inducing labour may have unwanted effects. Inducing labour is indicated only when it is agreed that hastening birth will give mother or foetus a better chance at a healthy outcome. The process of inducing

labour should only be considered when a vaginal delivery is possible for the mother.

Induced labours were introduced in the 50s when oxytocin was synthesized. The frequency of inducing labour varies among health care settings and regions, and it is used more and more frequently. The understanding of delivery mechanisms and successful inductions has increased during lasting recent years.

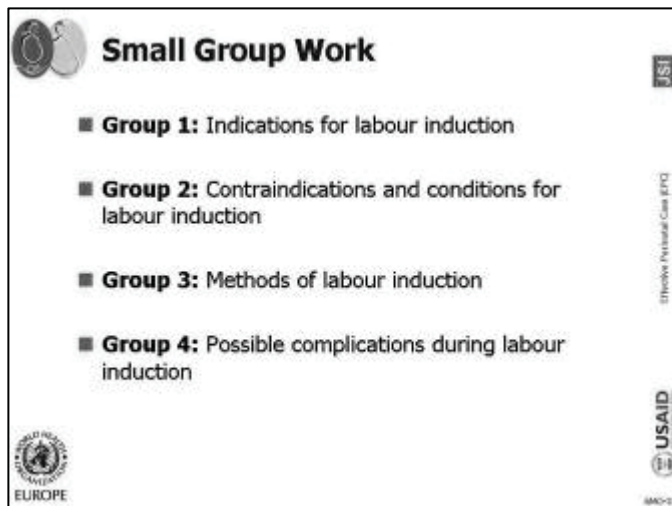
It is important that the cervix be “ripe”, or soft, however, before labour is induced. Many factors influence this. The mediators in this process are the prostaglandins E2 (PGE2) and F2alpha (PGF2alpha). Their exogenous application stimulates the softening of the cervix. Endogenous and exogenous oxytocin is the main stimulant for uterine contractions. It also stimulates the production of PGE2 and PGF2alpha.

Induction must be distinguished clearly from augmentation of labour. Both use similar techniques, but the first aims to start labour, whereas the second enhances uterine contractions once labour has begun.

Inducing labour should not be regarded as an easy procedure as it can be hazardous for both mother and child.

Geoffrey Chamberlain, Luke Zander. *ABC of labour care: Induction*. *BMJ*, 1999, 318, 995-998.

Royal College of Obstetricians and Gynaecologists (RCOG). *Induction of labour. Evidence-based Clinical Guideline Number 9*. RCOG Press, 2001.

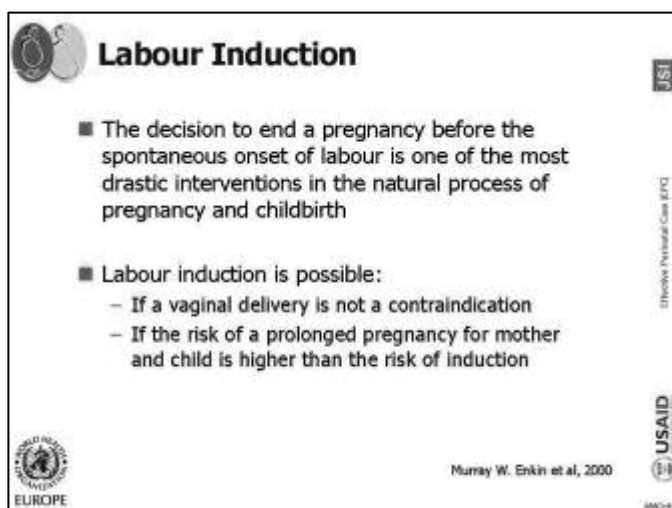


**Small Group Work**

- **Group 1:** Indications for labour induction
- **Group 2:** Contraindications and conditions for labour induction
- **Group 3:** Methods of labour induction
- **Group 4:** Possible complications during labour induction

Logos: USAID, EUROPE, EPC

Slide 6MO-3 Small Group Work



**Labour Induction**

- The decision to end a pregnancy before the spontaneous onset of labour is one of the most drastic interventions in the natural process of pregnancy and childbirth
- Labour induction is possible:
  - If a vaginal delivery is not a contraindication
  - If the risk of a prolonged pregnancy for mother and child is higher than the risk of induction

Murray W. Enkin et al, 2000

Logos: USAID, EUROPE, EPC

Slide 6MO-4 Labour Induction

Deliveries may be induced in cases where the risk of prolonging a pregnancy vs, the risks of inducing labour has been thoughtfully considered. The frequency of inducing labour is varied among different health care settings and regions/maternalities, even within the same country. Research conducted by the National Birth Centre in 1994 in Great Britain showed that induced labours among women who delivered in maternities was 19% compared to 0.2% among women who delivered at home. The results of the published reports varied

from 0% to 30%.

The rate of induced labour in the USA was 9.6% among 5,418 planned home deliveries; 21.0% among women without risk factors who delivered in maternities, and 44% among all risk categories who delivered in maternities. There was no essential difference among these categories of deliveries when comparing level of intrauterine and neonatal deaths.

Geoffrey Chamberlain, Luke Zander. *ABC of labour care: Induction*. *BMJ*, 1999, 318, 995-998.

Murray W. Enkin et al. *A guide to effective care in pregnancy and childbirth*. Oxford University Press, 3<sup>rd</sup> Edition, 2000.

**Indications for Labour Induction (1)**

- Pregnancy-induced hypertension
- Pre-eclampsia, eclampsia
- Premature rupture of membranes
- Chorioamnionitis
- Prolonged pregnancy
- Maternal request prior to 41 weeks

RCOG, 2001

### Slide 6MO-5 Indications for Labour Induction (1)

Labour can be induced when it is agreed that there will be a higher probability for a healthy outcome for foetus or mother if birth is hastened rather than delayed.

*Royal College of Obstetricians and Gynaecologists (RCOG). Induction of labour. Evidence-based Clinical Guideline Number 9. RCOG Press, 2001.*

**Labour Induction in a Prolonged Pregnancy**

- Routine labour induction after 41 week of gestation reduces perinatal mortality
- An ultrasound before 20 weeks to confirm gestation reduces the need to induce labour for a prolonged pregnancy
- Women with uncomplicated pregnancies should be offered labour induction beyond 41 weeks
- From 41 weeks, provide increased antenatal monitoring for women who decline labour induction
  - Twice weekly CTG and ultrasound estimation of maximum amniotic pool depth

RCOG, 2001  
Crowley P, 2005

### Slide 6MO-6 Labour Induction in a Prolonged Pregnancy

Prolonged pregnancies are those pregnancies that continue past 287 days (41 weeks) from the first day of the last menstrual period.

Research shows that indicators of maternal mortality and morbidity among healthy women with uncomplicated pregnancies increase with gestational age beyond 42 weeks. The risk of delivering a dead foetus at 37 week makes up 1 to 3000, at 42 week - 3 to 3000 and at 43 week of pregnancy - 6 to 3000.

An ultrasound to confirm gestation should be offered before 20 weeks gestation, as this reduces the need to induce for perceived prolonged pregnancy. [A]

A policy of early pregnancy ultrasound reduced the induced labours for prolonged pregnancy (1.9% vs. 2.8%; RR 0.69; 95% CI 0.58–0.82; NNT 111). This data was extracted from four trials, which focused on the use of ultrasound for early foetal assessment in pregnancy.

Women with uncomplicated pregnancies should be offered an induced labour beyond 41 weeks. [A]

What are the policy results of routine induction of labour after 41 weeks of pregnancy? The standard induced labour after 41 weeks of uncomplicated pregnancy reduces the risk of perinatal death (13 researches – 6,073 women; OR 0.23, 95% CI 0.06-0.90, NNT = 476). It also reduces the risk of meconium staining of amniotic fluids. (9 researches, 5,662 women). The standard induced labour does not influence the percentage of caesarean sections, vaginal operative deliveries, anomalies of the child's heartbeat rate during delivery, neonatal convulsions and a woman's satisfaction about her delivery.

From 42 weeks, women who decline an induced labour should be offered increased antenatal monitoring consisting of a twice weekly CTG and an ultrasound estimation of maximum amniotic pool depth. [A]

*Hilder L, Costeloe K, Thilaganathan B. Prolonged pregnancy: evaluating gestation-specific risks of fetal and infant mortality. Br J Obstet Gynaecol, 1998, 105, 169-173.*



Crowley P. *Interventions for preventing or improving the outcome of delivery at or beyond term. The Cochrane Database of Systematic Reviews, 2005, Issue 2.*

Royal College of Obstetricians and Gynaecologists (RCOG). *Induction of labour. Evidence-based Clinical Guideline Number 9. RCOG Press, 2001.*

**Labour Induction at Maternal Request Prior to 41 Weeks**

- Risks associated with induced labour at maternal request vs continuing the pregnancy
  - In healthy and uncomplicated pregnancies, the risks are equivalent to those of general population
  - Any potential benefits accrued are less easy to quantify
- Risks associated with induced labour before term
  - Increased risk of respiratory distress syndrome
  - Highlight these risks in any discussions regarding labour induction!
- Maternal request for labour induction could be considered if
  - Resources allow
  - Compelling psychological or social reasons
  - Favourable cervix

RCOG, 2001

USAID

EUROPE

6MO-7

### Slide 6MO-7 Labour Induction at Maternal Request Prior to 41 Weeks

#### Reasons why women request an induced labour

One study examined women's motives for opting for an elective induced labour. The study reported that among 237 women offered elective induction, 50% accepted. Their reasons for accepting this option included increased feelings of safety and a desire to shorten the duration of pregnancy.

Women who requested induction were more likely to have had problems during

their current pregnancy, complications in their previous pregnancies, problematic menstrual periods and to be more anxious about their labours than those women who chose a spontaneous onset of labour.

#### Risks associated with induction of labour at maternal request

Assuming that the woman is healthy, with an uncomplicated pregnancy, the risks of continuing the pregnancy should be equivalent to that of the general population. The risks of inducing labour for the mother will also be equivalent to those of the general population. However, any potential benefits accrued are less easy to quantify. There is an increased risk of respiratory distress syndrome in the baby if labour is induced before term. Therefore, it is important that these risks are highlighted in any discussions regarding induction prior to term.

#### Economic considerations

A policy of routinely offering 'elective' induction for psychological or social reasons would have resource implications. However, no published study has examined these costs. The costs would include both the immediate costs of drugs, equipment and staff time, and the indirect costs due to an increased risk of operative delivery. These costs would then have to be set against the benefits from the woman's point of view of having the freedom to choose 'elective' induction.

Further economic evaluation research is therefore needed to evaluate both the costs and the benefits of a policy of routinely offering 'elective' induced labours for psychological or social reasons.

**Conclusion:** There is insufficient evidence to recommend elective induced labours at maternal request.

Royal College of Obstetricians and Gynaecologists (RCOG). *Induction of labour. Evidence-based Clinical Guideline Number 9. RCOG Press, 2001.*

**Indications for Labour Induction (2)**

- Evaluate the risks and benefits of labour induction for women whose pregnancies are complicated by:
  - Diabetes mellitus
  - Suspected foetal macrosomia
  - Multifoetal pregnancy
  - History of a previous caesarean section
  - Breech presentation
  - Suspected foetal growth compromise

RCOG, 2001

USAID

EUROPE

Effective Perinatal Care (EPC)

## Slide 6MO-8 Indications for Labour Induction (2)

### Diabetes mellitus

Women who have pregnancies complicated by diabetes should be offered an induced labour prior to their estimated delivery date. [C]

Induction or elective delivery before full term has been proposed as a means of improving maternal and neonatal outcome. However, the potential benefits of induction need to be balanced against the potential to increase the risk of pulmonary complications in the foetus.

One systematic review compared the policy of elective induction of labour at 38 weeks with expectant management. Only one pragmatic RCT was included in this review. This trial had 200 participants, none of whom had type I diabetes. Three of the reviewers' pre-specified outcomes were reported upon. There was no difference in the risk of caesarean section (either elective or in labour) between interventions (25% vs. 31%; RR 0.81; 95% CI 0.52–1.26). The risk of macrosomia (birthweight over 4000 g) was reduced in those women who were actively induced (15% vs. 27%; RR 0.56; 95% CI 0.32–0.98; NNT 8). This trial is too small to draw conclusions regarding the effect of this policy on perinatal mortality.

Summary: Inducing labour of term pregnancies in women with diabetes is associated with a reduced risk of macrosomia.

Routine induction does not appear to increase the risk of caesarean section or neonatal morbidity, cases of which were rare.

### Suspected foetal macrosomia

One systematic review addressed the question of whether a policy of active induction versus expectant management in cases of suspected fetal macrosomia had any impact on maternal or neonatal outcomes. The review included two trials involving 313 women. Both trials included an active induction for babies estimated to weigh more than 4,000 g in pregnant women who were not diabetic. In both trials, the mean gestational age at birth in both experimental and control groups was similar, despite one group being managed expectantly.

Overall perinatal mortality and morbidity were similar for both policies. However, in total there were two babies who had brachial plexus injuries and four who had fractures. These all occurred in the control groups. There was no difference in rates of caesarean section or instrumental vaginal delivery between the two groups.

Summary: Currently, the evidence is inconclusive that a policy of induced labour for suspected fetal macrosomia in women who are not diabetic can reduce maternal or neonatal morbidity.

### Multifoetal pregnancy (the information below relates only to twin pregnancies)

One RCT examined the role of induced labour in multiple pregnancies in comparison with expectant management. The study examined 36 twin pregnancies at 37 weeks of gestation and randomised them to immediate induction with oral prostaglandins or expectant management with continued surveillance (consisting of daily non-stress testing, twice weekly ultrasound evaluation and cervical assessment).

There were 17 women in the immediate-induction group of the trial and 19 in the expectant-management group. The study was unable to detect any difference in perinatal mortality rates. There was no difference in caesarean section rates (32% vs. 18%), birth weight, Apgar scores

of less than 7 at 5 minutes or postpartum haemorrhage rates. There was an increase in meconium-stained liquid in the expectant-management group (13% vs. 0%). This may be related to a higher gestational age at delivery.

**Summary:** The perinatal mortality rate in twin pregnancies is increased in comparison with singleton pregnancies at term.

No conclusions can be drawn from the available trial evidence relating to the merits of an active policy of induced labour in uncomplicated multifetal pregnancies.

### **History of a previous caesarean section**

Women should be informed of the two- to three-fold increased risk of uterine rupture and around 1.5 fold increased risk of caesarean section in induced and/or augmented labours compared with spontaneous labours.

Women should be informed that there is a higher risk of uterine rupture with induction of labour with prostaglandins.

There should be careful serial cervical assessments, preferably by the same person, for both augmented and non-augmented labours, to ensure that there is adequate cervicometric progress, thereby allowing the planned VBAC (vaginal birth after caesarean) to continue.

The decision to induce, the method chosen, the decision to augment with oxytocin, the time intervals of serial vaginal examination and the selected parameters of progress that would necessitate and advise on discontinuing VBAC should be discussed with the woman by the consultant obstetrician.

Two studies have expanded on the difference in adverse outcomes between prostaglandin and non-prostaglandin (such as intracervical Foley catheter) based induction regimens. In the NICHD study, prostaglandin induction compared with non-prostaglandin induction incurred a non-significantly higher risk of uterine rupture (140/10,000 versus 89/10,000;  $P = 0.22$ ) In an analysis of nationally collected data from Scotland, prostaglandin induction compared with non-prostaglandin induction was associated with a statistically significantly higher uterine rupture risk (87/10,000 versus 29/10,000) and a higher risk of perinatal death from uterine rupture (11.2/10,000 versus 4.5/10,000). This compares with 6/10,000 risk of perinatal death in women with an unscarred uterus induced by prostaglandin identified by a Cochrane review.

Given these risks and the absence of direct robust evidence, it is important not to exceed the safe recommended limit for prostaglandin priming in women with prior caesarean birth. Due consideration should be given to restricting the dose and adopting a lower threshold of total prostaglandin dose exposure. Importantly, the decision to induce and the method chosen (prostaglandin versus non-prostaglandin) should be consultant-led. (RCOG, 2007, pgs 10-11)

### **Breech presentation**

About 3–4% of all pregnancies reach term with a foetus in the breech presentation. One trial provides information on the risks and benefits of planned caesarean section compared with planned vaginal breech delivery. The data within the trials relating to those women with a breech presentation who underwent induced labour are not reported separately from the whole group who were randomised to a planned vaginal delivery.

The perinatal mortality was lower for planned caesarean section compared with planned vaginal breech delivery (1.6% vs. 5.0%; RR 0.33; 95% CI 0.19–0.56; NNT 29). Hence, no conclusions can be reached from this data regarding induced labour with a breech presentation.

**Conclusion:** There is an increased risk associated with planned vaginal breech delivery. The risks associated with induced labour with a breech presentation cannot be quantified from the available trial literature.

### Foetal growth compromise

When undertaking an induced labour in women with recognised risk factors (including suspected foetal growth compromise), the clinical discussion regarding the timing and method of induction should be undertaken with a consultant. The induction process should not occur on an antenatal ward. [C]

Prolonged use of maternal facial oxygen therapy may be harmful to the foetus and should be avoided. There is no research evidence evaluating the benefits or risks associated with the short-term use of maternal facial oxygen therapy in cases of suspected foetal compromise. [C] No studies could be located that specifically considered induced labour in babies with suspected foetal growth compromise. Data is insufficient to comment on the risks of induced labour in women with babies with known growth restriction.

**General conclusion:** Adequately powered RCTs reporting relevant clinical outcomes in specific clinical groups are needed to evaluate the risks and benefits of induced labour for women whose pregnancies are complicated by, or associated with, the above-mentioned conditions.

*Royal College of Obstetricians and Gynaecologists (RCOG). Induction of labour. Evidence-based Clinical Guideline Number 9. RCOG Press, 2001.*

**Contraindications for Labour Induction**

- The contraindications for labour induction include contraindications for labour or vaginal delivery:
  - Vasa previa or complete placenta previa
  - Transverse/oblique foetal lie
  - Severe cephalopelvic disproportion
  - Previous transfundal uterine surgery
  - Active genital herpes
  - Invasive cervical cancer

ACOG, 1999

### Slide 6MO-9 Contraindications for Labour Induction

The process of inducing labour should only be considered when vaginal delivery is possible.

Contraindications to inducing labour include, but are not limited to, the situations shown on the slide.

*American College of Obstetricians and Gynecologists (ACOG). Induction of labor. Washington (DC): American College of Obstetricians and Gynecologists (ACOG), 1999 Nov, No. 10.*

**Prerequisites to Labor Induction**

- Assessment of indications and contraindications
- Assessment of gestational age
- Consideration of potential risks to mother and foetus
- Patient counselling
  - Indications, agents and methods of labour induction
  - Possible need for repeat induction or caesarean delivery
  - Documentation of discussion with the patient!
- Cervical favourability and pelvic assessment
- Assessment of foetal size and presentation
- Assessment of membrane status (intact or ruptured)
- Foetal wellbeing/foetal heart rate monitoring prior to labour induction

ACOG, 1999

### Slide 6MO-10 Prerequisites to Labor Induction

Before beginning induction it is necessary to discuss the need for it and the possible complications with the woman.

Inducing labour should only follow after informed consent by the woman. For consent to be fully informed it should include the reasons for inducing labour, the method to be used and the potential risks and consequences of accepting or refusing an offer to induce labour.

*American College of Obstetricians and Gynecologists (ACOG). Induction of labor. Washington (DC): American College of Obstetricians and Gynecologists (ACOG), 1999 Nov, No. 10.*

Royal College of Obstetricians and Gynaecologists (RCOG). Induction of labour. Evidence-based Clinical Guideline Number 9. RCOG Press, 2001.

**Labour Induction: How?**

- Sweeping amniotic membranes
- Amniotomy
- Oxytocin
- Prostaglandins

**THE METHOD USED TO INDUCE LABOUR DEPENDS ON THE CONDITION OF CERVIX**

Logos: JFS, Effective Perinatal Care (EPC), USAID, RCOG, EUROPE, 6MO-11

### Slide 6MO-11 Labour Induction: How?

Non-pharmacologic methods of inducing labour include sweeping the amniotic membranes and amniotomy.

In addition to oxytocin and misoprostol, other agents can be used for inducing labour. The progesterone antagonist mifepristone (RU 486) is one such suitable and effective induction agent.

*American College of Obstetricians and Gynecologists (ACOG). Induction of labor. Washington (DC): American College of Obstetricians and Gynecologists (ACOG), 1999 Nov, No. 10.*

**Sweeping Amniotic Membranes**

- This method is easy to perform
- No costs is involved
- There are some positive effects
  - Increases the likelihood of spontaneous labour within 48 hours, and birth within one week
  - Decreases the likelihood of prolonged pregnancy
  - Reduces the likelihood of having to use other methods to induce labour by 15%
- Increased maternal discomfort during vaginal examination and while performing the procedure
- It is not effective with an "unripe" cervix

RCOG, 2001  
Bouvain M et al, 2005

Logos: JFS, Effective Perinatal Care (EPC), USAID, RCOG, EUROPE, 6MO-12

### Slide 6MO-12 Sweeping Amniotic Membranes

The simplest procedure is to sweep the membranes with a gloved finger lubricated with antiseptic cream and inserted gently up the cervical canal. If performed by an experienced doctor or midwife, this need not be uncomfortable. After 40 weeks' gestation, this procedure may decrease by 50% the need for inducing labour but at 38-40 weeks it does not significantly increase the proportion of women who go into labour within 7 days.

Prior to formal induction, women should be offered sweeping of the membranes. [A]

When membrane sweeping is proposed, inform the mother that membrane sweeping:

- is not associated with an increase in maternal or neonatal infection
  - is associated with increased levels of discomfort during the examination and bleeding.
- [A]

Sweeping the membranes increased the likelihood of both:

- spontaneous labour within 48 hours (63.8% vs. 83.0%; RR 0.77; 95% CI 0.70–0.84; NNT 5)
- or birth within one week (48.0% vs. 66.0%; RR 0.73; 95% CI 0.66–0.80; NNT 5).

Sweeping the membranes performed as a general policy from 38–40 weeks onwards decreased the frequency of prolonged pregnancy:

- over 42 weeks: 3.4% vs. 12.9%; RR 0.27; 95% CI 0.15–0.49; NNT 11
- over 41 weeks: 18.6% vs. 29.87%; RR 0.62; 95% CI 0.49–0.79; NNT 8.

Membrane sweeping reduced the frequency of using other methods to induce labour (formal induction of labour). The overall risk reduction in the available trials was 15%. This risk reduction of a formal induced labour was 21.3% vs. 36.3% (RR 0.59; CI 0.50–0.70; NNT 7).

The risk of operative delivery is not changed by the intervention. There was no difference in other measures of effectiveness or adverse maternal outcomes.

Sweeping the membranes was not associated with an increase in maternal infection or fever rates (4.4% vs. 4.5%; RR 0.97; 95% CI 0.60–1.57). Similarly, there was no increase in neonatal infection (1.4% vs. 1.3%; RR 0.92; 95% CI 0.30–2.82).

No major maternal adverse effects were reported in the trials. A trial that systematically assessed minor adverse effects and women's discomfort during the procedure found that women in the sweeping group reported more discomfort during the vaginal examination. Median pain scores were higher in women allocated to sweeping of membranes.

In addition, more women allocated to sweeping experienced vaginal bleeding and painful contractions not leading to the onset of labour during the 24 hours following the intervention. There was no difference in any foetal outcome between the membrane sweeping and the non-membrane sweeping groups. These results must be interpreted with caution due to the presence of heterogeneity. The trials included in this review did not report in relevant clinical subgroups.

### Summary:

- Membrane sweeping is associated with a reduction in the length of time between treatment and spontaneous labour.
- Sweeping of the membranes reduces the incidence of prolonged pregnancy.
- Sweeping of the membranes reduces the need for the use of formal methods of induction of labour.
- Sweeping of the membranes is associated with an increase in maternal discomfort.

*Royal College of Obstetricians and Gynaecologists (RCOG). Induction of labour. Evidence-based Clinical Guideline Number 9. RCOG Press, 2001.*

*Boulvain M, Stan C, Irion O. Membrane sweeping for induction of labour. The Cochrane Database of Systematic Reviews 2005, Issue 1*

**Cervical Ripening**

If the cervix is unfavourable (Bishop score  $\leq 5$ ), cervical ripening is warranted prior to inducing labour

There are several methods available:

- Prostaglandin PGE<sub>2</sub> gel (Dinoprostone)
  - Intracervical PGE<sub>2</sub> gel (Prepidil®)
  - Intravaginal PGE<sub>2</sub> gel (Prostin®)
- Controlled-release PGE<sub>2</sub> (Proress®, Cervidil®)
- Misoprostol
- Mechanical methods

Logos: WHO EUROPE, USAID, SOGC, 2001, 6MO-13

### Slide 6MO-13 Cervical Ripening

A favourable cervix is defined as one with a modified Bishop's score of greater than eight.

A ripe cervix shows that a uterus is ready for labour when it is:

- Soft
- Shortened
- Dilated
- Central on the presenting part

### Bishop score

### Cervical dilation

1. Cervical dilation < 1 cm: 0 point
2. Cervical dilation 1-2 cm: 1 point
3. Cervical dilation 3-4 cm: 2 points
4. Cervical dilation  $\geq$  5 cm: 3 points

### Cervix length (effacement)

1. Cervical length > 4 cm (0% effacement): 0 point
2. Cervical length 2-4 cm (0 to 50% effacement): 1 point
3. Cervical length 1-2 cm (50 to 75% effacement): 2 points
4. Cervical length < 1 cm (>75% effacement): 3 points

### Consistency of cervix

1. Hard consistency of cervix: 0 points
2. Medium consistency of cervix: 1 point
3. Soft consistency of cervix: 2 points

### Cervix position

1. Cervix is in posterior position: 0 point
2. Cervix is in mid-position: 1 point
3. Cervix is in anterior position: 2 points

### Position of presenting part

1. Position of presenting part with regard to inter-spinal line -3 cm: 0 point
2. Position of presenting part with regard to inter-spinal line -1 cm: 1 point
3. Position of presenting part with regard to inter-spinal line +1 cm: 2 points
4. Position of presenting part with regard to inter-spinal line +2 cm: 3 points

### Modifiers

- Add 1 point to the scale if:
  - i. Pre-eclampsia
  - ii. For each previous vaginal delivery
- Deduct 1 point if:
  - i. Pregnancy is being planned
  - ii. Woman who never delivered
  - iii. Premature or prolonged rupture of membranes

### Explanations

Indications for cervical ripening with the use of prostaglandins:

- Bishop score <5
- Wholeness of membranes
- Irregular contractions

Indications for labour induction with the use of oxytocin:

- Bishop score  $\geq$  5
- Rupture of membranes

It is recommended that the physician or certified midwife use the Bishop Score as part of the assessment process. If the score exceeds 8, the chance of a successful delivery after induction is the same as that following a spontaneous onset of labour. As with many scoring systems, the Bishop's score provides only a guide. A modest correlation exists between cervical ripeness and the likelihood of success. The Bishop's score only translates into numbers what the experienced clinician learns when examining the cervix for ripeness.

One trial had analyzed the clinical and sonographic variables that predict the success of an induced labour. It studied the Bishop Score, cervical length, and parity in the prediction of successful vaginal delivery within 24 h of induction.

Cervical length (odds ratio (OR) 1.089,  $P < 0.001$ ), Bishop score (OR 0.751,  $P = 0.001$ ) and parity (OR 4.7,  $P < 0.001$ ) predict the success of labour induction. In a global analysis of the variables studied, the best statistic sequence that predicts the outcome of an induced labour was found

when we introduced parity in the first place. The success of induced labours in nulliparous was 50.8 and 83.3% in multiparous women ( $P=0.0001$ ).

Conclusions: Cervical length, Bishop Score and parity, integrated in a flow chart, provide independent prediction of vaginal delivery within 24h of induction.

Both PGE2 preparations, the gel and the vaginal insert, have been reported to increase the probability of successful initial induction, shorten the interval from induction to delivery, and decrease the total and maximal doses of oxytocin needed to induce contractions.

When PGE gels compared with placebo or no treatment, a meta-analysis has concluded that the use of prostaglandins for cervical ripening does ripen the cervix, reduces the likelihood of not being delivered in 24 hours, and decreases the use of oxytocin for augmentation.

Theoretical advantages of controlled-release PGE use include the ability of insertion without the use of a speculum, a slow continuous release of prostaglandin, only one dose being required, the ability to use oxytocin 30 minutes after its removal, and the ability to remove the insert if required (such as with excessive uterine activity). The manufacturer of controlled release prostaglandin indicates it should not be used with ruptured membranes.

#### OUTPATIENT USE OF PROSTAGLANDINS:

There have been few published studies of outpatient use of prostaglandin gel for cervical ripening. Several small trials suggest outpatient use may be appropriate in selected women, but further studies are needed to evaluate this practice in order to assess maternal and neonatal outcomes adequately.

Misoprostol is an inexpensive synthetic prostaglandin E1 analogue marketed for prevention and treatment of NSAID gastric and duodenal ulcers. Studies suggest that vaginal misoprostol is effective as a cervical ripening and labour induction agent.

However, Misoprostol has not been approved by many countries for inducing labour. RCOG recommends Misoprostol should only be used in clinical trials until the safest dosage and interval is known.

Mechanical methods of cervical ripening have been described, including the Foley catheter (with and without extraamniotic saline infusion), natural dilators (laminaria), and synthetic dilators. The mechanisms of action for mechanical methods include dilation of the cervix through mechanical pressure and increased prostaglandin production. Advantages proposed for these mechanical methods include simplicity of use, potential for reversibility, reduction in certain side effects such as excessive uterine activity, and low cost.

*Bishop EH. Pelvic scoring for elective induction. Obstet Gynecol, 1964, 24, 267.*

*American College of Obstetricians and Gynecologists (ACOG). Induction of labor. Washington (DC): American College of Obstetricians and Gynecologists (ACOG), 1999 Nov, No. 10.*

*Royal College of Obstetricians and Gynaecologists (RCOG). Induction of labour. Evidence-based Clinical Guideline Number 9. RCOG Press, 2001.*

*B Bueno et al. The labor induction: integrated clinical and sonographic variables that predict the outcome. Journal of Perinatology, 2007, 27, 4–8.*

*Society of Obstetricians and Gynaecologists of Canada (SOGC). Induction of Labour at Term. Clinical Practice Guideline. JOGC, August 2001, No. 107.*



**Prostaglandin Doses for PGE<sub>2</sub> gel**

Intravaginal administration:

- 1 mg followed by 1 mg or 2 mg six hours later if necessary
- 1 mg every six hours up to three doses
- 2 mg every six hours up to three doses
- 2 mg every 12 hours up to three doses

Intracervical administration

- 0,5 mg every six hours up to three doses
- 0.5 mg every six hours up to four doses (over two days)
- 0.5 mg three times a day up to two days

Oxytocin administration not earlier than 6 hours after the last dose

USAID  
SOGC, 2001  
EUROPE

### Slide 6MO-14 Prostaglandin Doses for PGE<sub>2</sub> gel

The controlled-release insert consists of a polymer base containing 10 mg of dinoprostone with a polyester retrieval string. The insert releases 0.3 mg per hour of prostaglandin E<sub>2</sub> over a 12 hour period and is placed in the posterior fornix of the vagina. It is removed with the onset of labour, spontaneous rupture of membranes, excessive uterine activity, or after 12 hours.

There are no randomized clinical trials comparing different timing of the use of oxytocin after prostaglandin gel. The manufacturer of intravaginal dinoprostone suggests a minimum of 12 hours, while the manufacturer of intracervical dinoprostone suggests a minimum of six hours.

*Society of Obstetricians and Gynaecologists of Canada (SOGC). Induction of Labour at Term. Clinical Practice Guideline. JOGC, August 2001, No. 107.*

**Comparison of Intracervical and Intravaginal Prostaglandins**

Intracervical and intravaginal prostaglandins

- Equally effective
- No differences between operative delivery rates

Intravaginal PGE<sub>2</sub> should be used in preference to intracervical preparations

- Administration of vaginal PGE<sub>2</sub> is less invasive

USAID  
RCOG, 2001  
EUROPE

### Slide 6MO-15 Comparison of Intracervical and Intravaginal Prostaglandins

The two most commonly used preparations and routes of administration of prostaglandins are intravaginal or intracervical PGE<sub>2</sub>. Methods of administration, doses and intervals between doses, are discussed in the subsequent sections. It should be noted, however, that intracervical PGE<sub>2</sub> is no longer available in the many countries for inducing labour.

There were no differences between operative delivery rates when intracervical and vaginal prostaglandins were compared, irrespective of patient group.

There was no difference in any of the other defined outcomes between intracervical and intravaginal prostaglandins.

**Summary:** There was no difference in relation to outcome between the uses of intravaginal or intracervical prostaglandins.

When inducing labour is undertaken with prostaglandins, intravaginal PGE<sub>2</sub> should be used in preference to intracervical preparations, as they are equally effective and administration of vaginal PGE<sub>2</sub> is less invasive. [A]

*Royal College of Obstetricians and Gynaecologists (RCOG). Induction of labour. Evidence-based Clinical Guideline Number 9. RCOG Press, 2001.*

**Cervical Ripening Ineffective Methods**

- Estrogens, oxytocin and relaxin are not recommended for ripening the cervix
 

Murray W. Enkin et al. 2000
- Intravenous administration of prostaglandins is not recommended for labour induction
  - Risk of hyper-stimulation with foetal heart rate abnormalities
    - Foetal heart beat rate is 7 times higher compared to the use of oxytocin
  - Maternal deaths have been reported
 

Lucas M. et al. 2000

WHO USAID EUROPE Effective Obstetrical Care (EPC)

### Slide 6MO-16 Cervical Ripening Ineffective Methods

The use of estrogens for cervical ripening has been suggested on the theoretical grounds that these agents might ripen the cervix without concomitant effects on uterine contractility. Data from controlled trials with a variety of estrogenic preparations, failed to show any beneficial effects.

A meta-analysis of five trials has concluded that the use of oxytocin to ripen the cervix is not effective.

The use of porcine relaxin to soften the cervix and shorten labour had a brief vogue of popularity in the 1950s. Placebo-controlled trials failed to show any benefits.

There is no research that shows the effectiveness of intravenous use of prostaglandins for softening the cervix. However there is a systematic review on the intravenous use of prostaglandins for inducing labour. The intravenous use of prostaglandins is associated with a high percentage of hyper-stimulation of uterine contractions with a change in foetal heart beat rate (relative risk (RR) 6.76, 95% confidence interval (CI) 1.23-37.11) and without change in heart-beat rate (RR 4.25, 95% CI 1.48-12.24) in comparison with the use of oxytocin. The use of prostaglandins is also associated with considerable side effects for the mother (gastro-intestinal tract, thrombophlebitis and pyrexia RR 3.75, 95% CI 2.46-5.70) compared to oxytocin. The effect of prostaglandin on vaginal deliveries wasn't different from the effect of oxytocin. (RR 0.85, 95% CI 0.61-1.18).

Intravenous prostaglandin is no more efficient than intravenous oxytocin for the induction of labour but its use (compared to oxytocin) is associated with higher rates of maternal side-effects and uterine hyperstimulation.

*Lucas M, Bricker L. Intravenous prostaglandin for induction of labour. The Cochrane Database of Systematic Reviews 2000, Issue 3.*

*Murray W. Enkin et al. A guide to effective care in pregnancy and childbirth. Oxford University Press, 3<sup>rd</sup> Edition, 2000.*

*Society of Obstetricians and Gynaecologists of Canada (SOGC). Induction of Labour at Term. Clinical Practice Guideline. JOGC, August 2001, No. 107.*

**Amniotomy: Advantages**

- This method is easy to use
- It is not expensive
- It requires a minimal use of instruments

USAID  
EUROPE  
6MO-17

### Slide 6MO-17 Amniotomy Advantages

Amniotomy (artificial rupture of membranes) is a very simple procedure, which can be performed without the assistance of other health care personnel for inducing labour if membranes are accessible. Thus, pharmacological interference can be avoided.

The traditional method of induction is to rupture the membranes, releasing amniotic fluid. The forewaters can be snagged with a simple Amnihook (EMS Medical Group), a pair of Kocher's

forceps, or a pair of special amniotomy forceps. Under sterile conditions, the chosen instrument is passed through the cervical canal. Under vision or digital pilotage, the forewaters are snagged. The colour of the amniotic fluid and the volume released should be assessed. The fetal heart rate should be checked immediately afterwards to ensure no fetal compromise, but it is unnecessary to continue with cardiotocography unless there is a specific indication.

At present, there is not enough evidence to assess the effectiveness of amniotomy for inducing labour. One attempt was made to compare amniotomy with a single dose of prostaglandins inserted vaginally for women with a ripened cervix. In the group with the amniotomy an increased need for the administration of oxytocin was found. (44% to 15%; RR 2.85, 95% CI 1.82-4.46). The researchers conclude that if modern labour induction methods are not accessible (pharmacological medications) then amniotomy is the clinical choice.

Amniotomy alone is not very effective among more than 50% of women with the cervix which was ready. In this case oxytocin administration is necessary.

*Bricker L, Luckas M. Amniotomy alone for induction of labour. The Cochrane Database of Systematic Reviews 2000, Issue 4.*

**Amniotomy: Disadvantages**

- This method is so simple and inexpensive that TEMPTATION to use it appears. Thus it can be abused
- Unpredictable and occasionally, a long interval to the onset of uterine contractions
- Increased risk of:
  - Intrauterine infections
  - Vertical transmission of specific maternal infections, such as HIV
  - Umbilical cord prolapse
  - Bleeding
- If used alone is often inadequate to induce labour

USAID  
EUROPE  
Murray W. Enkin et al, 2000  
6MO-18

### Slide 6MO-18 Amniotomy Disadvantages

A number of undesirable consequences have been attributed to artificial rupture of membranes. These include: pain and discomfort; intra-uterine infections (occasionally leading to septicaemia); early decelerations in the foetal heart rate; umbilical cord prolapse; and bleeding, either from foetal vessels in the membranes, from the cervix, or from the placental site. Serious complications, fortunately, are rare.

The view that amniotomy predisposes for foetal heart-rate decelerations is largely based on potential cord compression due to diminished amniotic fluid volume but there is no evidence that this risk is important enough to be a main determinant in choosing a method for inducing labour.

*Murray W. Enkin et al, A guide to effective care in pregnancy and childbirth. Oxford University Press, 3<sup>rd</sup> Edition, 2000.*

**Oxytocin Administration**

- In women with intact membranes, amniotomy should be performed where feasible, prior to commencement of an infusion of oxytocin
- To induce labour, oxytocin can be administered **ONLY** by controlled intravenous infusion in standard dilution

RCOG, 2001

### Slide 6MO-19 Oxytocin Administration

To reduce error, a standard dilution should always be used. Suggested standardised dilutions and dose regimens include:

- 30 IU in 500 ml of normal saline; hence 1ml/hr = 1milliunits per minute
- 10 IU in 500 ml of normal saline; hence 3ml/hr = 1milliunits per minute. [C]

The researchers compared the effectiveness of the use of oxytocin alone (with the whole membrane) and

combination of rupture of membrane with oxytocin administration. There was no difference in the frequency of caesarean sections. However, the increased number of successful vaginal deliveries with the use of oxytocin and amniotomy was noticed. A small number of women in the research couldn't make precise conclusions. In the cases where oxytocin alone was compared with vaginal or intra-uterine administration of prostaglandin E2 it showed an increased number of caesarean sections and some unsuccessful vaginal deliveries. This increase was not noticed when the use of oxytocin with amniotomy was compared to the use of prostaglandins. This is indirect evidence for the use of a combination oxytocin-amniotomy with the membrane intact.

*Royal College of Obstetricians and Gynaecologists (RCOG). Induction of labour. Evidence-based Clinical Guideline Number 9. RCOG Press, 2001.*

**Oxytocin: Method of Administration**

- Starting dose is 1-2 mU/min
- Double dose after 30 minutes
- Use of minimum-effective doses
- Aim for a maximum of three to four contractions every ten minutes
- In most of the cases, adequate contractions may be established at 12 mU/min
- Producers indicate the maximum dose of 20 mU/min
- Maximum dose should not exceed 32 mU/min

RCOG, 2001

### Slide 6MO-20 Oxytocin Method of Administration

Comparing low-dose oxytocin (gradual increase from low-dose to high-dose oxytocin) to high-dose oxytocin showed:

- Low dose doesn't lead to an increase of operative deliveries
- Gradual increase of low-dose oxytocin (every 30-60 minutes) leads to a decrease of hyper-contraction of uterus
- Low-dose mode doesn't lead to an increase of delivery duration
- Higher-dose oxytocin leads to an

increase of rapid deliveries.

Meta-analyses show that the mode of oxytocin increase (every 30-60 minutes) results in:

- Low frequency of excessive uterine contractions
- High percentage of vaginal deliveries
- Low percentage of postpartum infections and haemorrhages
- Tendency to decrease the percentage of caesarean sections.

In most cases the initial dosage was from 0.5 to 2.0 IU/min, increasing from 1.0 IU/min to a double dose with intervals every 30 min up to 60 min and the maximum dose – from 16 IU/min to 40 IU/min.

*Crane JMG, Young DC. Meta-analysis of low-dose versus high-dose oxytocin for labour induction. J Society Obstet Gynaecol Can, 1998, 20, 1215-23.*

Merrill DC, Zlatnik FJ. Randomized, double-masked comparison of oxytocin dosage in induction and augmentation of labour. *Obstet Gynecol*, 1999, 94, 455-63.

Royal College of Obstetricians and Gynaecologists (RCOG). *Induction of labour. Evidence-based Clinical Guideline Number 9*. RCOG Press, 2001.

Time after starting (min)	Oxytocin dose (mU/min)	Volume infused (ml/hour)	
		Dilution 30 IU in 500 ml	Dilution 10 IU in 500 ml
0	1	1	3
30	2	2	6
60	4	4	12
90	8	8	24
120	12	12	36
150	16	16	48
180	20	20	60
210	24	24	72
240	28	28	84
270	32	32	96

**Slide 6MO-21 Oxytocin Infusion Method**

On the slide is the table containing recommended oxytocin dosage. Doses highlighted are quantities above those referred to in the summary of product characteristics of 20 milliunits per minute.

If higher doses are used, the maximum dose used should not exceed 32 milliunits per minute.

*Royal College of Obstetricians and Gynaecologists (RCOG). Induction of labour. Evidence-based Clinical Guideline Number 9*. RCOG Press, 2001.

*Society of Obstetricians and Gynaecologists of Canada (SOGC). Induction of Labour at Term. Clinical Practice Guideline. JOGC, August 2001, No. 107.*

If after 32 mU/min of oxytocin labour has not been established in **multigravida** and in **women with previous caesarean scars** – deliver by caesarean section.

If after 32 mU/min of oxytocin labour has not been established in **primagravida** WHO recommends using higher concentration of oxytocin (rapid escalation):

- Infuse oxytocin 10 units in 500 mL dextrose (or normal saline) at 30 drops per minute
- Increase infusion rate by 10 drops per minute every 30 minutes until good contractions are established
- If **good contractions are not established at 60 drops per minute** (60 mIU per minute), deliver by caesarean section.

**Do not use oxytocin 10 units in 500 mL (i.e. 20 mIU/mL) in multigravida and women with previous caesarean section.**

*Managing Complications in Pregnancy and Childbirth: A guide for midwives and doctors. WHO, 2005*

**For the conversion to the equivalent to drops per minute (20 drops = 1 ml)**

Upon dilution of 10 IU of Oxytocin in 500 ml of Normal Saline:  
 1mU = 3 ml/hour = 60 drops/60 minutes = 1 drop/minute.

Upon dilution of 5 IU of Oxytocin in 500 ml of Normal Saline  
 1mU = 6ml/hour = 120 drops/60 minutes = 2 drops/minute

Upon dilution of 30 IU of Oxytocin in 500 ml of Normal Saline  
 1mU = 1ml/hour = 20 drops/60 minutes = 0.33 drops/minutes

Upon dilution of 5 IU of Oxytocin in 1000 ml of Normal Saline  
 1mU = 12ml/hour = 240 drops/60 minutes = 4 drops/minute

The oxytocin dose should be documented on the WHO partograph throughout the labour.

Attachment 1 provides 5 examples of oxytocin infusion rates (from 1mU/min to 20 mU/min) using different concentrations.

**Misoprostol (1)**

In comparison with vaginal PGE<sub>2</sub>, endocervical PGE<sub>2</sub> and oxytocin, inducing with vaginal Misoprostol is connected with:

- Reduced frequency of epidural analgesia
- Reduced frequency of ineffective vaginal deliveries within 24 hours
- Less need to use oxytocin

BUT

- Higher frequency of uterus hyper-stimulation
- Higher risk of abnormal foetal heart rate
- Higher risk of meconium-stained amniotic fluid

Hofmeyr GJ, 2003

Logos: USAID, EUROPE, ISI, Evidence Based Clinical Case (EBC)

### Slide 6MO-22 Misoprostol (1)

The use of Misoprostol is a very effective method for ripening the cervix and inducing labour. Other potential benefits of misoprostol is that it is much cheaper than currently available induction agents; it is easily stored and stable at room temperature. Its ease of administration may also be of benefit if oral misoprostol is shown to be safe and effective.

However, the use of Misoprostol is also associated with a higher risk of negative effects and the optimal dose regime was not studied and reported. Besides, its use

for inducing labour is not approved by many countries. For example, the Royal College of Obstetricians and Gynaecologists identifies Misoprostol with “induction of labour” rather than “cervical ripening” and recommends that until the best dose regime is determined, misoprostol’s use should be confined to clinical trials.

*Royal College of Obstetricians and Gynaecologists (RCOG). Induction of labour. Evidence-based Clinical Guideline Number 9. RCOG Press, 2001.*

*Hofmeyr GJ , Gülmezoglu AM Vaginal misoprostol for cervical ripening and induction of labour (Cochrane Review). In: The Cochrane Library, Issue 4, 2003*

**Misoprostol (2)**

- 0.25-0.5 mg four hourly into vagina
- Data on optimal regimens and safety are lacking

Hofmeyr GJ et al, 2004  
 Africiv Z., 2004

Logos: USAID, EUROPE, ISI, Evidence Based Clinical Case (EBC)

### Slide 6MO-23 Misoprostol (2)

Misoprostol pills 25 mcg are included in the WHO Essential Drug List.

A lower dosage regimen of Misoprostol (25 micrograms 6-hourly) was less effective than a higher dose (25 micrograms 3-hourly), with possibly reduced rates of uterine hyperstimulation.

Thus, though misoprostol shows promise as a highly effective, inexpensive, and convenient agent for inducing labour, it cannot be recommended for routine use at this stage. It is also not registered for

such use in many countries.

Because of the enormous economic and possible clinical advantages of misoprostol, there is a need for further trials to establish its safety.

Hofmeyr GJ, Gülmezoglu AM. Vaginal misoprostol for cervical ripening and induction of labour. *The Cochrane Library*, 2004, Issue 4.

Alfirevic Z. Oral misoprostol for induction of labour. *The Cochrane Library*, Issue 4, 2004.

Murray W. Enkin et al, *A guide to effective care in pregnancy and childbirth*. Oxford University Press, 3<sup>rd</sup> Edition, 2000.

**Foetal Surveillance and Induced Labour**

Facilities should be available for continuous uterine and foetal heart rate (FHR) monitoring

Induced labour with vaginal prostaglandins (PGE<sub>2</sub>)

- Continuous electronic foetal monitoring should be established once contractions are detected or reported

Induced labour with oxytocin

- Continuous electronic foetal monitoring should be used

RCOG, 2001

USAID

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WHO EUROPE

### Slide 6MO-24 Foetal Surveillance and Induced Labour

The assessment of fetal wellbeing is only one component of intrapartum care. It is an important area where due consideration must be given to maternal preference and priorities in light of potential risk factors to both mother and baby. Providing accurate information in these circumstances is essential to allow each woman to make the right decision for her.

Wherever labour is induced, facilities should be available for continuous uterine

and fetal heart rate (FHR) monitoring. [C]

When labour is induced with vaginal prostaglandins (PGE<sub>2</sub>), fetal wellbeing should be established once contractions are detected or reported. [C]

For women who are healthy and have had an otherwise uncomplicated pregnancy, the assessment of foetal wellbeing following the administration of vaginal prostaglandins should comprise an initial assessment with continuous electronic foetal monitoring and, once normality is confirmed, intermittent monitoring can be used. [C]

Following instillation of prostaglandin agents, the woman should be advised to lie down for at least 30 minutes, followed by continuous electronic monitoring of the foetal heart until fetal wellbeing is established. This need not be initiated until contractions are detected or reported.

Where oxytocin is being used for induction or augmentation of labour, continuous electronic fetal monitoring should be used. [C]

When oxytocin is employed following prostaglandin agents, it should not be started within six hours of the administration of prostaglandins. This is as a result of the potential uterotonic effect of combining oxytocin with prostaglandin agents.

*Royal College of Obstetricians and Gynaecologists (RCOG). Induction of labour. Evidence-based Clinical Guideline Number 9. RCOG Press, 2001.*

**Possible Complications of Induced Labour**

- Hyper-stimulation/uterus rupture
- Foetal state abnormalities
- Postpartum haemorrhage caused by uterus hypotonus
- Umbilical cord prolapse
- Placenta detachment
- Infection
- Increasing number of assisted deliveries

Geoffrey Chamberlain, Luke Zander, 1999

USAID  
EUROPE

### Slide 6MO-25 Possible Complications of Induced Labour

Stripping membranes is associated with bleeding from undiagnosed placenta previa or low-lying placenta, and accidental amniotomy.

Uterine hyperactivity and foetal heart rate decelerations have been reported in association with nipple stimulation.

Amniotomy used alone can be associated with unpredictable and sometimes long intervals before the onset of contractions, but is effective if combined with early

oxytocin infusion. Other potential risks of amniotomy include prolapse of the umbilical cord, chorioamnionitis, significant umbilical cord compression, and rupture of vasa previa.

Increased maternal and foetal infection have been reported in connection with the use of laminaria and hygroscopic dilators when compared with the PGE2 analogues.

The intracervical PGE2 gel has a 1% rate of uterine hyperstimulation, while the intravaginal PGE2 gel or vaginal insert is associated with a 5% rate. Maternal side effects of low-dose PGE2 (fever, vomiting, and diarrhea) in contrast to high doses, are uncommon. The use of PGE2 vaginal suppositories in the third trimester increases the risk of uterine rupture. The manufacturers recommend that caution be exercised when using PGE2 in patients with glaucoma, severe hepatic or renal dysfunction, or asthma.

Tachysystole and hyperstimulation are increased with a 50 micrograms or greater dose of misoprostol. The use of misoprostol in women with prior caesarean birth has been associated with an increase in uterine rupture. Misoprostol use for second-trimester pregnancy termination also has been associated with uterine rupture, especially when used with oxytocin infusion. An increase in meconium-stained amniotic fluid also has been reported with misoprostol use. The occurrence of complications with misoprostol use appears to be dose-dependent. Oral misoprostol is associated with fewer abnormal fetal heart rate patterns and episodes of uterine hyperstimulation when compared with vaginal administration, but there is not yet enough data to support oral administration as an alternative method.

The side effects of oxytocin use are principally dose related; uterine hyperstimulation and subsequent fetal heart rate deceleration are the most common side effects. Hyperstimulation may result in abruptio placentae or uterine rupture (a rare complication). Water intoxication can occur with high concentrations of oxytocin infused with large quantities of hypotonic solutions. The antidiuretic effect usually is observed only after prolonged administration with at least 40 mU of oxytocin per minute. A rapid intravenous injection of oxytocin may cause hypotension.

In case of hyperactivity of uterus contractions (especially with non-reassuring foetal heart-beat rate) the abnormal activity of uterus contractions should be terminated. In case of prostaglandin administration (vaginally or endocervically) it's necessary to remove the remains of the medication and stop oxytocin administration; place the mother on left side and supply oxygen with the help of the mask.

*Murray W. Enkin et al. A guide to effective care in pregnancy and childbirth. Oxford University Press, 3<sup>rd</sup> Edition, 2000.*

*American College of Obstetricians and Gynecologists (ACOG). Induction of labor. Washington (DC): American College of Obstetricians and Gynecologists (ACOG), 1999 Nov, No. 10.*



Geoffrey Chamberlain, Luke Zander. *ABC of labour care: Induction. BMJ, 1999, 318, 995-998.*

Royal College of Obstetricians and Gynaecologists (RCOG). *Induction of labour. Evidence-based Clinical Guideline Number 9. RCOG Press, 2001.*

**Uterine Hypercontractility with Induction Agents**

- Hypercontractility with a suspicious or pathological cardiotocograph (CTG) secondary to oxytocin infusions
  - Oxytocin infusion should be decreased or discontinued
- Hypercontractility and abnormal FHR patterns (not secondary to oxytocin infusion)
  - Tocolysis should be considered
    - Subcutaneous terbutaline 0.25 milligrams
- Hypercontractility and suspected or confirmed acute foetal compromise
  - Delivery should be accomplished as soon as possible
    - Ideally, should be accomplished within 30 minutes

RCOG, 2001

**Slide 6MO-26 Uterine Hypercontractility with Induction Agents**

**Uterine hypercontractility (with or without FHR changes):**

Uterine hypercontractility without FHR changes included uterine tachysystole (more than five contractions per ten minutes for at least 20 minutes) and uterine hypersystole/ hypertonus (a contraction lasting at least two minutes).

Uterine hyperstimulation with FHR changes denoted uterine hyperstimulation syndrome (tachysystole or hypersystole

with FHR changes such as persistent decelerations, tachycardia or decreased short term variability).

In cases of uterine hypercontractility with a suspicious or pathological cardiotocograph (CTG) secondary to oxytocin infusions, the oxytocin infusion should be decreased or discontinued. [B]

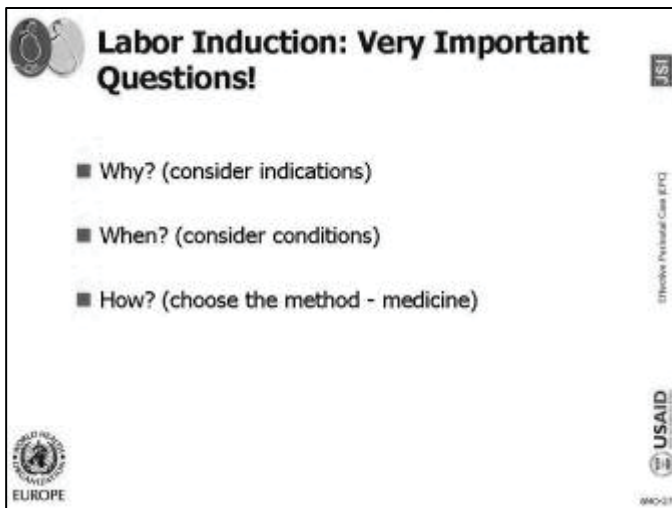
In the presence of abnormal FHR patterns and uterine hypercontractility (not secondary to oxytocin infusion), tocolysis should be considered. [A]

A suggested regimen is subcutaneous terbutaline 0.25 milligrams. [A]

In cases of suspected or confirmed acute foetal compromise, delivery should be accomplished as soon as possible, taking into account the severity of the FHR abnormality and relevant maternal factors. According to accepted standard this should be accomplished within 30 minutes. [B]

If prostaglandin only has been used, removal of the remainder of the agent may help to alleviate the uterine hypercontractility. However, irrigation of the cervix or vagina is not beneficial.

Royal College of Obstetricians and Gynaecologists (RCOG). *Induction of labour. Evidence-based Clinical Guideline Number 9. RCOG Press, 2001.*



**Labor Induction: Very Important Questions!**

- Why? (consider indications)
- When? (consider conditions)
- How? (choose the method - medicine)

25  
Effective Physical Care (EPC)  
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EUROPE  
6MO-27

**Slide 6MO-27 Labor Induction  
Very Important Questions!**

Inducing labour should not it be a quick decision. When inducing labour there should be clear reasons, conditions and a type of medication with regard to biological preparedness of the cervix.

## Oxytocin Infusion Rates for Induction/Augmentation of Labour

### 5 Examples of Different Oxytocin Solution Concentrations

#### Example 1

**Oxytocin Solution: 2.5 units oxytocin in 500 mL dextrose or normal saline**

**Concentration: 5mU/mL**

**IV tubing drip rate: 1mL = 20 drops**

Oxytocin Solution Concentration	Oxytocin Dose mU/minute	Drops Per minute	Volume Infused per Hour (mL/hour)
2.5 units in 500 mL dextrose OR normal Saline (5mU/mL)	1 mU	4	12 mL/hour
	2 mU	8	24 mL/hour
	3 mU	12	36 mL/hour
	4 mU	16	48 mL/hour
	5 mU	20	60mL/hour
	6 mU	24	72 mL/hour
	7 mU	28	84 mL/hour
	8 mU	32	96 mL/hour
	9 mU	36	108 mL/hour
	10 mU	40	120 mL/hour
	11 mU	44	132 mL/hour
	12 mU	48	144 mL/hour
	13 mU	52	156 mL/hour
	14 mU	56	168 mL/hour
	15 mU	60	180 mL/hour
	16 mU	64	192 mL/hour
	17 mU	68	204 mL/hour
	18 mU	72	216 mL/hour
	19 mU	76	228 mL/hour

**Example 2**

**Oxytocin Solution: 5 units oxytocin in 500 mL dextrose or normal saline**

**Concentration: 10 mU/mL**

**IV tubing drip rate: 1mL = 20 drops**

<b>Oxytocin Solution Concentration</b>	<b>Oxytocin Dose mU/minute</b>	<b>Drops Per minute</b>	<b>Volume Infused per Hour (mL/hour)</b>
5 units in 500 mL dextrose OR normal Saline (10mU/mL)	1 mU	2	6 mL/hour
	2 mU	4	12 mL/hour
	3 mU	6	18 mL/hour
	4 mU	8	24 mL/hour
	5 mU	10	30 mL/hour
	6 mU	12	36 mL/hour
	7 mU	14	42 mL/hour
	8 mU	16	48 mL/hour
	9 mU	18	54 mL/hour
	10 mU	20	60 mL/hour
	11 mU	22	66 mL/hour
	12 mU	24	72 mL/hour
	13 mU	26	78 mL/hour
	14 mU	28	84 mL/hour
	15 mU	30	90 mL/hour
	16 mU	32	96 mL/hour
	17 mU	34	102 mL/hour
	18 mU	36	108 mL/hour
	19 mU	38	114 mL/hour
	20 mU	40	120 mL/hour

**Example 3**

**Oxytocin Solution: 10 units oxytocin in 500 mL dextrose or normal saline**

**Concentration: 20 mU/mL**

**IV tubing drip rate: 1mL = 20 drops**

Oxytocin Solution Concentration	Oxytocin Dose mU/minute	Drops Per minute	Volume Infused per Hour (mL/hour)
10 units in 500 mL dextrose OR normal Saline (20mU/mL)	1 mU	1	3 mL/hour
	2 mU	2	6 mL/hour
	3 mU	3	9 mL/hour
	4 mU	4	12 mL/hour
	5 mU	5	15 mL/hour
	6 mU	6	18 mL/hour
	7 mU	7	21 mL/hour
	8 mU	8	24 mL/hour
	9 mU	9	27 mL/hour
	10 mU	10	30 mL/hour
	11 mU	11	33 mL/hour
	12 mU	12	36 mL/hour
	13 mU	13	39 mL/hour
	14 mU	14	42 mL/hour
	15 mU	15	45 mL/hour
	16 mU	16	48 mL/hour
	17 mU	17	51 mL/hour
	18 mU	18	54 mL/hour
	19 mU	19	57 mL/hour
	20 mU	20	60 mL/hour

**Example 4****Oxytocin Solution: 5 units oxytocin in 1000 mL dextrose or normal saline****Concentration: 5 mU/mL****IV tubing drip rate: 1mL = 20 drops**

<b>Oxytocin Solution Concentration</b>	<b>Oxytocin Dose mU/minute</b>	<b>Drops Per minute</b>	<b>Volume Infused per Hour (mL/hour)</b>
5 units in 1000 mL dextrose OR normal Saline (5mU/mL)	1 mU	4	12 mL/hour
	2 mU	8	24 mL/hour
	3 mU	12	36 mL/hour
	4 mU	16	48 mL/hour
	5 mU	20	60mL/hour
	6 mU	24	72 mL/hour
	7 mU	28	84 mL/hour
	8 mU	32	96 mL/hour
	9 mU	36	108 mL/hour
	10 mU	40	120 mL/hour
	11 mU	44	132 mL/hour
	12 mU	48	144 mL/hour
	13 mU	52	156 mL/hour
	14 mU	56	168 mL/hour
	15 mU	60	180 mL/hour
	16 mU	64	192 mL/hour
	17 mU	68	204 mL/hour
	18 mU	72	216 mL/hour
	19 mU	76	228 mL/hour
	20 mU	80	240 mL/hour

**Example 5**

**Oxytocin Solution: 10 units oxytocin in 1000 mL dextrose or normal saline**

**Concentration: 10 mU/mL**

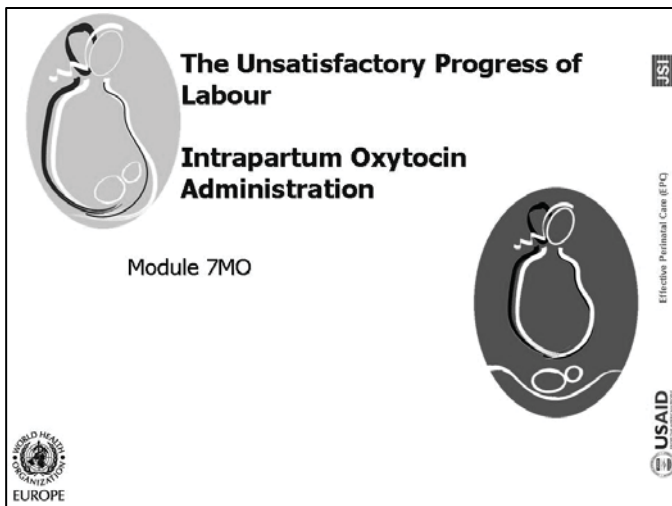
**IV tubing drip rate: 1mL = 20 drops**

Oxytocin Solution Concentration	Oxytocin Dose mU/minute	Drops Per minute	Volume Infused per Hour (mL/hour)
10 units in 1000mL dextrose OR normal Saline (10mU/mL)	1 mU	2	6 mL/hour
	2 mU	4	12 mL/hour
	3 mU	6	18 mL/hour
	4 mU	8	24 mL/hour
	5 mU	10	30 mL/hour
	6 mU	12	36 mL/hour
	7 mU	14	42 mL/hour
	8 mU	16	48 mL/hour
	9 mU	18	54 mL/hour
	10 mU	20	60 mL/hour
	11 mU	22	66 mL/hour
	12 mU	24	72 mL/hour
	13 mU	26	78 mL/hour
	14 mU	28	84 mL/hour
	15 mU	30	90 mL/hour
	16 mU	32	96 mL/hour
	17 mU	34	102 mL/hour
	18 mU	36	108 mL/hour
	19 mU	38	114 mL/hour
	20 mU	40	120 mL/hour

# **The Unsatisfactory Progress of Labour Intrapartum Oxytocin Administration**







**The Unsatisfactory Progress of Labour**

**Intrapartum Oxytocin Administration**

Module 7MO

WHO  
EUROPE

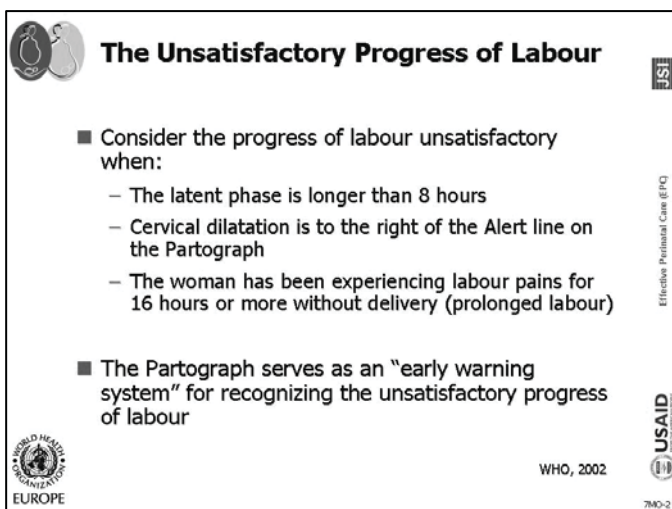
USAID

Effective Perinatal Care (EPC)

### Slide 7MO-1 The Unsatisfactory Progress of Labour Intrapartum Oxytocin Administration

Learning objectives:

- Understand the importance of recognizing the when labour is not progressing satisfactorily
- Know the methods of labour augmentation
- Know how to augment labour with oxytocin and understand the dangers related to this procedure
- Know when to stop augmentation.



**The Unsatisfactory Progress of Labour**

- Consider the progress of labour unsatisfactory when:
  - The latent phase is longer than 8 hours
  - Cervical dilatation is to the right of the Alert line on the Partograph
  - The woman has been experiencing labour pains for 16 hours or more without delivery (prolonged labour)
- The Partograph serves as an “early warning system” for recognizing the unsatisfactory progress of labour

WHO, 2002

USAID

Effective Perinatal Care (EPC)

7MO-2

### Slide 7MO-2 The Unsatisfactory Progress of Labour

In order to define the unsatisfactory progress of labour (abnormal labour), a definition of normal labour must be understood. **Normal progress of labour is defined as uterine contractions that result in progressive effacement and dilation of the cervix and foetal head descent.** By following thousands of labours resulting in uncomplicated vaginal births, certain time limits and progress milestones have been identified. Failure to meet these milestones defines abnormal labour, which suggests an increased risk

for an unfavourable outcome. Thus, abnormal labour alerts the midwife and obstetrician to consider alternative methods for a successful birth that minimizes risks to both mother and infant.

Friedman's original research in 1954 defined 3 stages of labour. The first stage starts with uterine contractions leading to complete cervical dilation and is divided into latent and active phases. In the latent phase, there are irregular uterine contractions but slow and gradual cervical effacement and dilation. The active phase is indicated by an increased rate of cervical dilation and foetal descent. The active phase usually starts at 3-4 cm of cervical dilation and is subdivided into the acceleration, maximum slope and deceleration phases.

The second stage of labour begins with complete cervical dilation and ends with the birth of the infant.

**Abnormal labour constitutes any findings that fall outside the accepted normal labour curve.**

**The WHO Partograph is an effective tool to help caregivers recognize early that labour is not progressing well. It helps them make the appropriate decisions.**

SIGNS:

- The latent phase is longer than 8 hours.
- Cervical dilatation is to the right of the Alert line on the Partograph.
- The woman has been experiencing labour pains for 12 hours or more without delivery (prolonged labour).

*Managing Complications in Pregnancy and Childbirth A guide for midwives and doctors, WHO, 2002*

Saju Joy, Deborah Lyon. *Diagnosis of Abnormal Labor eMedicine, August 6, 2005*  
<http://www.emedicine.com/>

*Preventing prolonged labour: a practical guide. The Partograph. WHO, 1994*

**Diagnosing When Labour is Progressing Unsatisfactorily**

- False labour
- Prolonged latent phase
- Prolonged active phase
  - Cephalopelvic disproportion/Obstructed labour
  - Inadequate uterine activity
  - Malpresentation or malposition
- Prolonged expulsive phase

WHO, 2002

**Slide 7MO-3 Diagnosing When Labour is Progressing Unsatisfactorily**

WHO classification of unsatisfactory progress of labour is presented

*Managing Complications in Pregnancy and Childbirth A guide for midwives and doctors, WHO, 2002; 2005*

**False Labour**

- Findings
  - Cervix not dilated
  - No palpable contractions/infrequent contractions
- Management
  - Re-examine after 4 hours for cervical changes
  - Confirm labour if there is effacement and dilatation
  - If there is no change, the diagnosis is false labour

WHO, 2002

**Slide 7MO-4 False Labour**

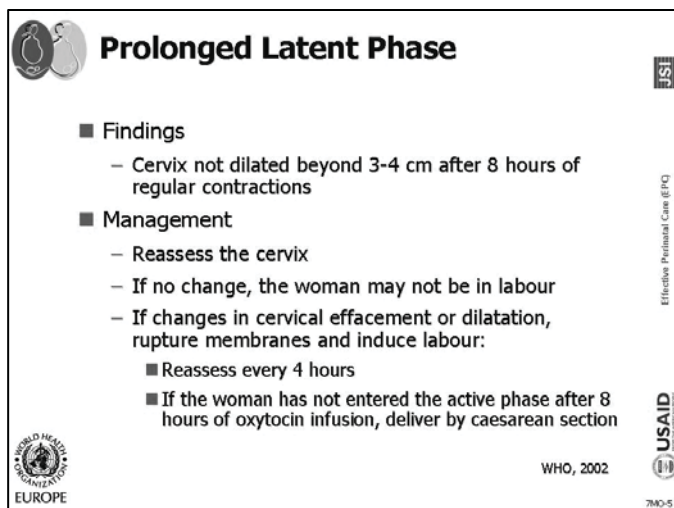
If the cervix is not dilated on first examination, it may not be possible to diagnose labour.

If contractions persist, re-examine the woman after 4 hours for cervical changes. If during re-examination there is effacement and dilatation, this means that the woman is in labour; if there is no change, the diagnosis is false labour.

Examine for urinary tract infection or other infections, or ruptured membranes, and treat accordingly.

If none of these are present, discharge the woman and encourage her to return if signs of labour recur.

*Managing Complications in Pregnancy and Childbirth A guide for midwives and doctors, WHO, 2002; 2005*



**Prolonged Latent Phase**

- Findings
  - Cervix not dilated beyond 3-4 cm after 8 hours of regular contractions
- Management
  - Reassess the cervix
  - If no change, the woman may not be in labour
  - If changes in cervical effacement or dilatation, rupture membranes and induce labour:
    - Reassess every 4 hours
    - If the woman has not entered the active phase after 8 hours of oxytocin infusion, deliver by caesarean section

WHO, 2002

### Slide 7MO-5 Prolonged Latent Phase

The diagnosis of a prolonged latent phase is made retrospectively.

When contractions cease, the woman is said to have had false labour. When contractions become regular and dilatation progresses beyond 4 cm, the woman is said to have been in the latent phase.

**Misdiagnosing false labour or prolonged latent phase leads to unnecessary induction or augmentation, which may fail. This may lead to unnecessary caesarean section and amnionitis.**

If a woman has been in the latent phase for more than 8 hours, and there is little sign of progress, reassess the situation by assessing the cervix.

If there has been no change in cervical effacement or dilatation and there is no foetal distress, review the diagnosis. The woman may not be in labour.

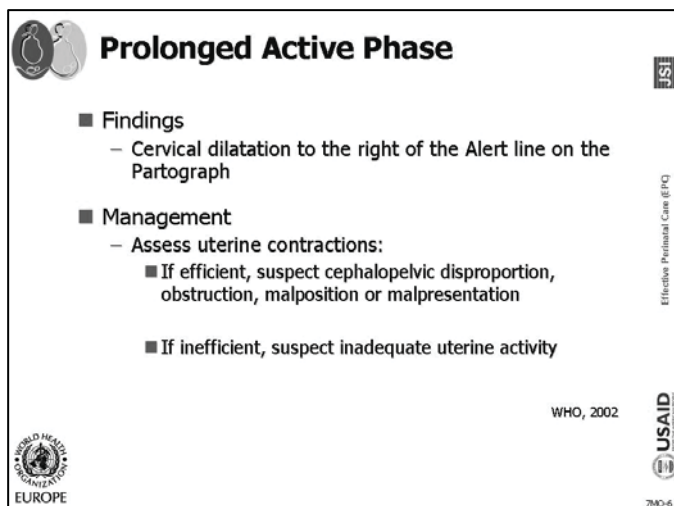
If there has been a change in cervical effacement or dilatation, rupture the membranes with an amniotic hook or a Kocher clamp and induce labour using oxytocin or prostaglandins:

- Reassess every 4 hours
- If the woman has not entered the active phase after 8 hours of oxytocin infusion, deliver by caesarean section.

If there are signs of infection (fever, foul-smelling vaginal discharge):

- Augment labour immediately with oxytocin
- Give a combination of antibiotics until delivery: ampicillin 2 g IV every 6 hours; PLUS gentamicin 5 mg/kg body weight IV every 24 hours
- If the woman delivers vaginally, discontinue antibiotics postpartum
- If the woman has a caesarean section, continue antibiotics PLUS give metronidazole 500 mg IV every 8 hours until the woman is fever-free for 48 hours

*Managing Complications in Pregnancy and Childbirth A guide for midwives and doctors, WHO, 2002; 2005*



**Prolonged Active Phase**

- Findings
  - Cervical dilatation to the right of the Alert line on the Partograph
- Management
  - Assess uterine contractions:
    - If efficient, suspect cephalopelvic disproportion, obstruction, malposition or malpresentation
    - If inefficient, suspect inadequate uterine activity

WHO, 2002

### Slide 7MO-6 Prolonged Active Phase

Assess uterine contractions:

- If contractions are inefficient (less than three contractions in 10 minutes, each lasting less than 40 seconds), suspect inadequate uterine activity.

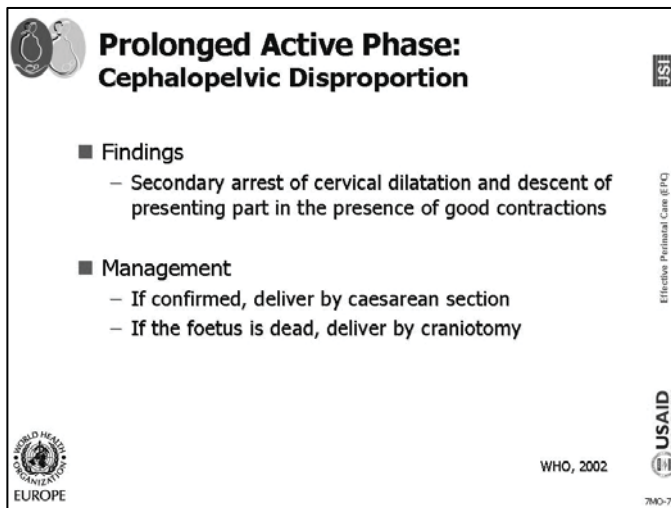
If there are no signs of cephalopelvic disproportion or obstruction, and the membranes are intact, rupture the membranes with an amniotic hook or a Kocher clamp.

General methods of labour support may improve contractions and accelerate progress e.g. upright position; companion presence; non-pharmacological methods for pain

relief; fluids and food; sensitive communication and physical care; give real information, listen to a woman and respect of her wishes.

- If contractions are efficient (three contractions in 10 minutes, each lasting more than 40 seconds) suspect cephalopelvic disproportion, obstruction, malposition or malpresentation

*Managing Complications in Pregnancy and Childbirth A guide for midwives and doctors, WHO, 2002; 2005*



**Prolonged Active Phase: Cephalopelvic Disproportion**

- Findings
  - Secondary arrest of cervical dilatation and descent of presenting part in the presence of good contractions
- Management
  - If confirmed, deliver by caesarean section
  - If the foetus is dead, deliver by craniotomy

WHO, 2002

### Slide 7MO-7 Prolonged Active Phase: Cephalopelvic disproportion

Cephalopelvic disproportion is a secondary arrest of cervical dilatation and descent of presenting part in presence of good contractions.

Cephalopelvic disproportion occurs because the foetus is too large or the maternal pelvis is too small.

If labour persists with cephalopelvic disproportion, it may become arrested or obstructed. The best test to determine if a pelvis is adequate is a trial of labour.

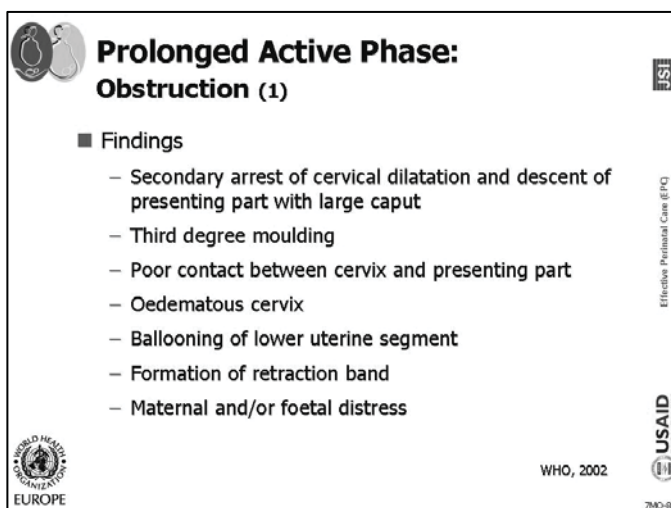
Clinical pelviometry is of limited value.

If cephalopelvic disproportion is confirmed, deliver by caesarean section.

If the foetus is dead:

- Deliver by craniotomy
- If the doctor is not proficient in craniotomy, deliver by caesarean section

*Managing Complications in Pregnancy and Childbirth A guide for midwives and doctors, WHO, 2002; 2005*



**Prolonged Active Phase: Obstruction (1)**

- Findings
  - Secondary arrest of cervical dilatation and descent of presenting part with large caput
  - Third degree moulding
  - Poor contact between cervix and presenting part
  - Oedematous cervix
  - Ballooning of lower uterine segment
  - Formation of retraction band
  - Maternal and/or foetal distress

WHO, 2002

### Slide 7MO-8 Prolonged Active Phase: Obstruction (1)

Findings to confirm obstruction:

- secondary arrest of cervical dilatation and descent of presenting part with large caput
- third degree moulding
- poor contact between cervix and presenting part
- oedematous cervix
- ballooning of lower uterine segment
- formation of retraction band
- maternal and foetal distress

*Managing Complications in Pregnancy and Childbirth A guide for midwives and doctors, WHO, 2002; 2005*

**Prolonged Active Phase: Obstruction (2)**

■ Management

- Vacuum extraction
  - Foetus is alive, cervix is fully dilated and foetal head is at 0 station or below
- Caesarean section
  - Foetus is alive but the cervix is not fully dilated

OR

- Foetal head is too high for vacuum extraction
- Craniotomy
  - Foetus is dead

WHO, 2002

### Slide 7MO-9 Prolonged Active Phase: Obstruction (2)

Rupture of an unscarred uterus is usually caused by obstructed labour.

If the fetus is alive, the cervix is fully dilated and the head is at 0 station or below, deliver by vacuum extraction.

If there is an indication for vacuum extraction and symphysiotomy for relative obstruction and the foetal head is at -2 station:

- deliver by vacuum extraction and

symphysiotomy

- if the doctor is not proficient in symphysiotomy, deliver by caesarean section

If the foetus is alive, but the cervix is not fully dilated, or if the fetal head is too high for vacuum extraction, deliver by caesarean section.

If the foetus is dead:

- deliver by craniotomy
- if the operator is not proficient in craniotomy, deliver by caesarean section

*Managing Complications in Pregnancy and Childbirth A guide for midwives and doctors, WHO, 2002; 2005*

**Prolonged Active Phase: Inadequate Uterine Activity**

Findings

- Less than three contractions in 10 minutes, each lasting less than 40 seconds
- Cervical dilatation to the right of the Alert line on the Partograph

Management: Labour augmentation

Artificial rupture of membranes

- Upright position and labour support
- If no change in one hour start oxytocin

Oxytocin infusion

WHO, 2002; 2005

### Slide 7MO-10 Prolonged Active Phase: Inadequate Uterine Activity

If contractions are inefficient, and cephalopelvic disproportion and obstruction have been excluded, the most probable cause of prolonged labour is inadequate uterine activity.

Inefficient contractions are less common in a multigravida than in a primigravida. Hence, every effort should be made to rule out disproportion in a multigravida before augmenting with oxytocin.

Ensure good communications and support by the staff. Explain the options, risks and benefits of augmenting labour with the woman. Explain all procedures, seek permission and discuss the findings with the woman. (MCP, 2005, p.C-57-58).

- Rupture the membranes with an amniotic hook or a Kocher clamp.
  - Encourage upright position and continued labour support
  - If good labour is not established one hour after ARM, begin oxytocin infusion
- OR
- Rupture the membranes with an amniotic hook or a Kocher clamp and augment labour using oxytocin.
- Reassess progress by vaginal examination 2 hours after a good contraction pattern with strong contractions has been established

- If there is no progress between examinations, deliver by caesarean section
- If progress continues, continue oxytocin infusion and re-examine after 2 hours

Continue to follow the progress of labour carefully.

*Managing Complications in Pregnancy and Childbirth A guide for midwives and doctors, WHO, 2002; 2005*

**Prevention of Inadequate Uterine Activity**

Comfort during labour, including:

- Food consumption
- Liquid consumption
- Individual labour and birth room, etc.

Companion presence during labour and birth

Vertical position, especially walking during labour

Routine early amniotomy

- Beyond 5 cm of cervical dilatation

Murray W. Enkin, 2000

WHO EUROPE

USAID

Effective Perinatal Care (EPC)

7MO-11

### Slide 7MO-11 Prevention of Inadequate Uterine Activity

Protracted labour has been recognized as a problem for centuries, and bewildering variety of treatments have been proposed to correct this condition.

In the past, proposed remedies have included homeopathic medications, various spasmodic drugs, sparteine sulphate, estrogens, relaxin, nipple stimulation, intracervical injections of hyaluronidase, vibration of the cervix and acupuncture.

Five controlled trials (over 8000 women) have compared the effects of labour and birth in home-like institutional settings, i.e. birth rooms or hospital birth centres, to that in a conventional hospital labour ward. The women allocated to labour and give birth in a home-like birth settings used, on average, less pain medication during labour, were slightly less likely to have their labours augmented with oxytocin and had a slightly greater chance of being very satisfied with their birth experience.

Because of the clear benefits and the absence of known risks associated with intrapartum support, every effort should be made to ensure that all labouring women receive support, not only from those close to them, but also from experienced caregivers. The presence of a supportive companion and ambulation during labour has been shown to result in shorter labours and a reduction in the use of oxytocin. The support that should be routinely offered to women should include the continuous presence of a supportive companion (when the mother wishes), the provision of hands-on comfort and verbal encouragement.

The results of several studies suggest that the supine position can adversely affect both the condition of the foetus and the progression of labour by interfering with the uterine blood supply and by compromising the efficiency of uterine contractions. Allowing the mother to change her position frequently is an important way to avoid the adverse effects lying down during labour. No evidence from controlled studies suggests that the supine position should be encouraged.

*Murray W. Enkin et al, A guide to effective care in pregnancy and childbirth, 3-rd ed, 2000*

**Routine Early Amniotomy**

Reduces:

- Labour duration of between 60 and 120 minutes
- Likelihood of a 5 minute Apgar score less than 7
- Need in further labour augmentation with oxytocin

Increases the risk of:

- Caesarean delivery
- Umbilical cord prolapse
- Abnormal foetal heart rate
- Transmission of specific maternal infections, such as HIV

Routine Early Amniotomy is not recommended

Fraser WD et al, 2000

WHO  
USAID  
Effective Perinatal Care (EPC)  
7MO-12

## Slide 7MO-12 Routine Early Amniotomy

Early amniotomy (artificial rupture of the amniotic membranes beyond 5 cm of cervical dilatation) has been advocated to prevent unsatisfactory progress of labour for women in spontaneous labour.

The influence of elective amniotomy on foetal heart rate patterns and the course of labour in term patients was the aim of meta-analysis: a randomised trial comparing a policy of early with selective amniotomy in uncomplicated labour at term and randomized controlled trial and meta-

analysis of active management of labour were analyzed using Mantel-Haenszel method (fixed effect model) in meta-analysis.

**RESULTS:** (1) The routine early amniotomy can shorten 94.90 min of the first stage of labour, 95% CI (-119.17, -70.52). (2) The OR for caesarean section was 1.25, 95% CI (0.99-1.57), for instrumental vaginal delivery was 1.05, 95% CI (0.90-1.24). (3) There was no difference in abnormal foetal heart rate at first stage (OR = 0.95, 95% CI: 0.75-1.21), but there was increased abnormal foetal heart rate at second stage (OR = 1.28, 95% CI: 1.02-1.61). (4) The frequency of stained amniotic fluid and abnormal Apgar scores at 1 minute was not significantly different [OR = 1.17, 95% CI (0.78-1.73); OR = 0.71, 95% CI: (0.49-1.03)].

**CONCLUSIONS:** Routine early amniotomy appears to be associated with both benefits and risks. Beneficial effects include a reduction in labour duration and a possible decrease in the frequency of abnormal Apgar scores at one minute. Risks include an increase in abnormal foetal heart rate at second stage and a possible rise in the caesarean section rate.

*Li N, Wang Y, Zhou H. Effects of routine early amniotomy on labor and health status of foetus and neonate: a meta-analysis. Zhonghua Fu Chan Ke Za Zhi. 2006 Jan;41(1):16-9.*

In HIV- infected pregnant women, observational studies indicate that ruptured membranes more than 4 hours before delivery increases the risk of neonatal infection.

A number of undesirable consequences have been attributed to artificial rupture of membranes. These include: pain and discomfort; intra-uterine infections (occasionally leading to septicaemia); early decelerations in the foetal heart rate; umbilical cord prolapse and bleeding, either from foetal vessels in the membranes, from the cervix, or from the placental site. Serious complications, fortunately, are rare.

The view that amniotomy predisposes to foetal heart-rate decelerations, is largely based on potential cord compression due to diminished amniotic fluid volume, but there is no evidence that this risk is important enough to be a main determinant in choosing a method for the inducing of labour.

*Murray W. Enkin et al, A guide to effective care in pregnancy and childbirth. Oxford University Press, 3<sup>rd</sup> Edition, 2000.*

In areas of high HIV prevalence it is prudent to leave the membranes intact for as long as possible to reduce perinatal transmission of HIV.

*Managing Complications in Pregnancy and Childbirth. A guide for midwives and doctors, WHO, 2002*



Early amniotomy was associated with a reduction in labour duration of between 60 and 120 minutes. There was a marked trend toward an increase in the risk of caesarean delivery: OR = 1.26; 95% Confidence Interval (CI) = 0.96-1.66. The likelihood of a 5 minute Apgar score less than 7 was reduced in association with early amniotomy (OR = 0.54; 95% CI = 0.30-0.96). Groups were similar with respect to other indicators of neonatal status (arterial cord pH, NICU admissions). There was a statistically significant association of amniotomy with a decrease in the use of oxytocin: OR = 0.79; 95% CI = 0.67-0.92.

**REVIEWER'S CONCLUSIONS:** Routine early amniotomy is associated with both benefits and risks. Benefits include a reduction in the duration of labour and a possible reduction in abnormal 5-minute Apgar scores. The meta-analysis provides no support for the hypothesis that routine early amniotomy reduces the risk of caesarean delivery. Indeed there is a trend toward an increase in caesarean sections. An association between early amniotomy and caesarean delivery for foetal distress is noted in one large trial.

**This suggests that amniotomy should be reserved for women with an abnormal progress of labour.**

*Fraser WD, Turcot L, Krauss I, Brisson-Carrol G. Amniotomy for shortening spontaneous labour. Cochrane Database Syst Rev. 2000, Issue 2*

*G Brisson-Carroll, W Fraser, G Breart, I Krauss, and J Thornton. The effect of routine early amniotomy on spontaneous labor: a meta-analysis Obstetrics & Gynecology 1996;87:891-896*

**Artificial Rupture of Membranes (1)**

- Membrane rupture sets off the following chain of events:
  - Amniotic fluid is expelled
  - Uterine volume is decreased
  - Prostaglandins are produced, stimulating labour
  - Uterine contractions become stronger

WHO, 2002

7MO-13

### Slide 7MO-13 Artificial Rupture of Membranes (1)

If the membranes are intact, it is recommended practice in both induction and augmentation of labour to first perform an artificial rupture of the membranes.

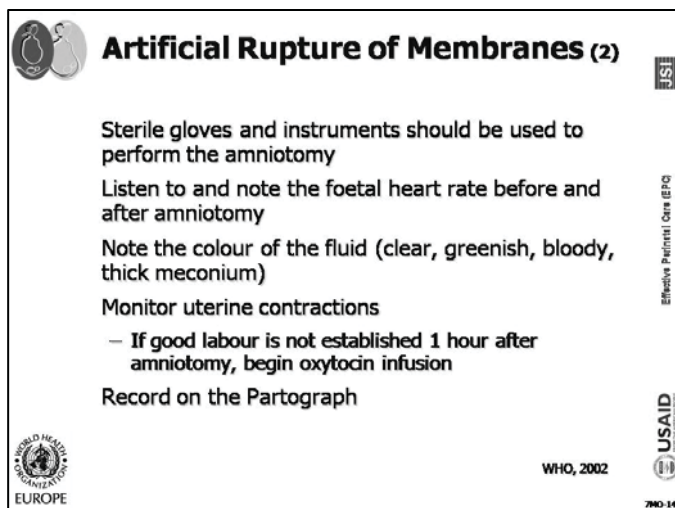
In some cases, this is all that is needed to induce labour. Membrane rupture, whether spontaneous or artificial, often sets off the following chain of events:

- Amniotic fluid is expelled
- Uterine volume is decreased
- Prostaglandins are produced that

stimulate labour

- Uterine contractions begin (if the woman is not in labour) or become stronger (if she is already in labour)

*Managing Complications in Pregnancy and Childbirth A guide for midwives and doctors, WHO, 2002*



**Artificial Rupture of Membranes (2)**

Sterile gloves and instruments should be used to perform the amniotomy

Listen to and note the foetal heart rate before and after amniotomy

Note the colour of the fluid (clear, greenish, bloody, thick meconium)

Monitor uterine contractions

- If good labour is not established 1 hour after amniotomy, begin oxytocin infusion

Record on the Partograph

WHO, 2002

USAID

7MO-14

Effective Perinatal Care (EPC)

WORLD HEALTH ORGANIZATION EUROPE

### Slide 7MO-14 Artificial Rupture of Membranes (2)

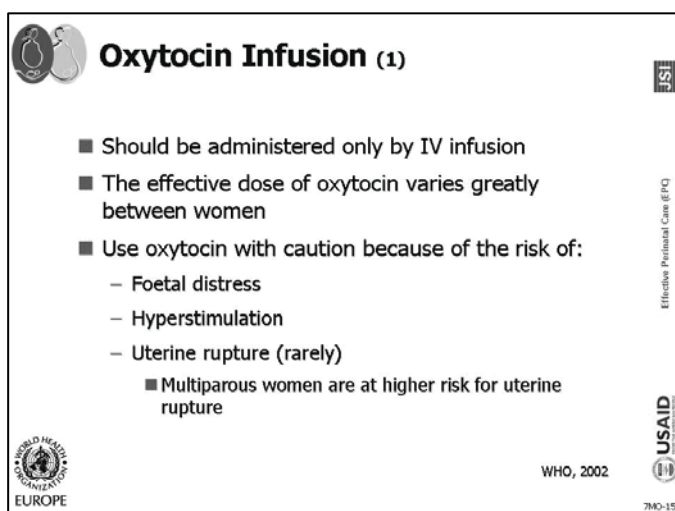
- Listen to and note the foetal heart rate.
- Ask the woman to lie on her back with her legs bent, feet together and knees apart.
- Wearing sterile gloves use one hand to examine the cervix and note the consistency, position, effacement and dilatation.
- Use the other hand to insert an amniotic hook or a Kocher clamp into the vagina.

- Guide the clamp or hook towards the membranes along the fingers inserted in the vagina.
- Place two fingers against the membranes and gently rupture the membranes with the instrument. Allow the amniotic fluid to drain slowly around the fingers.
- Note the colour of the fluid (clear, greenish, bloody). If thick meconium is present, suspect foetal status (preferably using continuous tocography).
- After ARM, listen to the foetal heart rate during and after a contraction. If the foetal heart rate is abnormal (less than 100 or more than 180 beats per minute), suspect foetal distress.
- Record findings on the WHO Partograph
- If it is not anticipated that delivery will happen within 18 hours, give prophylactic antibiotics in order to help reduce the possibility of Group B streptococcus infection in the neonate:
  - penicillin G 2 million units IV
  - OR ampicillin 2 g IV, every 6 hours until delivery
  - If there are no signs of infection after delivery, discontinue antibiotics

**Note:** In areas of high HIV prevalence it is prudent to leave the membranes intact for as long as possible to reduce perinatal transmission of HIV.

**If good labour is not established 1 hour after ARM, begin oxytocin infusion.**

*Managing Complications in Pregnancy and Childbirth A guide for midwives and doctors, WHO, 2002*



**Oxytocin Infusion (1)**

- Should be administered only by IV infusion
- The effective dose of oxytocin varies greatly between women
- Use oxytocin with caution because of the risk of:
  - Foetal distress
  - Hyperstimulation
  - Uterine rupture (rarely)
    - Multiparous women are at higher risk for uterine rupture

WHO, 2002

USAID

7MO-15

Effective Perinatal Care (EPC)

WORLD HEALTH ORGANIZATION EUROPE

### Slide 7MO-15 Oxytocin Infusion (1)

The effective dose of oxytocin varies greatly among women.

Cautiously administer oxytocin in IV fluids (dextrose or normal saline), gradually increasing the rate of infusion until good labour is established (three contractions in 10 minutes, each lasting more than 40 seconds).

Use oxytocin with great caution as foetal distress can occur from hyperstimulation, and though it is rare, uterine rupture can occur. Multiparous women are at higher

risk for uterine rupture.

When oxytocin infusion results in a good labour pattern, maintain the same rate until delivery.

*Managing Complications in Pregnancy and Childbirth. A guide for midwives and doctors, WHO, 2002*

**Oxytocin Infusion (2)**

- Carefully observe women receiving oxytocin
  - Pulse and blood pressure
  - Contractions
  - Foetal heart rate
  - Rate of oxytocin infusion
- Record findings on Partograph

WHO, 2002

- Electronic foetal monitoring is recommended if oxytocin is used

RCOG, 2001

7MO-16

### Slide 7MO-16 Oxytocin Infusion (2)

Carefully observe women receiving oxytocin.

Monitor the woman's pulse, blood pressure and contractions and check the fetal heart rate.

Record the following observations on a partograph every 30 minutes:

- Rate of infusion of oxytocin

Note: Changes in arm position may alter the flow rate as well as the:

- Duration and frequency of contrac-

tions;

- Foetal heart rate

Listen to the foetal heart rate every 30 minutes, and always immediately after a contraction. If the foetal heart rate is less than 100 beats per minute, stop the infusion.

*Managing Complications in Pregnancy and Childbirth. A guide for midwives and doctors, WHO, 2002*

### Indications for the use of continuous Electronic Foetal Monitoring

There are a number of antenatal and intrapartum risk factors that have been shown to be associated with the development of neonatal encephalopathy, cerebral palsy or even perinatal death.

Continuous EFM should be offered and recommended for high-risk pregnancies where there is an increased risk of perinatal death, cerebral palsy or neonatal encephalopathy.

Continuous EFM should be used where oxytocin is being used for induction or augmentation of labour.

*The Use of Electronic Fetal Monitoring. The use and interpretation of cardiotocography in intrapartum fetal surveillance Evidence-based Clinical Guideline Number 8, Royal College of Obstetricians and Gynaecologists, 2001*

**Preparation of Oxytocin Solution**

Time after starting (min)	Oxytocin dose (mU/min)	Volume infused (ml/hour)	
		Dilution 30 IU in 500 ml	Dilution 10 IU in 500 ml
0	1	1	3
30	2	2	6
60	4	4	12
90	8	8	24
120	12	12	36
150	16	16	48
180	20	20	60
210	24	24	72
240	28	28	84
270	32	32	96

RCOG, 2001

Effective Perinatal Care (EPQ)

USAID

7MO-17

### Slide 7MO-17 Preparation of Oxytocin Solution

On the slide is the table containing recommended oxytocin dosage. Doses highlighted are quantities above those referred to in the summary of product characteristics of 20 milliunits per minute.

If higher doses are used, the maximum dose used should not exceed 32 milliunits per minute.

*Royal College of Obstetricians and Gynaecologists (RCOG). Induction of labour.*

*Evidence-based Clinical Guideline Number 9. RCOG Press, 2001.*

*Society of Obstetricians and Gynaecologists of Canada (SOGC). Induction of Labour at Term. Clinical Practice Guideline. JOGC, August 2001, No. 107.*

If after 32 mU/min of oxytocin labour has not been established in **multigravida** and in **women with previous caesarean scars** – deliver by caesarean section.

If after 32 mU/min of oxytocin labour has not been established in **primagravida** WHO recommends using higher concentration of oxytocin (rapid escalation):

- Infuse oxytocin 10 units in 500 mL dextrose (or normal saline) at 30 drops per minute
- Increase infusion rate by 10 drops per minute every 30 minutes until good contractions are established
- If **good contractions are not established at 60 drops per minute** (60 mIU per minute), deliver by caesarean section.

**Do not use oxytocin 10 units in 500 mL (i.e. 20 mIU/mL) in multigravida and women with previous caesarean section.**

*Managing Complications in Pregnancy and Childbirth: A guide for midwives and doctors. WHO, 2005*

**For the conversion to the equivalent to drops per minute (20 drops = 1 ml)**

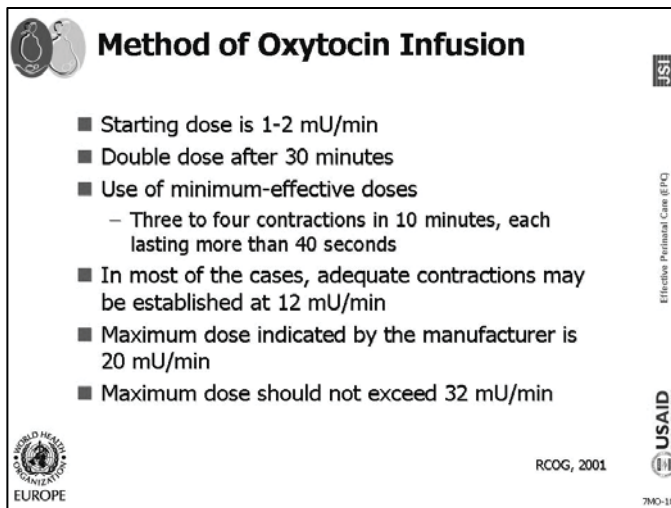
Upon dilution of 10 IU of Oxytocin in 500 ml of Normal Saline:  
 $1\text{mU} = 3\text{ ml/hour} = 60\text{ drops}/60\text{ minutes} = 1\text{ drop/minute}.$

Upon dilution of 5 IU of Oxytocin in 500 ml of Normal Saline  
 $1\text{mU} = 6\text{ml/hour} = 120\text{ drops}/60\text{ minutes} = 2\text{ drops/minute}$

Upon dilution of 30 IU of Oxytocin in 500 ml of Normal Saline  
 $1\text{mU} = 1\text{ml/hour} = 20\text{ drops}/60\text{ minutes} = 0.33\text{ drops/minutes}$

Upon dilution of 5 IU of Oxytocin in 1000 ml of Normal Saline  
 $1\text{mU} = 12\text{ml/hour} = 240\text{ drops}/60\text{ minutes} = 4\text{ drops/minute}$

The oxytocin dose should be documented on the WHO partograph throughout the labour.



**Method of Oxytocin Infusion**

- Starting dose is 1-2 mU/min
- Double dose after 30 minutes
- Use of minimum-effective doses
  - Three to four contractions in 10 minutes, each lasting more than 40 seconds
- In most of the cases, adequate contractions may be established at 12 mU/min
- Maximum dose indicated by the manufacturer is 20 mU/min
- Maximum dose should not exceed 32 mU/min

RCOG, 2001

USAID

7MO-18

Effective Perinatal Care (EPC)

## Slide 7MO-18 Method of Oxytocin Infusion

Comparing low-dose oxytocin (gradual increase from low-dose to high-dose oxytocin) to high-dose oxytocin showed:

- Low dose doesn't lead to an increase in operative deliveries
- Gradual increase of low-dose oxytocin (every 30 to 60 minutes intervals) leads to the decrease of hypercontractility of uterus
- Low-dose mode doesn't lead to increase the duration of labour
- Higher-dose oxytocin leads to the

increase of rapid deliveries.

Meta-analyses show that the mode of oxytocin increase (every 30 to 60 minutes intervals) results in:

- A low frequency of excessive uterus contractions
- A high percentage of vaginal deliveries
- A low percentage of postpartum infections and haemorrhages
- A tendency to decrease the percentage of caesarean sections.

In most cases the initial dosage was from 0.5 to 2.0 IU/min, increasing from 1.0 IU/min to a double dose with 30 min intervals up to 60 min intervals, and the maximum dose from 16 IU/min to 40 IU/min.

Oxytocin should not be started for six hours following the administration of vaginal prostaglandins. [C]

In women with intact membranes, amniotomy should be performed where feasible, prior to the commencement of an infusion of oxytocin. [C]

When induction labour is undertaken with oxytocin, the recommended regimen is [C]:

- A starting dose of 1–2 milliunits per minute
- Increased at intervals of 30 minutes or more.

The minimum possible dose of oxytocin should be used and this should be titrated against uterine contractions aiming for a maximum of three to four contractions every ten minutes.

Adequate contractions may be established at 12 milliunits per minute.

In the summary of product characteristics, the licensed maximum dose is 20 milliunits per minute.

If higher doses are used, the maximum dose used should not exceed 32 milliunits per minute.

*Crane JMG, Young DC. Meta-analysis of low-dose versus high-dose oxytocin for labour induction. J Society Obstet Gynaecol Can, 1998, 20, 1215-23.*

*Merrill DC, Zlatnik FJ. Randomized, double-masked comparison of oxytocin dosage in induction and augmentation of labour. Obstet Gynecol, 1999, 94, 455-63.*

*Royal College of Obstetricians and Gynaecologists (RCOG). Induction of labour. Evidence-based Clinical Guideline Number 9. RCOG Press, 2001.*

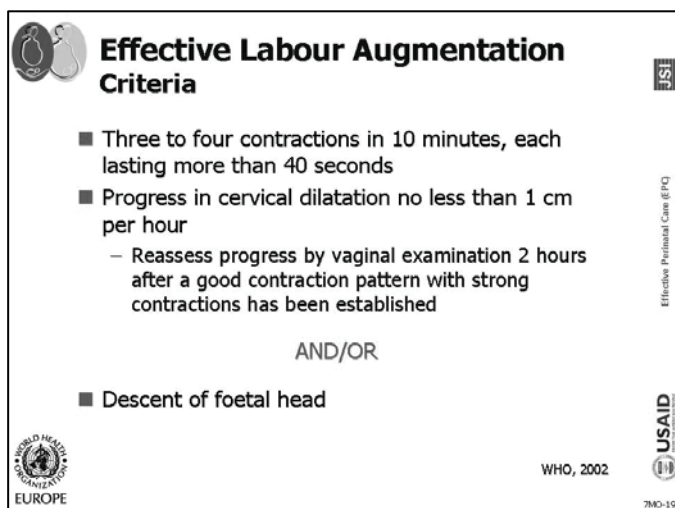
If after 32 mU/min of oxytocin labour has not been established in **multigravida** and in **women with previous caesarean scars** – deliver by caesarean section.

If after 32 mU/min of oxytocin labour has not been established in **primagravida** WHO recommends using higher concentration of oxytocin (rapid escalation):

- Infuse oxytocin 10 units in 500 mL dextrose (or normal saline) at 30 drops per minute
- Increase infusion rate by 10 drops per minute every 30 minutes until good contractions are established
- If **good contractions are not established at 60 drops per minute** (60 mIU per minute), deliver by caesarean section.

**Do not use oxytocin 10 units in 500 mL (i.e. 20 mIU/mL) in multigravida and women with previous caesarean section.**

*Managing Complications in Pregnancy and Childbirth: A guide for midwives and doctors. WHO, 2005*



**Effective Labour Augmentation Criteria**

- Three to four contractions in 10 minutes, each lasting more than 40 seconds
- Progress in cervical dilatation no less than 1 cm per hour
  - Reassess progress by vaginal examination 2 hours after a good contraction pattern with strong contractions has been established

AND/OR

- Descent of foetal head

WHO, 2002

USAID

7MO-19

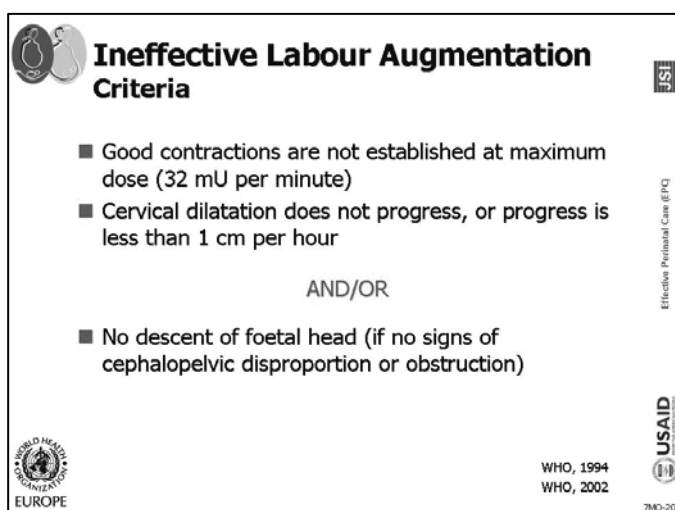
### Slide 7MO-19 Effective Labour Augmentation Criteria

The effective dose of oxytocin varies greatly among women. Cautiously administer oxytocin in IV fluids (dextrose or normal saline), gradually increasing the rate of infusion until good labour is established (three contractions in 10 minutes, each lasting more than 40 seconds). Maintain this rate until delivery. The uterus should relax between contractions.

If progress continues, continue oxytocin infusion and re-examine after 2 hours.

Continue to follow the progress of labour carefully.

*Managing Complications in Pregnancy and Childbirth. A guide for midwives and doctors, WHO, 2002*



**Ineffective Labour Augmentation Criteria**

- Good contractions are not established at maximum dose (32 mU per minute)
- Cervical dilatation does not progress, or progress is less than 1 cm per hour

AND/OR

- No descent of foetal head (if no signs of cephalopelvic disproportion or obstruction)

WHO, 1994  
WHO, 2002

USAID

7MO-20

### Slide 7MO-20 Ineffective Labour Augmentation Criteria

If labour still has not been established, infuse oxytocin at a higher concentration:

- Infuse oxytocin 10 units in 500 mL dextrose (or normal saline) at 30 drops per minute;
- If good contractions are not established, deliver by caesarean section.

*Managing Complications in Pregnancy and Childbirth. A guide for midwives and doctors, WHO, 2002*

Failure to make satisfactory progress in labour, measured as a cervical dilatation rate of less than 1 cm/hour between two examinations, means delivery is indicated.

**Oxytocin Infusion Complications (1)**

- Hyperstimulation
  - More than four contractions in 10 minutes, lasting longer than 60 seconds
- If associated with a normal foetal heart rate pattern:
  - Decrease the oxytocin infusion rate
  - Reassess uterine activity to determine if any further interventions are required
- If associated with foetal heart rate abnormalities:
  - Stop the oxytocin infusion and relax the uterus using tocolytics:
    - Terbutaline 250 mcg IV slowly over 5 minutes **OR**
    - Salbutamol 10 mg in 1L IV fluids (normal saline or Ringer's lactate) at 10 drops per minute

WHO, 2002  
RCOG, 2001

7MO-21

### Slide 7MO-21 Oxytocin Infusion Complications (1)

Uterine hypercontractility.

The terminology of uterine hypercontractility is problematic. Uterine hypercontractility without FHR changes, included uterine tachysystole (more than five contractions per ten minutes for at least 20 minutes) and uterine hypersystole/hypertonus (a contraction lasting at least two minutes).

Uterine hyperstimulation with FHR changes denoted uterine hyperstimulation syndrome (tachysystole or hypersystole with FHR

changes such as persistent decelerations, tachycardia or decreased short term variability). However, due to varied reporting of this outcome, there is the possibility of subjective bias in interpreting data.

Prolonged use of maternal facial oxygen therapy may be harmful to the fetus and should be avoided. There is no research evidence evaluating the benefits or risks associated with the short-term use of maternal facial oxygen therapy in cases of suspected fetal compromise.

In cases of uterine hypercontractility with a suspicious or pathological cardiotocograph (CTG) secondary to oxytocin infusions, the oxytocin infusion should be decreased or discontinued. [B]

A In the presence of abnormal FHR patterns and uterine hypercontractility (not secondary to oxytocin infusion), tocolysis should be considered. A suggested regimen is subcutaneous terbutaline 0.25 milligrams.

*Royal College of Obstetricians and Gynaecologists (RCOG). Induction of labour. Evidence-based Clinical Guideline Number 9. RCOG Press, 2001.*

If hyperstimulation occurs (any contraction lasts longer than 60 seconds), or if there are more than four contractions in 10 minutes, stop the infusion and relax the uterus using tocolytics:

- Terbutaline 250 mcg IV slowly over 5 minutes; or
- Salbutamol 10 mg in 1 L IV fluids (normal saline or Ringer's lactate) at 10 drops per minute.

*Managing Complications in Pregnancy and Childbirth. A guide for midwives and doctors, WHO, 2002*

**Oxytocin Infusion Complications (2)**

- Foetal heart rate abnormalities
  - Stop the oxytocin infusion
  - Place woman on her left side
  - Plan delivery:
    - If foetal heart rate abnormalities persist
    - Additional signs of distress (thick meconium-stained fluid)
    - If atypical variable decelerations, late decelerations, single prolonged deceleration greater than 3 minutes

WHO, 2002  
RCOG, 2001

USAID

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## Slide 7MO-22 Oxytocin Infusion Complications (2)

Foetal heart rate abnormalities

### PROBLEMS

- Abnormal foetal heart rate (less than 100 or more than 180 beats per minute).
- Thick meconium-stained amniotic fluid.

### GENERAL MANAGEMENT

Prop up the woman or place her on her left side.

Stop oxytocin if it is being administered.

*Managing Complications in Pregnancy and Childbirth. A guide for midwives and doctors, WHO, 2002*

In cases of suspected or confirmed acute foetal compromise, delivery should be accomplished as soon as possible, taking into account the severity of the FHR abnormality and relevant maternal factors. Ideally, the accepted standard is delivery within 30 minutes. [B]

*Royal College of Obstetricians and Gynaecologists (RCOG). Induction of labour. Evidence-based Clinical Guideline Number 9. RCOG Press, 2001*

**Conclusions**

Labour abnormalities can be revealed in a timely manner by using the WHO Partograph

Create a warm and friendly atmosphere in the maternity, have a companion present during labour and birth, encourage food and fluid consumption and upright position to reduce the rate of prolonged labour

Early amniotomy should not be routinely used

Amniotomy should be reserved for women when labour progresses abnormally

Oxytocin should be used with caution, followed by closely monitoring the progress of labour, and the condition of mother and baby

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## Slide 7MO-23 Conclusions

Complications which may be caused by labour augmentation may be dangerous both for the mother and the baby.



