

Nurses Research Publication for  
Continuing Education

# PERINATAL ASSESSMENT

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## Course Objectives:

At the end of this course, each participant will be able to:

1. Give better nursing care and/or advice to those pregnant patients and/or families, contacted in the clinical setting (to be evaluated by each participant at their own clinical facility).
2. Properly refer the pregnant woman for the appropriate medical care and/or prenatal testing, using the guidelines listed in this text for the “normal” pregnancy.
1. Properly explain procedures listed in this text and the reasons for the tests required for determination of maternal and/or fetal well-being.
2. Properly perform the basic exam techniques listed in this text on the pregnant client, in order to help determine maternal and/or fetal well-being (to be evaluated by each participant in their own clinical setting). If the nurse is not working in the appropriate clinical setting, each participant will be able to name at least 5 of the basic exam procedures used and explain their use in helping to determine maternal and/or fetal well-being.
3. Properly evaluate the results of the exam (above), and be able to state whether or not the results are abnormal; if these results are abnormal, the nurse should be able to state what emergency measures would be instituted, if needed.
4. Explain how the family would be included in the evaluation of each of the clients the nurse contacts, and name at least 3 ways to include the family in the care of the client.
5. Name and discuss at least 3 ways to utilize lines of communications in your own clinical facility, so that the client will obtain appropriate information and referral to the labor and delivery unit in your facility, or to another facility.
6. Name and discuss at least 5 specific assessments performed on the pregnant client which are performed routinely in order to maintain the well-being of the mother and fetus.
7. Describe the appropriate follow-up for the above assessments, if they indicate an abnormality.
8. Name and discuss the 3 major reasons for follow-up of the woman with Rh negative blood, who has a high antibody screening titer.

3. To be better able to identify those problems and potential problems in the newborn which can lead to compromise of the well-being of the infant.
4. To be better able to care for the newborn with any of the problems or the potential problems identified in text.
5. Recognition of the fact that the parents of the at-risk newborn will need referrals in order to cope with the situation; they will need emotional support, explanations and counseling.
6. Identify at least four torch infections and discuss the ramifications of the assessment of the newborn infant.
7. Name and discuss all the reproductive outcomes of exposure of the mother to environmental pollutants mentioned in this text.
8. Name and discuss all the reproductive outcomes of exposure of the mother to the drugs mentioned in this text.
9. Identify the special needs and considerations of the nurse for assessment of the newborn in family-centered care setting.
10. Perform satisfactorily on an objective examination at the end of this course which includes all areas of assessment discussed in this text.

## PRENATAL ASSESSMENT

### A. Maternal Assessment

The purpose of this course is to provide staff development in the area of clinical nursing practice. The course contains a series of self-contained learning material to be used for the care of the low-risk pregnant client.

The material herein should be used in conjunction with any policies or procedures already in effect in your facility. This course is intended only as a guide for those nurses perhaps unfamiliar with protocol relating to the pregnant client. It is also hoped that this course will help plant the seed of cooperation between departments at your facility.

1. Blood Pressure Considerations  
Cardiovascular changes and pregnancy

This section will present the importance of assessment of the vital signs of the woman, in particular the blood pressure. Monitoring the blood pressure is one of the most important dimensions of prenatal care. A sustained elevation of the blood pressure can indicate a threat to the mother and/or fetus.

Normally, pregnancy brings about a slight decrease in the woman's blood pressure. The cardiac output increases, in some cases, up to 50%. The higher cardiac output is due to an increase in blood volume, body weight, and increased metabolism during normal pregnancy. This usually continues throughout the entire pregnancy, except during the late phase of pregnancy, due to impeded Blood return to the heart because of an enlarged uterus.

A baseline blood pressure reading is important. The Pressure is recorded early in the pregnancy and all subsequent readings are also recorded at regular intervals. It will be normal for the blood pressure to fluctuate during the confinement; however, large fluctuations may mean the existence of such problems as preeclampsia.

### MEASURING THE BLOOD PRESSURE

Determination of the blood pressure is not difficult. It should follow the same procedure of any blood pressure determination.

1. Patient in same position each time
2. Same arm (or both arms) each time
3. Same relative time of day each time
4. Cuff size should be appropriate (20% wider than the arm diameter)
5. Cuff placed snugly on the arm

6. Provide a short rest period before each blood pressure reading

Blood pressure is affected by position during the reading. Brachial artery pressure is highest when sitting, lowest when in the lateral recumbent position. The best position for measuring the pressure is in the sitting position; or the left lateral recumbent position. Supine readings should be avoided due to fluctuations, especially during late pregnancy. Be sure to use the same position each time the pressure is taken.

### **HYPERTENSION DURING PREGNANCY**

Elevated blood pressure, as we already stated, can indicate a severe risk for the mother and fetus. Normal elevations are common for very short time periods. However, any time the pressure is above 140/systolic, or /90 diastolic, it can be a risk to both mother and fetus.

Intensive monitoring of the pressure is necessary as soon as the hypertension is noted. As soon as the pressure begins to reach that point (136/80), the woman is watched closely. Each person is evaluated as an individual. If the woman has had blood pressure problems in their past pregnancies, she will be watched more carefully than someone who has not had problems in the past. Since it is difficult to actually pinpoint one specific blood pressure reading that you can say is sure. It is important when determining the significance of the elevated pressure reading, that you look for such things as edema, proteinuria and neuro changes. If some other adverse sign/symptom is also present, it might indicate severe pathology.

Toxemia is a well-known term; it is not very often used today except as a very general term describing one of the hypertensive-related disorders of pregnancy. More properly the terms are:

1. Pregnancy-induced hypertension preeclampsia, eclampsia, gestational hypertension, trophoblastic disease.
2. Preexisting chronic hypertensive disease
3. Chronic hypertension with superimposed preeclampsia

These disorders, rather than just “toxemia”, are the ones which we are discussing in this section. When hypertension is present, there is a decreased blood flow to the fetus at the uteroplacental junction. This condition causes a number of problems including intrauterine growth retardation, placenta abruption or fetal-neonatal depression.

Each of these hypertensive disorders will be discussed next. In order to determine if the woman has hypertension which may affect the fetus, the “roll-over” test was developed by Gant and Associates in 1974. The woman is placed on her left side and the blood pressure is taken every 5 minutes until two identical diastolic readings are obtained. The woman then rolls over to a supine position where her blood pressure is taken immediately and in 5 minutes. If the pressure is found to be 20mm Hg or more, over the left lateral recumbent reading, the test is considered to be positive for hypertension.

These women then may be at risk for preeclampsia. This test is not very well known, as its reliability has not been researched thoroughly yet. The mechanism by which this test predicts the risk of hypertension is that hypersensitivity in some women predisposes to develop pregnancy-induced hypertension.

### **PREGNANCY-INDUCED HYPERTENSION**

Preeclampsia is defined as the development of hypertension with edema and/or preteinuria after the 20<sup>th</sup> week of gestation. Most authorities agree with this definition, using 20, 22, or 24<sup>th</sup> week as the time frame. Preeclampsia is divided into two types, mild or severe. It is most often found in women, who are you primigravidas, or diabetics, or over age 35, or who have chronic hypertension. Mild preeclampsia may very rapidly progress to severe type, so all cases are treated aggressively.

#### Mild Preeclampsia

1. Blood pressure: Systolic 140 to 160 mm Hg  
Diastolic 90 to 110 mm Hg  
  
....or....systolic elevation of 30 mm Hg or more  
....or...diastolic elevation of 15 mm Hg or more
2. Proteinuria: 1+ or 2+
3. Sudden weight gain or edema (hands or face)

These symptoms of the mild type can quickly progress to the severe type described on the next page. Mild preeclampsia can usually be treated at home with close supervision by a family member or reporting to the physician on a regular basis. Bed rest is usually quite effective in relieving the symptoms.

Since the hypertension impairs circulation to the fetus, bed rest can increase blood flow to the uterus. By lying in the left lateral recumbent position, the uterus is kept off the maternal inferior vena cava and the right iliac artery. This causes spontaneous diereses within 24 hours due to increased renal blood flow. This position also increases the return blood flow to the heart, and raises cardiac output which was compromised due to the hypertension.

These two factors will usually decrease the symptoms dramatically. In addition to prescribing bed rest, the physician may give tranquilizers to help the mother stay in bed. And a high protein diet with plenty of fluids.

Any other signs/symptoms the woman has will also be treated with either drug therapy or other methods safe to the fetus.

Diuretics are usually not used unless absolutely unavoidable. They all tend to deplete sodium and that will add to the hypertension. Phenobarbital is usually the sedative of choice; it is safe



and will let the mother rest in bed which can be very difficult at times. The only one immediate danger of the drug is that it has long-lasting effects and can cause neonatal respiratory depression. The high protein in the diet will have lower incidence of preeclampsia.

In summary, mild preeclampsia is usually treated at home. The woman must be taught to recognize the warning signs/symptoms to report to the physician. They are:

1. Severe headache or confusion
2. blurred vision or scotoma
3. periorbital edema
4. increasing general edema (anywhere)
5. oliguria
6. increased proteinuria
7. difficulty breathing
8. hyperflexia (when previously not present)

The woman should also be taught how to collect her urine at home and even to test it for protein. Eclampsia is characterized by convulsions and/or coma. It almost always can be prevented with the proper treatment of preeclampsia. In most cases, preeclampsia symptoms will disappear upon delivery or death of the fetus, in utero. Only in some rare cases will the woman continue to have symptoms after the delivery. In even more rare cases, symptoms have been noted up to a week after the delivery.

### **GESTATIONAL HYPERTENSION**

This type of hypertension is also called transient hypertension. It is defined as hypertension with no other symptoms present, noted in the second half of pregnancy or the first 24 hours after the delivery. The elevated blood pressure usually disappears a week after the delivery. It is treated like preeclampsia, with bed rest and sedation. Drugs are avoided unless it is severe; and it can become severe. In those severe cases, drug therapy may be used. The woman is carefully watched for signs of preeclampsia/eclampsia during the treatment of gestational hypertension.

### **THROPHOBLASTIC DISEASE**

If the previously mentioned symptoms of preeclampsia develop prior to the 20<sup>th</sup> week of gestation, the cause of the hypertension may be due to a hydatidiform mole. In this condition, the trophoblastic cells fail to form normal chorionic villi. Instead, the villi degenerate and form the hydatidiform mole, a mass of grape-like structures that may possibly become malignant in time.

The symptoms to watch for are:

1. preeclampsia symptoms (before 20<sup>th</sup> week)
2. vaginal bleeding
3. absent fetal heart tones
4. uterus is larger than expected for that period of confinement

## CHRONIC HYPERTENSION

This condition exists when there is blood pressure above any of the previously mentioned readings of 140 mm Hg systolic and/or 90 mm Hg, diastolic, prior to the 20<sup>th</sup> week of gestation, and no other significant findings are present. When these signs of hypertension are present, the woman is checked every two weeks until about the 28<sup>th</sup> week, when the visits will be once weekly if the blood pressure remains high. The nurse should stress to the patient, the need for rest periods during the day while at home, at least one hour in the morning and one hour in the afternoon. In the second trimester, at least 2 hours in the morning and afternoon should be taken. In the third trimester, even more rest is needed.

The treatment then, includes frequent rest periods. The woman was probably taking some oral form of antihypertensive drug prior to the pregnancy, and will usually continue it. The antihypertensive drugs are preferred over the use of diuretics, due to the fact that diuretics will tend to deplete the person of one or more electrolytes. Diet is also important; usually a low-salt diet will be used. Sedatives may also be prescribed in order to help the person to rest the required amount of times during the day.

Careful monitoring of the patient's status is vital. The blood pressure must not fall too low or get too high; both conditions will deprive the fetus of blood flow and thus nutrients and the removal of wastes. The kidney function is monitored by routinely collecting urine and monitoring the output daily. The nurse should instruct the patient on the use of the medications, the diet therapy and resting. The nurse should also teach the patient's family as to the side effects of drugs the patient will be taking and how to notify the physician if any problems occur.

If the woman should have chronic hypertension and then develop symptoms of preeclampsia, immediate treatment and/or hospitalization are needed. These signs would be an increased elevation of blood pressure over 160/110. edema, and/or proteinuria. Again, preeclampsia can develop at any time, this stresses the importance of the family being taught how and what to do in the case where the woman herself is unable to get help. The edema and high blood pressure can incapacitate the patient, so that she cannot recognize the need for help. The nurse should provide for home support either through the family or visiting nurse if no family is available.

See the following pages for information on the nursing role and responsibilities for assessment.

## URINALYSIS

Urine evaluation is an important part of every office visit. The woman should bring in a specimen to every office visit. If the pregnancy is uneventful, routine urinalysis procedure is sufficient. If there is a known complication, the physician\* may request more frequent urine evaluations.

Each woman should be instructed as to the procedure used at your facility. It is, however, desirable to obtain a "clean catch" and midstream specimen. Explain to the woman how to obtain the specimen. Do not assume that they know how to do it, just by reading the direction; show the patient their first few times.

The urinalysis in many cases, will consist of using the reagent strips manufactured by many different companies. Some strips will have multiple reagents and tests for many factors in the urine: pH, protein, glucose, ketones, blood and others, can be test in just a few minutes. Do take precautions when handling and reading the results of the strips. They must be protected from moisture when being stored and you should always follow the instructions on the package for use and storage. Also be aware that there are many sources of false readings from the strips. If the patient is on any medications, check with a reference source to see if that drug will interfere with the results of the reagent strips. Contaminants in the urine and/or the specimen container can also give false readings.

Preeclampsia, as we discussed, can cause abnormal constituents to be present in the urine. Protein is not normally found in the urine except in minute amounts. With preeclampsia, renal disease and others, protein will be found in the urine. Any other abnormal constituent in the urine will cause the practitioner to investigate and perhaps run further tests to determine the nature of the problem. A change in the urine specific gravity, or pH or color may indicate preeclampsia or other problem.

\* When we refer to the “physician” we are also referring to any health care practitioner who is caring for the patient. Today, nurse practitioners and other types of health professionals may be taking the responsibility for following and treating the patient for a “routine” pregnancy.

The nursing responsibilities include instructing the patient, which we discussed, and collecting and testing the specimen. Always use a fresh specimen. If the urine will not be tested for several hours, refrigerate it and/or add an approved preservative. Urine will sometimes give false results if it is left standing for an hour or more. Another responsibility of the nurse is the complete assessment of the patient. Especially if there is an abnormal result, the nurse will thoroughly assess the patient. A patient history is vital for reasons why the urinalysis is abnormal. Perhaps the patient ate a “strange” meal before the specimen was obtained. Foods may temporarily color the urine and even cause other changes. Exercise, drugs, and body temperature may also cause abnormal urinalysis results. The nurse should be alert to anything out of the ordinary, and report it as a possible cause.

## **URINARY INFECTIONS**

An infection in the urinary tract will cause one of the several abnormal constituents to appear in the urine. Protein, blood, cells and discoloration are just a few. Infection can also be asymptomatic.

Normal physiological changes of pregnancy make the urinary tract more susceptible to infection; such as dilation of ureters and kidney pelvis and general hypokinesis (slowed function) of the tract. These changes lead to stasis of urine, thus the increased risk of infection. If infections are mild, there is usually no affect on the fetus. However, severe and untreated infections can lead to pyelonephritis. This is a severe condition which may affect the fetus; research is still being conducted in these areas.

The urinalysis still remains the most reliable method of screening for infection of the urinary tract. It will detect up to 90% of all cases, since these infections will show abnormal test results. Of course, there can always be some error in the urinalysis testing, due to improper storage, temperature, and others discussed previously, but if the nurse follows all safe procedures for sampling, error will be kept to a minimum. The following are symptoms which might indicate an infection:

- a. burning and/or painful urination
- b. urgency of urination
- c. chills and/or fever
- d. urinary frequency (although this may be common among pregnant women)
- e. suprapubic tenderness
- f. costovertebral angle tenderness: (formed by junction of last ribs and vertebral column, each side of the back is gently tapped, from midscapula to top of pelvis, pain can be indicative of kidney infection)

The nursing actions include the following:

1. Repeat urinalysis if any abnormal results are found, clean catch
2. Order: microscopic exam of the urine, possible culture and sensitivity, and/or colony count
3. Be sure to repeat all urine specimens with strict sterile procedures so as to be sure there is no contamination of the specimen
4. If symptoms are accompanied by chills, fever, or any other adverse symptoms, is sure to obtain medical consultation immediately
5. Patient education; includes:
  - a. good hygiene techniques
  - b. wear cotton underpants and change daily
  - c. increase fluid intake (avoid sugar drinks)
  - d. empty bladder frequently (Q3 to Q4 hours)
  - e. avoid tight underwear
  - f. diet education (well-balanced diet)

It is important that all of the above actions be followed. In those cases of asymptomatic infection, be sure to investigate even the smallest complaint, as it may be the only warning of an infection. Always use the recommended procedure for collecting specimens, to avoid contamination and to obtain best results.

## **GLUCOSURIA**

Glucose and Lactose may normally filter through the kidneys of the pregnant woman, in small amounts. Lactose is usually of no significance. During pregnancy, the renal threshold is lowered and the glomerular filtration rate is increased, these lead to some glucose being filtered into the urine. It usually is of no concern, but should be carefully monitored on each visit to the office or clinic. Urine test strips should be used, or any other reagent which tests for glucose

only, should be used. A 1+ glucose level is almost always significant and should be referred for medical follow-up. There are some authorities who feel that even a trace of glucose should be treated aggressively, so please use the protocol at your facility.

Nursing Assessment for glucosuria:

1. History and Subjective Data

Include any diabetes in the family, previous infant of 4,000 grams or more, previous history of infant death or placental problems, any infant with congenital anomalies, late abortions, infertility, hydramnios, prepregnancy obesity, any symptoms of thirst, weakness or sweating.

Record: urinalysis results, any related symptoms of diabetes, recurrent candidacies, weight gain pattern during pregnancy, hydramnios during pregnancy, and any other significant lab tests related to blood sugar levels or postprandial blood sugars.

2. Nursing Actions

If any of the above suggests diabetes, obtain fasting urine specimen and repeat the urinalysis or follow the protocol at your facility and refer the patient immediately for medical consultation, whichever is the appropriate procedure at your facility.

## **KETONURIA**

Ketonuria is the presence of ketone bodies in the urine. Ketone bodies are the products of incomplete fat metabolism. There is only weak evidence that ketone bodies in blood will adversely affect the fetus. Some studies show that brain damage might occur, but reliable evidence is absent at this time. Ketones are present in the woman's blood in diabetes, severe dieting, hyperemesis gravidarum and other conditions. Routine testing for ketones is generally accepted as good, due to the fact that in certain disease conditions, ketones are present.

Ketonuria in diabetic women, indicates the presence of ketoacidosis, and can be a sign of possible impending coma. Young adults are more prone to ketoacidosis, especially in conjunction with other problems or infections.

Nursing Assessment:

1. History

Diabetes in family, dieting, vomiting, nutritional assessment of the woman

2. Objective Data

Urinalysis results (including ketones), weight, loss or failure to gain weight

### 3. Actions

Obtain medical consult if any ketones present in the urine, obtain history and record it, glucose tolerance test or other similar test may be ordered if ketones are present

In summary, always be accurate with testing procedures and your assessment of data. If there is an abnormal result, follow established protocol, and also anticipate the type of tests which may be used as follow-up for the woman.

## EVALUATION OF LABORATORY TESTS

### General Considerations

1. Pregnancy alters some bodily functions, tests performed must relate to the changes which occur in pregnancy
2. Each lab which performs the test, has its own normal value for that test. Be aware of the norms used
3. Always be alert to the possibility of laboratory error
4. Cost should always be considered
5. Always consider if a test is abnormal, the woman may need to be assessed for certain data relating to that test

This chapter will present the most commonly used tests for screening certain “abnormal” conditions in the pregnant woman. It goes without saying that these are not all of the tests that can be used. There are many other tests that could possibly be performed, especially in the case of complications of pregnancy. Always be aware of the fact that each facility or physician will have a different protocol, be informed of that and use that, as well as using your nursing skills of assessment learned in this booklet.

### TESTS MOST COMMONLY USED FOR SCREENING

#### 1. Blood Tests

CBC (complete blood count), blood group, Rh factor, antibody screening, syphilis, rubella titer, two-hour postprandial blood sugar

#### 2. Cervical Tests

Pap Smear, culture for gonorrhea

#### 3. Urine Tests

Glucose, Protein, bacteria count (covered in previous section)

In the following part of the text, we will present lab values for the pregnant and non-pregnant woman. Usually, you will note that the lab values for most blood tests for the pregnant woman will be lower than the values for the non-pregnant woman. This does not always hold true, and the assessment for the nurse is vitally important for the diagnosis of problems during the pregnancy.

### BLOOD TESTS

Routine blood studies may reveal many potential problems. This routine screening is usually done at the first prenatal visit and then only if there is a suspected problem, will the entire series be repeated. Once this baseline is obtained, only the minimum number of tests will be performed at each visit due to the expense and inconvenience.

#### Hemoglobin (Hgb) and Hematocrit Hct)

These tests are part of the CBC (complete blood count) test, and are usually performed as a baseline test in order to detect the gross anemias. Some clinics perform only the Hct because it alone will give indication of anemia, and it is much faster and cheaper to perform than the Hgb. The Hgb and Hct can be affected by changes during pregnancy. There is a rise in total blood volume (35% to 50%), which can affect results. Normal Hgb is 12-16 for non-pregnant women, 11-12 for pregnant women (gm/100ml). The Hct for the non-pregnant women is 37-47%, for pregnant women, 32-42%.

Anemia is a general term and there is disagreement as to what value indicates anemia. Certainly, the lower the lab value, the worse is the anemia. However, if the Hgb or Hct is lowered, the woman will need to be assessed further for the type of anemia, the cause and the treatment.

#### WBC, White Blood Cell Count

This is another baseline test, usually performed only on the first visit unless otherwise indicated. It is used to detect blood abnormalities such as leukemia and to screen for such conditions as infection. The normal non-pregnant woman is 4,500 to 10,000. The pregnant woman will usually show an increase in the neutrophils and then the total white count will be about 5,000 to 15,000. During labor and immediately postpartum, the count may be as high as 20,000 to 25,000.

The pregnant woman is usually not treated “routinely” with antibiotics as any other person would be with a high white count. The woman with an elevated WBC should be carefully assessed for signs and symptoms before any treatment should be instituted.

### Differential Smear (diff)

With this test, the individual types of WBC's are examined. The proper ratio and amounts of each type should be present. Of course, if one type of WBC is high or lower than normal, it could indicate a specific type of infectious process. RBC's are routinely examined at this time just to screen for abnormalities. The platelets are also "loosely" examined just to ensure an adequate number.

### Blood Grouping

This blood typing is routinely performed, even though the woman may say she knows her blood type. Often they are mistaken, and the type they submit is not their type. Incompatibility may exist for the infant if, for instance, her type is O, and the male partner is A, B, or AB. This incompatibility is rare, but can happen.

### Rh Factor Determination

Erythroblastosis fetalis can be avoided by determining the Rh factor and treating those whose mother is Rh negative and the male is Rh positive. This is a common situation, and easily treated today.

### Antibody Screen

This test is usually performed on the first visit in order to determine whether or not the mother has any antibodies which may be harmful to the fetus. A woman can build up antibodies to a number of factors. They can occur naturally, or in response to antigens or even rare blood factors. Even in primigravidas the screen should be done because the woman could have been sensitized before even the first pregnancy by some external factor.

### SEROLOGY FOR SYPHILIS

Syphilis treated by the 16<sup>th</sup> to 18<sup>th</sup> week of gestation will usually leave the fetus unaffected. If the infection is allowed to go longer than 18 weeks, the fetus may die in utero or be born with the infection. This test is always a part of the routine screening tests done on the first visit.

### RUBELLA SCREENING

A baseline rubella titer is usually a routine test at the first visit. It is important to establish a rubella antibody titer. During the first 5 months of pregnancy, the fetus can be adversely affected if the mother contracts rubella. In fact, there are major risks in the first trimester.

Most women do not know for sure if they have ever had rubella. This is due to the mild symptoms which are typical of the disease. Therefore, if the titer is high (1:16), it suggests that the woman is immune to the disease. If the titer is low (1:8 or less), it suggests that the woman is susceptible.



Generally, women of child-bearing age are not routinely immunized against rubella, due to the risk to the fetus if they should happen to be pregnant. The vaccine will have the same bad effect upon the fetus as the disease would. Therefore, the best time to immunize the woman is immediately after delivery, since it is sure she is not pregnant. If this is the case, she should not become pregnant for at least 3 months after the immunization.

#### Two-hour Postprandial Blood Sugar

This test is usually a routine test at the first visit only. The non-pregnant woman of child-bearing years will usually metabolize glucose in the normal way. If the woman has hidden tendencies toward diabetes mellitus, it will be more likely to appear during pregnancy due to the changes in the process of glucose metabolism at this time.

The test is usually performed during the 26<sup>th</sup>-30<sup>th</sup> weeks of gestation. This test is also preferred over the full glucose tolerance test because of less expense and time involved. Findings of greater than 145 mg/100ml may indicate further assessment is needed.

The test should also be definitely performed on these:

1. family history of diabetes
2. obesity (20% or more overweight)
3. recurrent infections
4. previous deliveries of infant over 4,000 grams or higher than normal weight for gestational period.
5. previous delivery with congenital anomalies
6. previous unexplained intrauterine or neonatal death
7. repeated late abortions
8. infertility
9. glycosuria
10. hydramnios
11. if over 40 years of age

With any of these historical findings, the woman should always be screened for diabetes. If the nurse should encounter any other signs or historical facts which might suggest glucose intolerance, the patient should be carefully assessed and further screening should be performed.

#### CERVICAL TESTS

Pap Smear (Papanicolaou Smear), is used to detect cervical cancer or asymptomatic cervical herpes. If the test is positive, further evaluation is necessary, even if the woman is pregnant at the time. The nurse should also assess for the presence of infections or inflammations; as well as ask for a history of recent or past recurrent infections/inflammations. A detailed coital history is important as well as information on any periodic infections.

### CULTURE OF GONORRHEA

Due to the rise in the numbers of persons who develop the resistant strains of gonorrhea, it is very important that all clients have this test performed on the first visit. If there are symptoms later on in the pregnancy, the test should be repeated thereafter. There is conflicting data as to when the test should be performed in order to obtain the best results. Some authorities say it should be performed only in the first trimester, others say only late in the third trimester. Use the guidelines at your facility, and always be alert for the symptoms of the infection.

### OTHER SPECIFIC TESTS

The tests listed below, will be used for only selected women who are at high risk for the particular problem. Always keep in mind the possible effects upon the fetus of any woman with any health problem.

1. Tay-Sachs Screen  
Occurs mainly in persons of Eastern or Central European Jewish ancestry
2. Sickle Cell Screen  
Autosomal recessive disorder carried almost exclusively by Blacks
3. Herpesvirus Hominis Type 2  
Genital form of Herpes Simplex virus; C-section may be chosen if diagnosed late in pregnancy
4. TB Skin Test  
May be used for certain high risk groups or if symptoms present

This concludes the section on maternal prenatal assessment. We have concentrated upon the lab tests which are the most useful and commonly used tools for screening. There are many other tests available, both invasive and non-invasive, which can be used for diagnosing and accessing problems with the mother or the fetus. The nurse should use these available resources at your particular facility, in order to fully be able to assess the person completely. Always follow established guidelines at your facility and always keep the patient informed as to the purpose of the tests and their outcomes.

Patient education can and should be a “routine” procedure at your facility. If the mother feels at ease with the testing procedure, the nurse will be better able to assess the woman and will usually gain the full cooperation of the mother-to-be, making the process much easier for the client.

### FETAL ASSESSMENT

To begin this section, we will review the normal development of the fetus. Again, this is only a guide to fetal assessment, and should be used in conjunction with established protocol.

## Fetal Development:

1<sup>st</sup> lunar month

0.75 to 1 cm in length, trophoblasts embed in decidua, chronic villi form, buds of arms and legs form

2<sup>nd</sup> lunar month

2.5 cm (1 inch) in length, 4 grams in weight, sex differentiation begins, centers of bones begin to ossify

3<sup>rd</sup> lunar month

7-9 cm in length, weight is 5 grams, fingers and toes are distinct, placenta is complete, fetal circulation is complete

4<sup>th</sup> lunar month

10-17 cm in length, 55-120 grams (approx 4 ounces), and heartbeat is present, primitive kidneys begin to produce urine

5<sup>th</sup> lunar month

30 cm in length, weight 300 grams, lanugo covers entire body, fetal movements first felt by mother, heart tones can be heard with fetoscope

6<sup>th</sup> lunar month

38-34 cm in length, 650 grams (1.5 pounds), vernix caseosa is apparent, eyebrows and fingernails appear

7<sup>th</sup> lunar month

35-38 cm, 1200 grams, skin is red, infant will usually respond if born at this time, but will usually not survive

8<sup>th</sup> lunar month

38-43 cm, 2000 grams, fetus is viable; eyelids open, fingerprints are set, vigorous fetal movement is present

9<sup>th</sup> lunar month

48-52 cm, 3000-3600 grams (6.5-7.9 pounds), skin is smooth, bones of skull are ossified and almost all together at the sutures

## FETAL CIRCULATION

Umbilical Vein                      obliterated, becomes round ligament of the liver

Umbilical Arteries                becomes vesicle ligament on anterior abdominal wall

Ductus Venosus and  
Ductus Arteriosus                obliterated and become ligaments

Foramen Ovale	obliterates
Lungs	open to full capacity after birth
Pulmonary Arteries	open and expand after birth
Aorta	before birth receives blood from both ventricles, after birth, received blood from only the left ventricle.

### FETAL HEART TONES

This method of testing fetal well-being can be used commencing with the 18<sup>th</sup> to 20<sup>th</sup> week of pregnancy. A fetoscope is used for counting the rate. In some cases, ultrasonic equipment may be used to detect fetal heart tones, as early as the 10<sup>th</sup> week of gestation. However, most nurses will use the standard fetoscope for heart tones.

Normal heart tones range between 120 and 160 per minute. Mild bradycardia is considered to be 100 to 119 BPM (beats per minute). Marked bradycardia is considered as 99 or fewer BPM. Marked tachycardia is considered to be 180BPM or higher. This is only a guide; some authorities will use different parameters for diagnosis; be familiar with what is used at your facility to diagnose these conditions.

1. Locate the point of loudest heart tones:

Locating this point may be difficult, but with some practice, the nurse can learn to locate that point quickly. Between 10<sup>th</sup> and 16<sup>th</sup> weeks, usually an ultrasound device will be used. Between 16<sup>th</sup> and 24<sup>th</sup> weeks, search about two fingers above the pubic hairline with the fetoscope. After the 24<sup>th</sup> week, start at the midline about half way to the umbilicus from the pubic hairline. If nothing is heard at this point, start searching in a rotating circle, becoming increasingly larger in diameter with each swing across the lower abdomen. If you still cannot detect heart tones, you should start a systematic search over the entire abdomen. The fetus can be in such a position that heart tones cannot be heard in the normal area

2. Counting the heart tones:

Once located, count the heart tones for a full minute in order to gain the most accurate results. It is acceptable to count for 15 seconds and multiply by 4; or to count for 30 seconds and then multiply by 3 in order to estimate the minute rate. However, it is best to count for a full minute when possible. If there is an irregularity of any kind, always count for a full minute.

3. Considerations:

- a. Maternal heart rate may be mistaken for the fetal heart rate. To be sure that you are not counting the maternal heart rate, place your finger on the radial pulse of the

mother and listen to the heart tones at the same time. If the two are the same, you may be hearing the maternal pulse as the blood courses through the large uterine arteries.

b. “uterine soufflé” is a “swooshing” sound often heard; it is also related to maternal pulse, as mentioned above. Relocate and try again.

c. Changes in the rate of heart tones which are only occasional can be associated with fetal movements. While counting heart tones, be aware of fetal movements which can cause an apparent change in the rate of the heart tones.

### SERIAL ESTRIOIOL DETERMINATIONS

As the name implies, a series of tests are performed in order to determine estriol levels. Estrogen levels in the urine can fluctuate widely on a daily basis. Therefore, a series of these urine tests are performed in order to obtain an accurate diagnosis.

The hormone being sought is Estriol (E3), and is excreted during pregnancy. This hormone requires that the fetus be viable, because it is excreted through the fetus. One single test for E3 is not by itself significant, because as we said, the level will fluctuate. However, very low levels can indicate fetal distress. 24-hour urine specimens are obtained, usually at home, for this test. The test is most helpful in cases of diabetes mellitus; postdate pregnancies, and intrauterine growth retardation cases. It is less helpful for cases of hypertensive diseases, because these need to be diagnosed immediately, and the E3 test determination needs several days minimum from the start of collecting for the test to obtaining the results.

### ANALYSIS OF AMNIOTIC FLUID

Amniocentesis is performed when it is thought that results of the study will outweigh the risks. In early pregnancy, the following may be determined:

- a. ABO blood group type
- b. Tay-Sachs disease
- c. fetal sex determination
- d. Rh factor sensitization levels
- e. mongolism
- f. inborn errors of metabolism

In late pregnancy, the following may be determined:

- a. fetal maturation by determining creatinine levels; measures the amount of muscle and kidney function
- b. maturity of fetal lungs by L/S ratio (lecithin/sphingomyelin ratio)
- c. fetal distress: (non-specific problems)
  1. fluid yellow—may be erythroblastosis
  2. fluid dark red/brown—may indicate fetal death
  3. meconium present—may indicate several possible disorders
  4. acid-base measurement—may indicate hypoxia

Amniotic fluid studies are not very conclusive by themselves. In combination with other test results, a diagnosis may be made by the physician. The nursing responsibilities will include assisting with the test, preparation of the mother and explanation to the client. Each facility will have its own procedure, become familiar with it and be able to explain all facets to the client.

#### FETAL GROWTH AND MATURITY

We have already presented normal characteristics of the fetus and the approximate growth expectations. This section will deal with the nursing factors associated with assessment of the fetus. First we will discuss the EDC and date of delivery. Naegele's rule for the EDC (expected date of confinement), is:

1. Identify the first day of the last normal menstrual period (LNMP)
2. Add 9 months and 7 days to LNMP or count back 3 months and add 7 days
3. When LNMP occurs at end of a month, the addition of the 7 days will bring the EDC to the next month.

Most nurses have learned the above formula in their basic nursing programs. You must also remember that the rule is an approximation of the delivery date. In fact, probably less than 5% of all births in this country will occur on the exact date determined by that formula. There are very many factors that influence that date. If the baby is actually born a week or two later or sooner, there is usually no need for concern, since the estimated date is going to be an estimate at best.

Factors which can influence the determination of the EDC are numerous, including contraception pills, abnormal periods, abnormal bleeding, disease conditions, and of course, if the woman has poor recollection of when her last period was. It will be helpful if the nurse can obtain the following information:

1. coital history
2. birth control method history
3. measurement of fundal height & growth
4. date of quickening
5. week when fetal heart tones first heard

These and several other factors are important in determining the EDC. The fundal height is one of those factors. When measuring the fundal height, the nurse should remember to place the same amount of pressure on the top of the fundus each time it is measured. The proper way to measure it, is to place one end of a measuring tape on the middle of the upper border of the pubic symphysis and bringing the other end directly over the umbilicus until the upper border of the fundus is reached. The height of the fundus can be expected to become higher as the pregnancy continues. It is also possible however, for the fundus to remain the same height for long periods of time (2-4 weeks). If it should not consistently grow as it was expected, further tests should be done and the physician alerted. If the fundus is consistently lower than expected or higher than expected, there may be an abnormal condition present.

#### THE OXYTOCIN CHALLENGE TEST (OCT)

The OCT is also called Stress monitoring. The test delivers an intravenous dose of oxytocin, which induces uterine contractions. The fetus is monitored during the contractions, and by the way it responds, the physician can predict the well-being of the fetus.

The protocol for the nurse is different at each facility; usually the client is given a very light meal the night before the test. However, some places prefer that she remain NPO. A signed permit usually is required, since there is a slight risk with the procedure.

The nurse will monitor the mother as the physician monitors the recording device for the fetal heart tones and rate. The test results of negative means that no significant changes were noted in the fetal heart rate when the contractions were induced, and the fetus is probably well and safe for labor.

If the test results are positive, it indicates that there are significant changes in the heart rate of the fetus, and the fetus may be in danger. If other tests also confirm fetal distress, the physician will usually decide to terminate the pregnancy then, and deliver the infant.

Stress monitoring tests are carried out routinely in many places today. They are relatively safe, however, the nurse must remember to constantly monitor the patient. There are many adverse conditions which can occur. In fact, labor may be induced by the administration of the drug, since this test is usually performed late in pregnancy. So always be ready for any emergency in conjunction with this test.

### SPECIAL CHARACTERISTICS AND GOALS OF ASSESSMENT OF THE FETUS

At the present time, there is tremendous disagreement among physicians about testing for fetal well-being. Various combinations of tests seem to be the only agreement among physicians, meaning that no one test should be relied upon. Rather a series of tests, or combination of tests should be given if fetal distress is suspected.

If you as a nurse are unsure as to the implications of these tests or as to their results, review their implications in any basic obstetrical nursing textbook. When tests indicate that the fetus is not doing well, the physician must determine the risks involved with the termination of pregnancy. The physician will weight all of the factors such as the relative hostility of the uterine environment, the other risk factors, before deciding to terminate the pregnancy.

Please review basic anatomy and physiology of labor and delivery if you are unsure of the particular risks involved with terminating the pregnancy early. These are the pertinent facts:

1. stages of labor
2. mechanism of labor
3. fetal position and descent
4. signs of labor
5. vaginal examination techniques
6. fetal monitoring

Most hospitals today use the scalp clip connected to the fetal monitoring system; review the methods and nursing implications if you are interested in that area of nursing. It is too lengthy a subject for us to detail in this course.

## **NEWBORN ASSESSMENT**

### SECTION 1 TORCH INFECTIONS

Before beginning our assessment of the newborn, we must first consider the infections which can adversely affect the infant. The term torch infections was first used by Dr. Andre' Nahmais who studied these organisms which could cross the placental barrier and damage the fetus. We will first talk about the organisms, then later we will present assessment aspects with which most nurses will be concerned.



### 1. Rubella

The rubella virus has been known to cause severe damage to the fetus, and as early as 1940, it has been known to be teratogenic\*. The effects are the most severe if the mother contracts rubella during the first trimester. The transplacental transmission happens before there are any symptoms. This makes the diagnosis difficult, until after the virus has already crossed the placenta. Most fetuses which are infected before the 10<sup>th</sup> week of gestation, will contract the disease. The virus will show slowed growth and fewer cells than normal. Approximately 50% of those infected will show this gross damage.

Approximately 70% will show effects by age five. Other children will develop such conditions as panencephalitis around age ten, and then develop some type of neurological damage including retardation or the motor functions and/or mental retardation.

Prognosis for infants infected with rubella is guarded, especially if premature, underweight, etc. Also, the virus is especially dangerous, since the effects may not show until later childhood.

### 2. Toxoplasmosis\*\*

Toxoplasmosis occurs only after primary maternal infection. The mother is usually asymptomatic and so is the infant at birth. However, about 15% of those infected infants will die and the other 85% show severe psychomotor retardation. Usually the most severe symptoms will appear by age 1 year, but some symptoms do not appear until the child is older. The treatment for the infection is Daraprim and sulfadiazine. These drugs do not reverse any damage that has already been done, but does help stop further damage from occurring. The child must be observed carefully for long time periods since there is a cyst form of the parasites which cannot usually be killed, and the diseases may have an exacerbation at any time.

\* teratogenic—leads to an abnormal development of the embryo (fetus)

\*\* Toxoplasmosis—A disease due to infection with the protozoa, *Toxoplasma gondii*. The organism is found in many mammals and birds including humans.

Assessment includes cognitive functioning and motor functioning of the newborn. It may be difficult to assess these in an infant, but any abnormal psychomotor symptoms may be a sign of the disorder. Today this disorder is not a big health problem. Most women will have an antibody screening done on their first prenatal visit. This screening will usually detect signs of the disease and it can then be treated quickly.

### 3. Hepatitis B Virus

When the virus is transmitted to the fetus, there is a chance of prematurity, stillbirth and other disorders which increase infant mortality. Most infants, however, who develop the infection, usually are asymptomatic. The disease usually runs its course with few long-term complications. The virus is most often transmitted to the fetus during the last

trimester, or during the delivery. The nursing considerations include preventing spread of virus and remembering that the infant will likely be a carrier.

#### 4. Cytomehalovirus (CMV)

CMV is the most common cause of perinatal infection. It is a member of the herpesvirus family. The symptoms it causes are closely similar to the Epstein-Barr virus (EBV), or mononucleosis. In the mother, the disease often causes no symptoms. However, 50% of middle-class women show evidence of having the virus at some time, the highest incidence of the virus being among the poor.

Of those women who become infected during pregnancy, approximately 50% of the fetuses will become infected. The infection of the mother may have occurred during a previous pregnancy. The virus, like herpes, lays dormant and may reactivate during a subsequent pregnancy.

The newborn may be affected in several different ways. Of those fetuses affected, 12-20 percent will be born with the systemic CMV inclusion disease. The gravity of the disease is unrelated to the gestational age of the fetus when infected. When infected, the infant will excrete the CMV in the urine for up to four years, making assessment of the disease easy for the nurse.

Effects of the CMV include birth deformities such as hydrocephaly and microphthalmia; such other disorders as seizures, blindness, and hematological changes. About 85% of the newborns show no immediate problems related to the virus. Most of the problems show up from 3 years old to seven years of age. This age group shows lowered IQ's, deafness, motor defects, and learning disabilities. Assessment of the newborn is important if the mother has a history of herpes, CMV, or any such related virus.

There are immunizations for the CMV, however, at this time, most of the immunizations are quite toxic to the body. Other experimental drugs and treatments are being tried, but at this time none are being used on a widespread basis.

#### 5. Herpesvirus (HV)

In most diseases of the newborn, there has been no definite link between herpes and any congenital diseases of the newborn. However, when the mother has the primary genital herpes, there seems to be an association with prematurity, spontaneous abortion and certain congenital anomalies.

In the case where the mother has open lesions in the birth canal and the infant becomes grossly contaminated with the virus, the results are different. There is a 30 to 50% infection rate for those infants delivered through a contaminated birth canal. Of these infants, about 50% will die or be severely damaged by the herpes infection.

The incubation period of HV is 2 days to as long as 3 weeks. During this period, careful assessment of the infant is important in order to detect any of the first symptoms of the HV in the infant.

There is no known cure for the HV, therefore it is important to prevent the contamination of the infant. Cesarean section is often indicated when there is a positive culture and active lesions in the birth canal. If the infant does become infected, there usually is not a long hospital stay indicated. They can be managed very well on an outpatient basis. They will usually be given large doses of gamma globulins, interferon stimulants, and other drugs, in an attempt to alleviate the symptoms, however, there still is no cure once infected.

Summary:      Assessment of the newborn with Torch Infection

During the intrapartum period, the nurse must perform a careful assessment in order to facilitate the postpartum assessment. The nurse should always wear gloves when there is suspected torch infection, and be careful of disposing of articles and/or secretions. Careful hand washing is essential. Serum (needle) precautions are observed when necessary. Extra samples of the cord blood are often needed for obtaining titer levels and the placenta is sent to the lab as "contaminated" when a torch infection is present. Also do not forget the emotional support of the mother during this period. She undoubtedly will be concerned about the safety of the child and any possible deformities. Expert counseling may be necessary after the delivery.

During the immediate postpartum period, there are several considerations necessary for an accurate and complete assessment. When a torch infection is suspected, the infant will usually be isolated (in most cases). The nurse should make arrangements ahead of time. Abnormal findings of the following should be noted and reported immediately:

Skin lesions, eye disorders, microcephaly, hepatosplenomegaly

Abnormal laboratory findings should also be noted and reported, such as thrombocytopenia, anemia, and elevated serum bilirubin levels.

The above abnormalities should be reported immediately. Most of these problems will be present at birth, but not always. In some cases the nurse will see these conditions develop in the nursery within the first few hours of life of the newborn. Therefore, the MD would need to be notified of changes which occur in the nursery.

The nurse must remember proper hand washing in addition to strict isolation in the cases of these infectious disorders. Patient teaching is also important. The mother and other family members should know the treatment plan for the infant. They should know how to assess the newborn themselves, for any acute distress; and they should know how to properly dispose of contaminated linens and articles, hand washing technique and referrals, if necessary. Parents should also be taught about modes of transmission of the disease, so that they do not spread it further. The nurse should be aware of appropriate agencies to refer the family about questions of breast feeding and other problems of the newborn care, when a torch infection is present.

## SECTION II

## CHEMICAL &amp; PHYSICAL EXPOSURE AND THE EFFECTS ON THE NEWBORN

(environmental pollution and drug exposure)

What is the significance of environmental pollutants and drugs upon the unborn infant? This section will discuss some of the known effects and the possible effects of these hazards and the related nursing assessment of the newborn.

There are numerous environmental contaminants which can affect the embryo, the fetus and the infant. The obvious cases occur when large amounts of chemicals are released, affecting all persons, adults as well as the unborn, such as cases of food additives which are discovered to be carcinogenic, but have already “poisoned” many persons. Other risks include smoking, alcohol, drugs, heavy metals, and other poisons in our environment.

Specific questions regarding the nursing assessment will be discussed shortly, now however, keep in mind the factors which can harm the newborn. We will present certain facts regarding the harmful effects on common pollutants and drugs. When the nurse is aware of those conditions leading to poisoning and threats to the infant’s health, we can better assess these conditions and help to lessen their severity. We will also discuss aspects of informing the client as to health risks during pregnancy, the legal issues and ethical issues. As you look at the statistics and risks of these chemicals, keep in mind the issues of progress versus health risks, and how do we, as nurses, fit into the battle ground of those issues. Environmental toxins can affect the reproductive process in any of the phases. Man and animals can be affected from the adult germ cells to the actual gestational period and fetal development.

The American Chemical Society can name over 110,000 different biologically active substances which may adversely affect development of the newborn. There are about 1,000 new chemicals introduced each year. Each of these substances acts differently upon different people. However, it is well documented that these substances may have a carcinogenic effect, a mutagenic effect, a teratogenic effect or many other effects upon the developing fetus. Many of the chemicals will cross the placental barrier and directly contaminate the fetus, but many others have an indirect effect.

Following is a chart of possible effects of exposure to toxic substances during the reproductive cycle:

Reproductive Outcomes:\*

Altered fertility pattern, spontaneous abortion, chromosomal abnormalities, nonchromosomal congenital abnormalities, nonchromosomal congenital defects, altered sex ratio, late fetal death, neonatal death, low birth weight, development disabilities, behavioral disorders, childhood malignancy, childhood death.

Classification of Pollutants:

## a. Macroenvironmental:

Heavy Metals, mercury, lead, cadmium, nickel, chlorinated dibenzop-diocins (TCDD), polychlorinated and polybrominated biphenyls (PCB and PBB), organochlorine pesticides, polycyclic aromatic hydrocarbons, air pollutants (natural) carbon monoxide, ozone, and radiation.

## b. Microenvironmental: (social environmental)

Tobacco smoke, carbon monoxide, nicotine, polycyclic aromatic hydrocarbons, alcohol;

Drugs: opiates, barbiturates, anesthetics, sex steroids, food additives

The above is a summary of the different types of pollutants which might affect the fetus and/or reproduction. Following now in this text, will be an explanation of some of these more common ones with which we are more familiar. We will not present these in too great detail, or we will lose site of the objectives of this course, which is the assessment of the newborn. It is important, however, that we as nurses know the major sources of newborn disorders and then we will better be able to teach, as well as assess parents and the newborn. As you read and study this text, you should remember that part of the assessment process is a detailed history. You should discover if the parents have been exposed to any dangerous chemicals, either before or during the pregnancy, especially if the newborn is deformed in any way. Another major nursing consideration, of course, is teaching, (prevention) the parents or potential parents.

\* from Sullivan, F.M., and Barlow, S.M., London 1979.

## EXPOSURE TO COMMON POLLUTANTS:

a. Heavy Metals

Heavy metals present a hazard to the fetus due to their becoming concentrated in the blood and brain tissue. Once introduced into the body, the heavy metals cross the placental barrier and will damage the fetus. Lead, mercury and others are present in the environment and can cause severe brain damage in the newborn. The nurse should assess for neurological problems of any kind, such as tremors, convulsions, chorea, ataxia and other symptoms are possible.

b. PCB's and PBB's

These two chemicals are widely used as insulators and fire retardants. Although use as insulators in electrical transformers is banned in most areas, there are still many of these transformers in use today. Most are located on telephone poles in many neighborhoods. These

two chemicals are still being investigated today, but it is felt that they are powerful carcinogens and toxic to the fetus.

c. Carbon Monoxide

Carbon monoxide is present in our air due to some natural causes, but the highest concentration is due to the gasoline engine. In some cities, due to heavy industrial activities, and vehicular use, the levels are quite high. The level of carbon monoxide in the blood of persons in these areas may get as high as if having smoked a pack of cigarettes per day. The effect upon the fetus is the effect of oxygen deprivation. Carbon monoxide binds more easily with the hemoglobin of the blood, thereby blocking oxygen from the hemoglobin.

d. Ozone

Ozone is a gas found naturally in our upper atmosphere. However, exposure to this gas in industry is becoming common. Exposure during flying is also known to be a hazard. Some flight attendants claim higher rates of abortion and birth defects. Ozone is a powerful oxidizer, and can cause irritation of the respiratory tract and eyes. Also, other symptoms have been reported. Ozone has also been known to cause biochemical changes in the blood of the exposed persons.

e. Radiation

The effects of radiation upon the newborn and the developing fetus, have been well documented. It is known that, in high doses, mutations in germ cells can and will occur. Microencephaly and mental retardation can occur due to excessive exposure. Excessive exposure can come from too many X-Rays, from hazards in the environment, such as water contamination, contaminated building materials, and other sources. Our normal "background radiation" is known to be quite minimal. Radiation in medicine should be very carefully controlled, so as to protect from excessive exposure, and especially exposing the pregnant woman to X-Rays or other sources of radiation.

f. Tobacco Smoke

Tobacco smoke during pregnancy has an adverse effect upon the early development of the fetus, and possibly in the later development of the child. Nicotine, carbon monoxide, nitrogen oxides, polycyclic aromatic hydrocarbons, hydrogen cyanide, and vinyl chloride are a few of the several thousand compounds found in tobacco smoke.

The adverse effects upon the fetus are well known. Included in these adverse effects are: increased bleeding during pregnancy, spontaneous abortion, spontaneous rupture of the membranes, long-term growth disorders, diminished intellectual functioning, others. When assessing newborn, be aware of maternal smoking habits, amount, and frequency of smoking.

## EXPOSURE TO PHARMACOLOGICAL AGENTS

Beginning in 1961, starting with the thalidomide epidemic, drugs and pregnancy were examined very closely. Certain drugs are now known to be toxic to the growing fetus. The list on this page represents the most common agents and the possible effects seen when administered during pregnancy.

a. sex hormones

contraceptives, some pregnancy tests and androgens may cause developmental disabilities, possible increased abortions, and congenital heart defects

b. Anticonvulsants

may cause increased spontaneous abortions, neonatal deaths, deaths and developmental disabilities

c. Antimetabolites

(folate antagonists) methotrexate animopterin; may cause an increase of spontaneous abortions, developmental disabilities

d. Tranquilizers

some show increased spontaneous abortions, most others show increased developmental disabilities

e. Salicylates

increase of late fetal deaths, neonatal deaths, developmental disabilities

f. Oral anticoagulants

increase in late fetal deaths and developmental disabilities

g. Heroin

increased spontaneous abortions; fetal deaths

h. Alcohol

fetal alcohol syndrome, increased female developmental disabilities

i. Smoking

increased spontaneous abortions with fetal defects, increased late fetal deaths, increased neonatal deaths, increased low birth weight and premature infants, increased developmental disabilities.

This is for reference only. There are many other specific effects by many other drugs; i.e. anesthetics, can have adverse effects upon fetus when used. Use an up-to-date reference if in doubt about any drugs.

### SECTION III

#### INTRAPARTUM PERIOD ASSESSMENT

##### A. Family-centered Newborn Care in Hospitals

Family-centered care is defined as the delivery of safe, quality health care while recognizing, focusing on, and adapting to both the physical and psychosocial needs of the patient and the family. The emphasis is on providing health care which fosters family unity, while maintaining physical safety. The family-centered program is very popular in many large hospitals today, as a way of keeping the patient's support system close. The father or other significant person (s) may stay with the mother as much as possible throughout the childbirth process. Most nurses are quite familiar with the physical layout of the program center, which includes birthing room, labor rooms, diagnostic room and/or admitting rooms. All support services are close to the birthing room, should they be necessary. The nurse should become familiar with all the available services of your particular hospital.

Assessment of the newborn will take place in the birthing room. The infant will usually stay with the mother and the family from the time of birth. However, if there is a problem with the delivery, or with the newborn, the infant will have to be moved immediately to another area. The newborn assessment will include all the "normal" parameters, which we will discuss in the next section, in addition to an awareness of the nurse to include the parents as much as possible. Teaching is also an important role during assessment, as the parents will usually be quite anxious to learn all that they can.

The last consideration of the assessment is the discharge planning. During the normal assessment, the nurse should keep in mind that discharge of the mother and infant. The physician will attempt to discharge the infant as soon as possible. We all know that the "well" infant does not need to "hang around" the hospital and catch an infection. This is another reason that the nursing assessment must be thorough, so that the infant is not discharged with any condition that was overlooked. Review the next section of this text, covering the assessment of the normal newborn, in order to detect any of these (and other) following conditions:

##### B. Birth Injuries

Objectives for this section: Each participant should be able to:



1. Name and identify seven neonatal birth injuries and their underlying causes
2. Name and identify the related risk conditions and potential complications of the above
3. Name and identify injuries needing immediate care or transport to high-risk center
4. Name and discuss emotional support provided to families of infants with birth injuries
5. Name and discuss appropriate nursing interventions needed for each of the injuries discussed in this section

All delivery rooms must be equipped to handle the life-threatening birth injuries which can occur, especially with a difficult delivery. The nurse must be able to assess the situation quickly and help the physician in attendance to prevent serious complication of the particular injury. The focus of this section will be to familiarize the nurse with the most common types of birth injuries and the assessment of the infant, along with the nursing care needed to prevent serious complications.

There are many possible birth injuries which can occur. Many do not need any special nursing care except to observe the condition to see if it becomes worse. We will present the seven most common in this section, but always remember that many more injuries are possible

#### CAPUT SUCCEDANEUM

This condition is a swelling of the presenting portion of the fetal head. It occurs as pressure is exerted upon the presenting part of the head, especially during prolonged labor, and before the cervix is fully dilated. The venous blood flow from the part is obstructed by pressure and by the tight squeeze. This results in soft, circumscribed swelling consisting of serum, and/or blood above the periosteum of the skull bone in the presenting part. If the swelling extends across the suture lines, the head has elongated appearance. Petechiae, pupura or ecchymoses are often present over the swollen area.

#### Nursing considerations:

There is usually no treatment for this condition. The nurse will constantly assess the size, shape and markings of the head. Observe for any further swelling and hematoma formation. Assess this condition carefully, to be sure that it is not a condition called cephalhematoma, which will be presented. The condition of caput succedaneum will usually resolve itself in several days. Occasionally this condition can cause anemia due to blood loss into the scalp. Assess the patient for signs of anemia, and transfusions may be required in rare cases.

### CEPHALHEMATOMA

This is a condition of bleeding between the cranial bones and overlying periosteal membrane. The cause is usually a difficult and/or prolonged labor and possibly from the use of forceps. These problems can cause rupture of the blood vessels located under the periosteum. On assessment, the nurse can palpate a soft, irreducible mass on the scalp. It is usually unilateral, but sometimes it can be bilateral. The hematoma does not cross suture lines, therefore, only one bone is usually involved. However, if more than one mass is palpated, it can mean that more than one bone has been traumatized. The masses can vary in size. They may become larger in the first several days, due to the slow nature of the bleeding which usually occurs. There may even be noticed a linear fracture of the skull on X-Ray under the hematoma. This disorder usually causes no harmful sequelae, even when there is a fracture. The nurse will assess the patient for signs of anemia, which can develop due to the blood loss.

Hyperbilirubinemia may also develop, requiring use of the photo-therapy lights for the resultant jaundice. Always remember to assess carefully for anemia and signs of severe hemorrhage which rarely can happen. This condition usually disappears in 2 weeks to 3 months. It takes that long for the hematoma to be absorbed. If there are complications due to fracture or jaundice, it may take longer.

<u>CAPUT SUCCEDANEUM</u>	<u>CEPHALHEMATOMA</u>
1. Present at birth	1. May not appear for several hours
2. Soft, pits on pressure	2. Soft, does not pit
3. Diffuse swelling	3. Sharply circumscribed
4. Crosses over sutures	4. Does not cross suture lines
5. Moveable on skull; seeks dependent portions	5. fixed to original site
6. Large at birth and gets smaller (gone in 24-48 hours)	6. Appears after a few hours; grows larger; takes 3 months to disappear

### FACIAL NERVE PARALYSIS

This is a temporary type of palsy which occurs due to pressure on the infant from forceps or pressure from labor pushing against the mother's sacrum. It can also be caused from intracranial bleeding.

The two types of paralysis are:

1. Central Facial Nerve Paralysis

This affects the lower portion of one side of the face. It is a spastic paralysis where the affected side appears smooth and full, the nasolabial fold is eliminated and the corner of the mouth drops. When the infant cries, its mouth is drawn toward the normal side. The movements of the forehead and eye are not affected.

2. Peripheral Facial Nerve Paralysis

This usually affects the entire side of the face, including the forehead and eye. When crying, the affected side is smooth, as in Central Nerve Paralysis, but the forehead and eye are involved. The eye usually will also remain open, due to paralysis of the orbicular muscle.

Nursing considerations include care of the open eye. The cornea may be damaged from the constantly open eye. Artificial tears should be put in the eye frequently to prevent drying of the cornea, sclera and conjunctiva. Feeding should be done carefully due to the difficult sucking of the infant.\*

\* Breast feeding mothers will need help for the infants with this disorder. Be sure to prevent aspiration, and continue to assess the progress of the infant.

Assessment includes both of these things plus possible gavage feeding and emotional support for the parents about the appearance of the infant. The symptoms will begin to disappear readily, the child steadily improving, and should be totally resolved by 2 or 3 weeks. If no improvement is seen in 7 to 10 days, the infant may be suffering from another type of nerve damage.

The nursing assessments are important to chart the progress of the disorder. Always carefully document your findings. Each hospital will have its own method of charting, so be familiar with it and use it. Infants, who still have symptoms which are severe, after one week, may be referred to an acute care center for evaluation and treatment.

## BRACHIAL PALSY

Paralysis to certain muscles of the arm may occur with an injury to the network of nerve fibers in neck and shoulder areas, the brachial plexus. The injury can be caused by edema, stretching or hemorrhage at the brachial plexus. During delivery, the plexus can be injured; especially in a vertex or breech delivery, if the head is laterally flexed. These are the three main type of Brachial Palsy:

1. ERB-DUCHENNE (upper arm) PARALYSIS

This is the most common form, an injury to the fifth and sixth cervical roots. The arm lies limp at the side in a position of extension and inward rotation. The palm of the hand

faces down or ever rotated outward with the thumb down. Moro reflex is weak or absent due to flexion of arm at the level of the shoulder. The grasp reflex is intact.

## 2. KLUMPKE (lower arm) PARALYSIS

This is a rare form, an injury to the eighth cervical and first thoracic roots. The hand and wrist are paralyzed, grasp reflex is absent, but deep tendon reflexes are intact. Sensory impairment along ulnar side of forearm and hand is present. Dependent edema of the hand can develop, along with cyanosis and changes in fingernails.

## 3. PARALYSIS OF THE ENTIRE ARM

Usually the arm is motionless, flaccid and hangs limply to one side. All reflexes are absent and the sensory deficit may extend to the shoulder.

## NURSING CONSIDERATIONS

Prognosis depends upon the type of injury and the site injured. Upper arm injuries usually heal in 3 to 6 months. Lower and total arm injuries usually leave some type of permanent paralysis.

When assessing the injury, use care not to further injure the arm. The physician will order the specific type of physical therapy needed to prevent the contractures and to minimize the wasting of the muscles. Always assess the extent of the paralysis and report any changes in motor or sensory ability. In upper arm paralysis, you may use a splint or brace for comfort and preventing deformities. Observe for signs of decreased circulation. Active and passive ROM (under orders), may be done until the ability returns. For the lower arm and total arm paralysis, splinting in a neutral position is needed along with passive ROM to arm, hand, wrist, and fingers. Always check the physician's orders and make a schedule so as to compliment the physical therapy department in their schedule of therapy.

## PHRENIC NERVE PARALYSIS

The most common cause of this injury is a difficult breech delivery. The 3<sup>rd</sup> and 4<sup>th</sup>, and 5<sup>th</sup> cervical spinal roots are the ones usually damaged by the lateral hyperextension of the neck during the delivery. The paralysis is usually unilateral, causing irregular and labored respirations, cyanosis, and no abdominal respirations which are usually present when there is no injury to the diaphragm. This disorder is often accompanied by brachial palsy. In severe cases, apnea and tachypnea may be present.

## NURSING CONSIDERATIONS

Assessment of this infant is vitally important. Always assess the respiratory rate and rhythm. Oxygen is usually administered along with the placing the infant on the affected side. Feeding can be started, depending upon the condition, by nipple or gavage.

If symptoms are severe, the infant will be transported to the ICU. If the condition is stable, the infant will still need close observation for a period of time. Most infants recover spontaneously in 6 weeks to 3 months. If the damage is severe and permanent however, the infant may need surgery to correct the collapsed lung or the pneumonia which can develop.

### CLAVICLE FRACTURE

This is one of the most common injuries which occur during delivery. They usually occur during a difficult delivery of vertex or breech positions where the shoulders are extended, or they are forcefully manipulated. A fracture will be suspected if Moro reflex is absent on affected side and there is limited movement of the arm.

The treatment is usually to immobilize the arm and relieve pain. The nurse will observe the infant closely for the first few days for complications. Assessment includes level of pain, respiratory assessment, immobilization, and teaching the parents the proper way to hold and lift the baby. Prognosis is good unless complications arise.

### ECCHYMOSES

This is usually caused by a traumatic or breech delivery. These bruises can also be caused by pressure and/or clotting defects or severe systemic infections. Most commonly, forceps can cause the bruises on the face and the scalp.

Ecchymoses usually resolve spontaneously in about one week. However, if the cause is something other than “normal” birth trauma, there may be concern for prognosis. Assessment is very important. The nurse must watch for signs of increasing ecchymosis or bruising. Signs of anemia may be indicated if there are large amounts of bleeding into the tissues. Jaundice may also develop, again, due to large blood loss. Serum bilirubin exams may be performed routinely, watch for any abnormal findings. Phototherapy may be necessary if hyperbilirubinemia is present.

Pre-term infants should be assessed even more frequently than full-term infants. They may need special care if large ecchymosis is present. The nurse’s careful assessment of all these factors and possible complications is essential to the well-being of the infant and the family.

### IN SUMMARY...

The nursing assessment of all these cases is important in order to prevent complications and to promote the infant’s struggle back to their optimal health. Teaching the parents is another important function, and can best be accomplished in most cases, while the nurse is assessing the infant...just show the parents what you are doing. They will also have a better sense of well-being if they feel they are participating in the care of their infant.

## POSTPARTUM TRANSITIONAL PERIOD

### DELIVERY ROOM ASSESSMENT

#### Objectives:

At the end of this section, each participant will be able to:

1. Define the transitional period and the adaptations which the infant must make to the extra uterine life
2. Differentiate between normal and abnormal characteristics of the newborn during the reactivity period
3. Name and discuss the 5 assessment criteria used for the Apgar score
4. Name and discuss the signs of inadequate oxygenation in the newborn
5. Name and discuss the problems of hypoglycemia in the new born
6. Name and discuss the principles of neonatal thermoregulation

The transitional period for the neonate is usually considered to be the first 24 hours of life. Other authorities will use a different definition for the transitional period, so do not be confused. Transition refers to adjustments which must be made by the infant in order to survive the world outside the uterus. The first 24 hours is usually the most crucial period for the infant. The adjustments which must be made include respiration, circulation, and changes to the liver, kidneys, and to the metabolic process.

The nursing assessment of the newborn involves more than just meeting the basic needs of the infant, it includes periodic assessment of all systems and recording them, so that the appropriate medical and nursing intervention can be initiated if necessary.

The assessment begins with a detailed history of the mother and the course of the pregnancy. As we discussed earlier, there are many factors during pregnancy which can affect the infant. There should also be a record of the labor and delivery, including the type of anesthesia, etc.

The first assessment is made immediately after the delivery. The Apgar score is taken and recorded. If the infant needs special care or resuscitation, he/she will be transferred to the ICU. However, the normal healthy infant will be taken to the normal newborn nursery soon after the

delivery. The Apgar is then repeated in 5 minutes. We will not go into detail about the Apgar because most nurses are already quite familiar with the scoring. If you do need refreshing, you may use any basic text in obstetrical nursing to review the Apgar scoring system (we also include a summary in the next section of this text).

The next major assessment is performed in the nursery within the first 6 hours after delivery. Hospitals have various time limits for the performance of this exam, so always check your own hospital policy.

The newborn's physiological status is assessed along with the heart and respiratory rates, also the gestational age. The third assessment is a complete physical examination, which is performed within the first 24 hours of life, or when the infant's condition is stable.

The following table summarizes the items on the assessment in the first 24 hours of life:

<u>ASSESSMENTS</u>	<u>DELIVERY ROOM</u>	<u>NURSERY</u>	<u>NURSERY</u>
Appearance (Apgar) (color)	Immediately and in 5 minutes	within 6 hours	within 24 hours
Pulse (Apgar)	Imm. And 5 min.	within 6 hours	24 hours
Grimace (Apgar)	Imm. And 5 min.	within 6 hours	24 hours
Activity (Apgar)	Imm. And 5 min.	within 6 hours	24 hours
Respirations (Apgar)	Imm. And 5 min.	within 6 hours	24 hours
Thermal Status	Immediately after birth	within 6 hours	24 hours
Birth injuries or congenital anomalies	Immediately after birth	within 6 hours	24 hours
Elimination; meconium, stool and voiding	Immediately after birth	within 6 hours	24 hours
Height, weight, head circumference	Immediately after birth	within 6 hours	
Gestational Age	Immediately		
Response to stimuli	Immediately	within 6 hours	24 hours
Complete physical and neurological examination			within 24 hours

### REACTIVITY PERIOD

The initial period of reactivity is the first 30 minutes of life. It is characterized by rapid, fluctuating heartbeat and alertness. The respirations are being established and the infant reacts to stimuli. There may be slight cyanosis, but it soon disappears. During this period, the infant should be assessed for all of the above items. The nurse should be ready to use resuscitation equipment if needed.

During this time, it is also important that the mother have contact with the infant. The nurse should make the assessment and then let the mother hold the infant for as long as possible. You should always follow established procedures, but this contact with the mother is known to be very important. Also keep in mind that there are many variations of normal. Some infants do not easily tolerate handlings, so perform the exam as quickly and thoroughly as possible.

## **OTHER NURSING ASSESSMENTS**

### **NECNATAL THERMOREGULATION**

The neonate's temperature should be maintained at 36.6 to 37 degrees Centigrade. Normal rectal temperature ranges from 35.5 to 37.5 degrees. The nurse will assess and maintain infant's temperature at an acceptable level. Hypothermia can lead to hypoxia and/or anoxia or possibly hypoglycemia in newborns. The nurse can do much to prevent heat loss while performing the assessment of the newborn. This is one of the times where hypothermia can develop.

1. The receiving area for the newborn should be away from drafts.
2. Keep infant on blankets or heated mat (heated blankets) after the delivery.
3. After delivery, infant should be dried immediately; wrapped in warmed sterile blankets.
4. Give extra heat during procedures such as examination, oxygen administration, the circumcision, etc.
5. Expose smallest part of body as possible during procedures such as foot printing, etc.
6. Do not give gull bath until temperatures has stabilized; monitor the temperature during assessment process.
7. Do not overheat; always continue to monitor the temperature while the infant is in a heated crib or incubator.

These and other measures can be performed by the nurse during the assessment. If you are unsure of other measures to endure the warmth of the infant, review any basic text on heat loss of the infant. Heat production and heat loss are in delicate balance in the newborn infant and the nurse can do much to minimize losses during assessment process.

### **HYPOGLYCEMIA IN THE NEWBORN**

Blood sugar levels in the newborn decline immediately after birth to levels of 50 to 60 mg/100ml in 4 – 6 hours. After birth, levels are 90 to 100 mg/100ml. When assessing the newborn, the nurse must observe for signs of hypoglycemia which include tremors, cyanosis, convulsions,



apnea, irregular respirations, apathy, lethargy, high-pitched weak cry, eye-rolling or low body temperature.

It is normal for infants to have fluctuations in the blood glucose levels, however, in 4 to 6 hours, levels will stabilize to 60 mg/100ml. Male newborns have an increased incidence of hypoglycemia over female incidence. Premature infants also have a higher rate than full term infants. Also at risk are infants under any intrauterine stress. They tend to burn any stored glucose before birth, and thus have low reserve after birth. Infants of diabetic mothers (IDM) are at higher risk, as well as newborns of toxemia mothers and the smaller of newborn twins.

Each nursery will always have its protocol for screening for hypoglycemia, most use the Dextrostix, and blood from a “heel stick” of the infant. Always be familiar with the procedure at your facility for the screening process.

Treatment for this condition will usually be the administration of glucose by slow intravenous drip. If the nurse suspects hypoglycemia during the assessment, the physician will be notified and appropriate orders carried out to administer the glucose. The goal of the therapy will be to maintain the level of glucose above 30 to 40 mg/100ml. The nurse will continue to assess the infant for signs of improvement.

In summary, the nurse should be aware of hypoglycemia or hyperglycemia in the infant. During the routine assessment process, gather information regarding those at-risk infants. The nurse must also maintain skills related to glucose metabolism in the infant and feeding the infant, in order to maintain adequate glucose levels in the newborn. If the nurse will dry the newborn immediately after birth and maintain the normal body temperature, the infant will be less likely to develop hypoglycemia. Lastly, the nurse should be familiar with monitoring the intravenous solutions of glucose, should the infant require it. Intake and output will be recorded for infant, including feedings, the type and amounts.

## **CONGENITAL ANOMALIES**

Objectives:

At the end of this section, each participant will be able to:

1. Identify the congenital anomalies which may be life-threatening.
2. Identify those anomalies which may not be life-threatening, but need further assessment and also treatment.
3. Describe specific anomalies as presented on an objective exam at the end of the course.
4. Know the potential risks and prognosis for the described anomalies.

5. Identify the specific assessment procedures involved in assessing the newborn with congenital anomalies.

### LIFE-THREATENING ANOMALIES

This section will present the major anomalies which can have a serious effect upon the newborn. When we discuss assessment of these conditions, we will concentrate our efforts on the assessment process itself and the role of the nurse.

#### Congenital Heart Defects:

Malformation of the heart and blood vessels account for approximately 8 per 1,000 births, at this time. Infants may have one or several of these anomalies, resulting from improper closure of heart and blood vessel structures. There are many types of these anomalies, but we will concentrate on presenting the major ones only.

Each of the following anomalies can cause severe circulatory problems in the newborn. The defects are classified according to their hemodynamic effects upon the infant. Some defects cause cyanosis and some do not. Some defects cause increased or decreased pulmonary blood flow. Still other defects cause a combination of problems, so they will be classified differently from the others.

#### Acyanotic disorders:

- a. Patent ductus arteriosis—blood flows into pulmonary artery instead of the aorta.
- b. Ventricular septal defect—shunts blood from left to the right ventricle.
- c. Artial septal defect—left to right shunting of blood.
- d. Endocardial cushion defect—causes shunting of blood from left to right atrium.

#### Obstructive Disorders:

- a. Aortic stebosis—increased pressure load on left ventricle.
- b. Coarctation of the aorta—obstructs flow through the aorta.
- c. Pulmonary valvular stenosis—increased pressure load on right ventricle.

#### Admixture Disorders: (cyanosis is usually present)

- a. Complete transposition of the great vessels—unoxygenated blood flows to the body and oxygenated blood flows back to the lungs.

- b. Truncus arteriosus—one common arterial vessel, cannot supply sufficient blood to the systemic and pulmonary circulation.
- c. Anomalous venous connection of the pulmonary veins—abnormal transfer of blood to the right side of the heart via the pulmonary veins.
- d. Tetralogy of fallout—four major defects.
- e. Tricuspid atresia—obstruction of flow from right atrium to right ventricle.

#### ASSESSMENT OF THE NEWBORN WITH A CONGENITAL DEFECT (S)

1. Cry
  1. Weak and muffled or loud and breathless
  2. Color
    - a. cyanotic—usually generalized, increases in the supine position, usually deepens with crying, usually not improved with oxygen administration
    - b. acyanotic—pale, may be mottling with exertion
3. Activity Level  
Restless, lethargic, unresponsive except to pain, lack of movements when crying
4. Posturing  
Flaccid muscles, hyperextension of neck, opisthotonos, dyspnea when supine, knee-chest position is favored.
5. Cardiac  
Persistent bradycardia or tachycardia
6. Respirations  
(counted when infant is sleeping) tachypnea, retractions with nasal flaring, dyspnea with diaphoresis, gasping or grunting.
7. Feeding

Anorexia, poor sucking, difficulty coordinating the sucking, swallowing and breathing (pulls away from nipple to take a breath), slow feeding with frequent rest pauses, unable to feed by nipple.

This is a guide to nursing assessment. Each nurse will observe each of the above common objective findings for the assessment process. Most of the cyanotic disorders are easy to observe, and usually are treated immediately by the physician. The nurse must always be alert for the above signs or symptoms for detecting the less obvious anomalies.

Early diagnosis can be made with the help of observation by the nurse of these and other abnormal signs and symptoms. Prognosis for these conditions is better with early diagnosis. Again, always follow hospital protocol if you suspect these conditions in the newborn; report negative findings quickly.

### NEURAL TUBE MALFORMATION

The closure of the neural tube, the precursor to the brain and spinal cord, occurs at about the fourth week of gestation. If incomplete closure happens, a variety of different disorders may occur. The following disorders are a result of incomplete closure at various points along the neural tube.

1. Spina Bifida
  - a. spina bifida occulta—in the lumbosacral region, with incomplete fusion of arch (es) of the posterior spine
  - b. spina bifida cystica—cystic lesion forming in the spinal column
2. Meningomyelocele

Is a sac-like herniation of the meninges, through a herniation defect in column (part of cord protrudes into sac)
3. Meningocele

Is a protrusion through the spina bifida that does not contain central nervous tissue (no cord protrusion)

This is an overview of the conditions of the spine. When the nurse assesses these conditions, most will be highly visible and obvious. However, there are some cases of spina bifida which are not as readily apparent. The nurse must carefully assess these conditions. Assessment includes:

1. Careful recording of lesion; size, color, shape, texture, and any other characteristics (very gently palpate if allowed)

2. Assess neurological involvement; paralysis, flaccidity, spasticity, sphincter control, leakage of spinal fluid
3. Assess for infection; temperature, redness, etc.
4. Assess for associated problems; hydrocephalus (check head circumference daily); club foot

The prognosis of the infant depends upon the extent of involvement of the central nervous system. If there is extensive brain involvement, the prognosis is usually poor. If there is minimal or no brain or spinal involvement, the prognosis is usually good. The nursing care involves positioning the newborn carefully, to avoid pressure on the lesion. Also the nurse should use sterile towels to help prevent infection of the area. The nurse will also be careful when holding and bathing the infant. Teaching is also important, for the parents of this newborn, there will be many concerns. Have them discuss the treatment method (s) with the physician, as there is a great deal of controversy regarding the different treatments available.

### DIAPHRAGMATIC HERNIA

This condition is an incomplete development of the diaphragm that allows displacement of abdominal organs into the thoracic cavity. This defect can be minimal, in which case, the repair is easily made. However, the defect can also be major in some cases. In the latter case, the hernia can cause severe respiratory distress, due to compression of the lung tissue. This compression can actually interfere with the normal development of the lungs, causing hypoplasia. Assessment of the infant may be difficult. In mild conditions, the infant could be asymptomatic. In very severe cases, the infant may need resuscitation due to the total absence of respiration at birth. In this case, the exact cause of difficulty may not be known until later X-rays confirm the diagnosis.

The nurse will assess for:

1. any respiratory distress
2. large or asymmetric chest contour
3. dullness to percussion on the affected side
4. bowel sounds are heard in the thoracic cavity
5. breath sounds are diminished
6. shift of heart to side opposite hernia
7. scaphoid (hollowed or boat-like) abdomen
8. X-rays confirm presence of intestines in the thorax, as well as mediastinal displacement

The prognosis is usually quite good if detected before severe respiratory difficulty develops. The nursing management includes careful observations and positioning of the infant for best possible breathing. Severe cases need ICU support.

### CHOANAL ATRESIA

This condition is a congenital obstruction of the passage between the nose and the pharynx. It may be partial or complete. Newborns may get into trouble with this disorder, as they do not learn to breathe through the mouth until about 2 to 3 weeks after birth. Therefore, if the obstruction is complete and bilateral, the infant rapidly becomes cyanotic after birth.

Assessment includes the following:

1. maintaining an airway while assessing the infant
2. observe for increasing dyspnea after birth
3. observe for nasal discharge; often accompanies this disorder
4. infant will attempt to mouth-breathe
5. observe for abnormal respirations (snorting, retractions, etc.)
6. feeding difficulty (in mild cases)

The infant with a mild case (smaller obstruction) may have few if any symptoms, the nurse should observe for any of the symptoms listed above when assessing the infant. If this condition is suspected, there will be resistance when you try to gently pass a flexible catheter into the nose. The prognosis is usually good if this condition is discovered early and there is no severe respiratory distress. Many infants also have other anomalies when this one is present, so assess the infant carefully for any other hidden conditions.

### ESOPHAGEAL, ATRESIA AND TRACHEOESOPHAGEAL FISTULA

Both of the above conditions may occur together or separately. As you recall, atresia is a malformation which forms a blind pouch in the esophagus. A fistula is a passage from the esophagus to the trachea. An X-ray is the best way to diagnose the condition, but the nurse should assess for these:

1. accumulation of oral secretions
2. choking or coughing episodes soon after feedings
3. cyanosis after feeding
4. abdominal distension after crying (fistula only)

5. passage of flexible tube can be used to screen infants  
(done by experienced personnel only)

Today the condition is usually diagnosed soon after birth and treated surgically. However, many of the infants with either of these conditions also may have other defects which complicate the treatment. It is essential to assess and identify the conditions as soon as possible and start the treatment so as to prevent complications. Do not feed the infant if these are suspected, until the problem has been corrected.

### OMPHALOCELE AND GASTROSCHISIS

Omphalocele is a protrusion of the viscera through the abdominal wall, in the area of the umbilical cord. Gastroschisis is similar, except the protruding viscera is in another location, usually the right side of the abdomen.

The nurse should assess for the large opening and protrusion of viscera, and usually it is quite obvious. The nursing responsibilities include preventing further injury and sepsis. The prognosis is usually quite good today, as long as intestinal functions can be re-established. If other anomalies are also present, the prognosis may be guarded.

### INTERSTINAL OBSTRUCTION AND IMPERFORATE ANUS

These two conditions will obstruct the intestinal tract and usually must be corrected surgically.

Assess for:

1. Intestinal Obstruction—abdominal distention, bile-stained or fecal vomiting
2. Imperforate Anus—obstruction to inserting thermometer, be careful when inserting thermometer for first time

These conditions can usually be repaired surgically, depending upon the degree of obstruction and malformation. In many cases, other anomalies also exist, further complicating the recovery. Mortality for these conditions is about 10%, and usually is due to complications.

### NON-LIFE THREATENING CONGENITAL ANOMALIES

#### CLEFT LIP AND CLEFT PALATE

These disorders may occur alone or may occur together. Cleft lip is usually very apparent upon visual examination. Cleft palate may require an experienced examiner.

Assessment includes:

1. inspection of the areas involved for any obvious deformity
2. regurgitation of fluids through the nose when feeding the infant

The prognosis is usually good when detected early. Surgery to correct the problem is usually quite successful. The nurse should take special care for the infant during the feeding, in order to prevent aspiration and infection. If cleft lip alone is present, there is little danger of feeding problems. It is usually only the cleft palate that causes the problems. However, both conditions are often present together. Be sure to address the emotional aspects of these disorders upon parents. It is usually disturbing to them to see such deformities.

### AMBIGUOUS GENITALIA

Careful examination of the genitalia is a part of the assessment process. In some cases, the sex of the child is mistakenly given to the parents, and later is found to be the other sex. The child may appear first, to be the sex that they are not. This is due to congenital malformation of the external organs.

The assessment of the infant is just like any other assessment. However, if you are in doubt as to sex of the infant, you should carefully describe and record appearance of external genitalia. Actual determination of the sex of the infant may have to be determined by lab tests and other examinations. In cases where organs are non-functional, and will affect adult life of the individual, expert counseling should be available to the medical team and to the parents. There must be a decision made as to the rearing of the child, as male or female. Plastic surgery is available to reconstruct the genitalia if necessary.

### CHROMOSOMAL ABNORMALITIES

There are many different types of malformation possible do to abnormal chromosome numbers or positions. Some abnormalities are easily recognized, such as Down's syndrome. Other problems are not so easily recognized.

The nurse should assess for these:

1. Head  
Abnormal size or shape
2. Eyes  
Too far apart, close together, long eyelashes, unusual size, and presence of colobomas
3. Ears



Abnormal length, no ear lobes, unusual shape, low-set beaked, upturned, bulbous, pinched, broad-bridged

4. Nose

Beaked, upturned, bulbous, pinched, broad-bridged

5. Oral region

Lip pits (depressions), serrated gingivae, shape of mouth

6. Neck

Short, webbed

7. Skeleton

Polydactyl, syndactyl

8. Hand

Clinodactyl, broadness, bent; tapered fingers, abnormal dermatoglyphics

9. Assorted symptoms

Gastrointestinal, neurological, cardiovascular

## **NEONAL GROWTH AND MATURITY**

Objectives:

At the end of this section, each participant will be able to:

1. Name the factors involved with assessing the growth and maturity of the newborn
2. Name and discuss how to estimate gestational age from obstetrical data
3. Name and define the criteria used to identify the infant as full-term or not
4. Assess infant's gestational age by physical measurements
5. Name 11 signs that can be used to assess the infant's physical maturity
6. Name 10 signs that can be used to assess neurological maturity

Until recently, the only factor used to determine developmental age of the newborn, was weight. Today, the gestational age is determined, in order to assess the maturity of the infant.

These are three methods used to assess neonatal growth and maturity:

- a. Duration of the pregnancy as computed from the onset of the mother's last menstrual period and other obstetrical data
- b. Growth  
As determined by birth weight and size of infant
- c. Maturity  
Physical and neurological development of the infant

### GESTATIONAL AGE FROM OBSTETRICAL INFORMATION

The first of the three categories is gestational age, and is the most frequently used and obtained from obstetrical records. There are situations where this is inaccurate, but most often the date of last menstrual period is used. Fertilization occurs approximately 2 weeks after the onset of the LMP (last menstrual period).

From this fertilization date, the "normal" newborn gestation period is about forty weeks. 38 weeks to 42 weeks is also considered normal. Infants born before the completion of the 37<sup>th</sup> week are "preterm". Those born after the 42<sup>nd</sup> week are "post term".

Examinations of the amniotic fluid, ultrasonic measurements and fundal height may help to indicate gestational age when the LMP is not precisely known. These items however, are not accurate and will be used in conjunction with any other data available.

### ASSESSMENT OF GROWTH

The following three items are widely used to determine the physical growth of the infant in relation to the gestational period of the infant. These items can be affected by other circumstances. Genetic differences can affect these; as well as can: diabetes, anomalies, drugs, prenatal care, and many other factors. It will be pointed out that since there are many factors that influence physical characteristics of the infant, all factors must be considered before calling an infant "at-risk" by saying he/she is premature.

1. Birth Weight

SGA, Small for Gestational Age, at 40 weeks less than 2500 Grams

LGA, Large for Gestational Age, at 40 weeks more than 3750 Grams

2. Length

Assess crown to heel length in centimeters

3. Head Circumference

Assess frontal-occipital circumference

#### ASSESSMENT OF MATURITY

The following section will present a reference guide for assessing the maturity of the infant. This maturity can be correlated to the infant's gestational age which we have already discussed. According to Korones, an infant should reach an acceptable level of physical maturity by a certain gestational age. After we have presented all assessments to be made, we will present the level of growth which the newborn should attain by birth.

#### Physical Assessment:

1. after birth record: date and time of birth
2. gestational age (according the LMP method)
3. weight in Grams
4. Apgar scores at 1 minute and 5 minutes

There are a number of assessment procedures for determining the assessment of maturity.

These are the guidelines for assessment by Dubowitz:

1. presence or absence of edema
2. skin texture and color and opacity
3. presence or absence of lanugo
4. plantar creases
5. nipple formation
6. breast size
7. ear form and firmness
8. genitals

All of these items can be significant when the physician determines the maturity of the infant. Most nurses will not normally conduct this in-depth assessment. However, your findings may be very helpful to the final determination of the infant's maturity. Your hospital may use a different scale, but they all are essentially the same.

### NEUROLOGICAL ASSESSMENT

The following assessment data will be used in conjunction with information previously obtained, in order to determine the maturity of the infant. If the infant is found to be under-developed or over-developed, the infant might be at-risk for certain special types of disorders of maturity. It may mean that there is a congenital deformity which has not surfaced yet. The guide we are presenting may be different from the one used at your facility; always use your hospital's procedure. If you have further questions, you may use any basic pediatrics or obstetrical nursing textbook for further details.

1. Posture

Normal newborn flexes both arms and legs when lying quiet and supine

2. Square Window

The normal newborn's hand and wrist will flex greatly, so that the angle between hand and forearm is very low (30 degrees or less)

3. Ankle Dorsiflexion

Same as above, when gently flexed by the examiner, the angle between dorsum of foot and leg is very low (30 degrees or less) (extreme flexion is possible)

4. Arm Recoil

Normal newborns will recoil their arm about half way or up to 90 degrees after the arm is flexed at the elbow by the examiner for at least 5 seconds. Then after fully extending the arm by pulling on the hand, the infant's arm should recoil; be sure infant is supine.

5. Leg Recoil

Similar to above, when the infant's hips are flexed by examiner and then pulled out straight, they will partially recoil (up to about 90 degrees)

6. Popliteal Angle

Similar to above, start with infant's thigh flexed in the knee-chest position, and leave it there by holding it gently. Now extend the lower leg as much as possible and let it go. The lower leg should return and form an angle of about 90 degrees.

7. Heel-to-Ear Maneuver

In the supine position, extend the foot as close as possible to the infant's head. Note the angle of the knee (lower leg and thigh), it should be about 90 degrees or slightly higher angle.

8. Head lag

Start infant in supine position and begin to pull to a sitting position by grasping both hands. If the head is supported by the infant in an even plane with the rest of the body, the infant is normal. The head should not "lag" behind for any period of time.

9. Ventral suspension

Suspend the infant in the prone position with a hand (or tow) under the infant's chest. In the normal infant, the back should be only slightly arched and the arms and legs should be held by the infant at an angle to the body, with elbows and knees flexed. (If dropped down, would be in a crawling position).

This was a detailed assessment that the nurse can perform or assist with. Record all findings, especially if abnormal. All of these neuro tests will show that the normal newborn infant should have a certain amount of neuro-muscular control over its body, even immediately after birth. The tests here should be performed when the infant is at rest. If crying, the tests may not be valid. If the infant over-reacts or under-reacts, it may mean that the infant is over or under developed for its gestational age. If the infant does not react normally, remember that it may be only a variation of normal. If there are grossly abnormal findings, report them immediately.

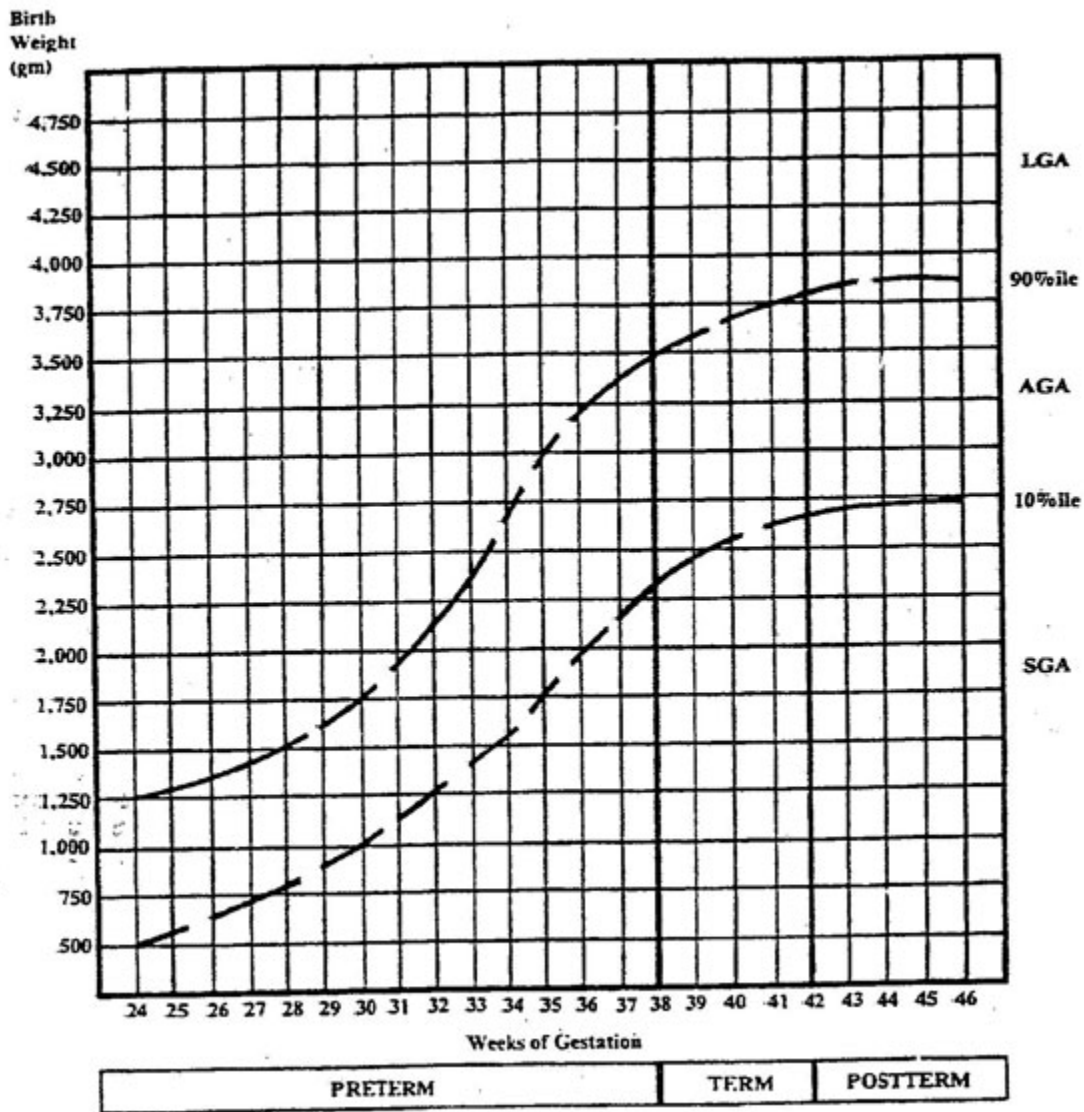


Figure 1. Classification of newborns by birth weight and gestational age.

Note. Adapted from "Neonatal Mortality Rate: Relationship to Birth Weight and Gestational Age" by L.O. Lubchenco, D.T.

Searls, & J.V. Brazic, "The Journal of Pediatrics", October 1972, 814-822. Copyright 1972 by C.V. Mosby. Reprinted by permission

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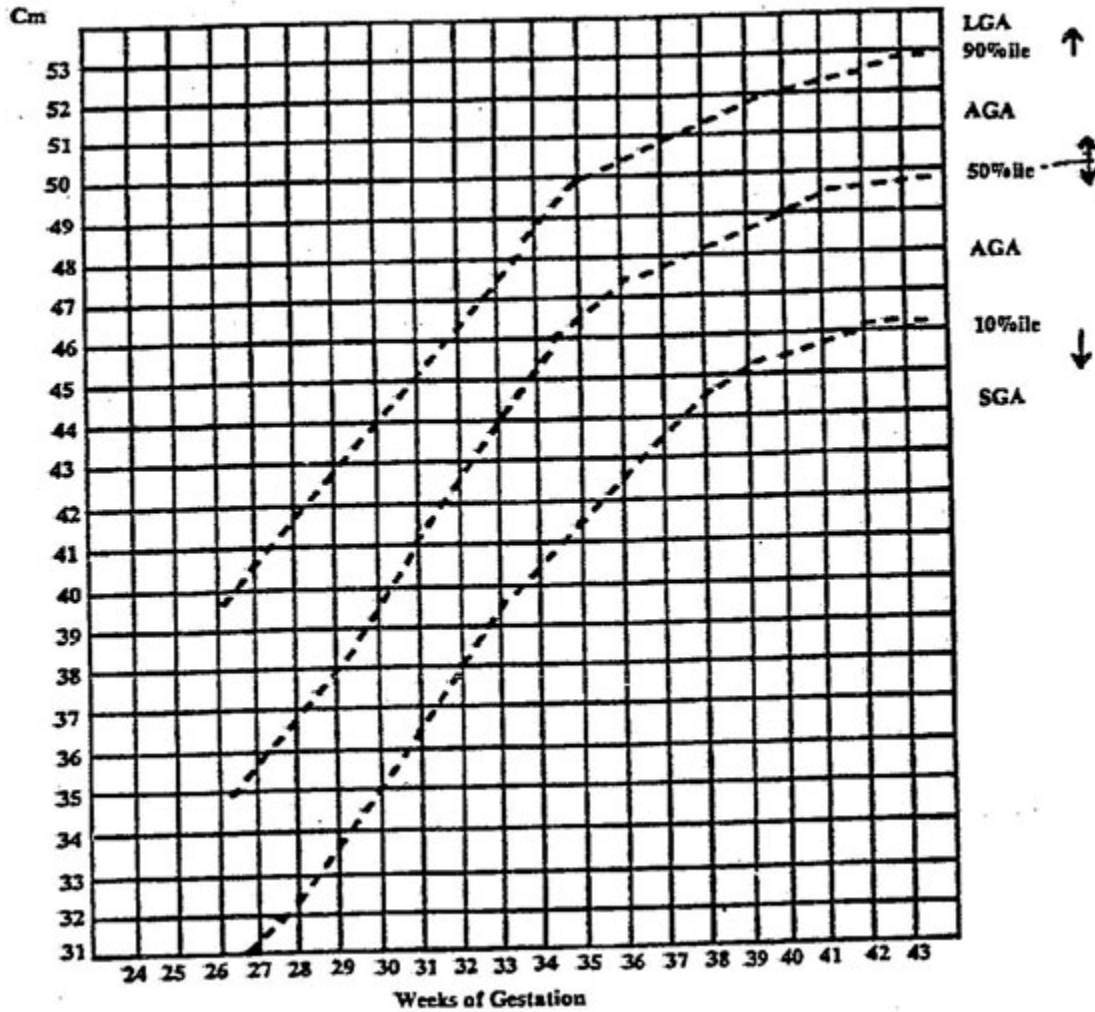


Figure 2. Classification of newborns by length and gestational age.

Note. Adapted from "Intrauterine Growth in Length and Head Circumference as Estimated from Live Births at Gestation Ages from 26 to 42 Weeks" by L.O. Lubchenco, C. Hansman, and E. Boyd, *Pediatrics*, 1966, 37(3), 403-416. Copyright 1966 by the American Academy of Pediatrics. Reprinted with permission.

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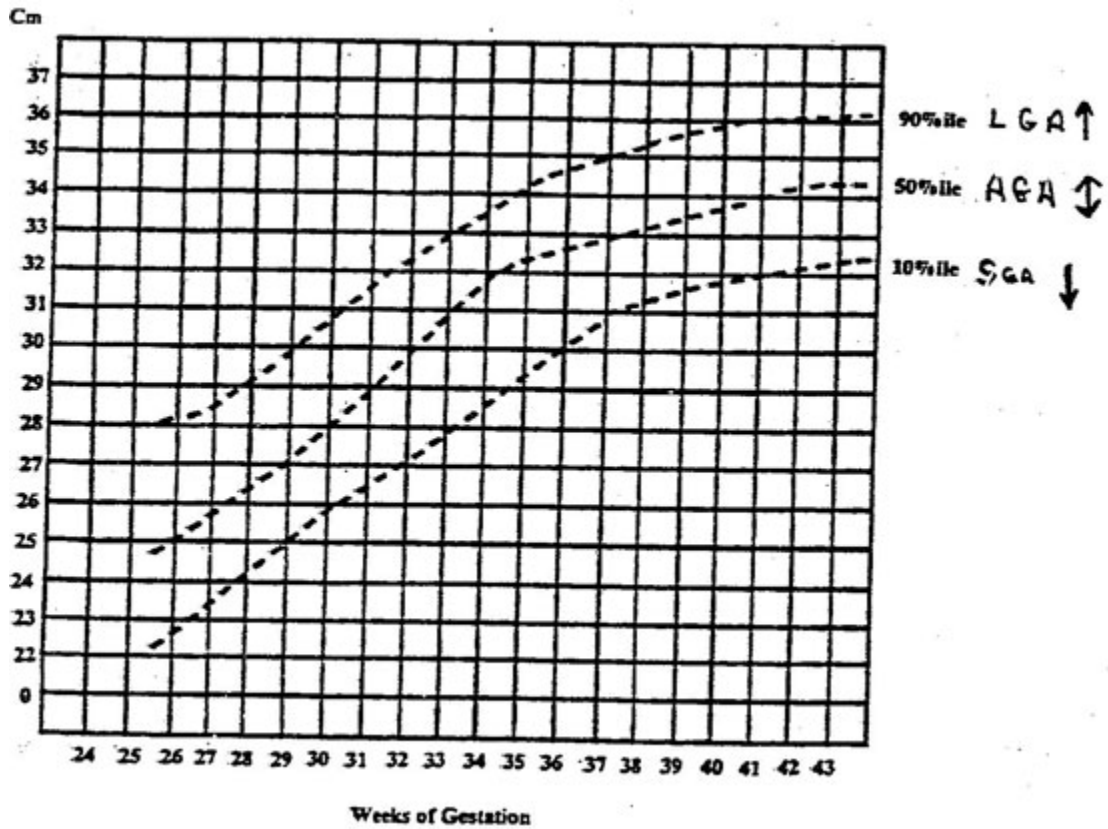


Figure 3. Classification of newborns by head circumference and gestational age.

Note. Adapted from "Intrauterine Growth in Length and Head Circumference as Estimated from Live Births at Gestational Ages from 26 to 42" Weeks. By L.O. Lubchenco, C. Hansman, and E. Boyd, Pediatrics, 1966, 37(3), 403-416. Copyright 1966 by the American Academy of Pediatrics. Reprinted with permission.

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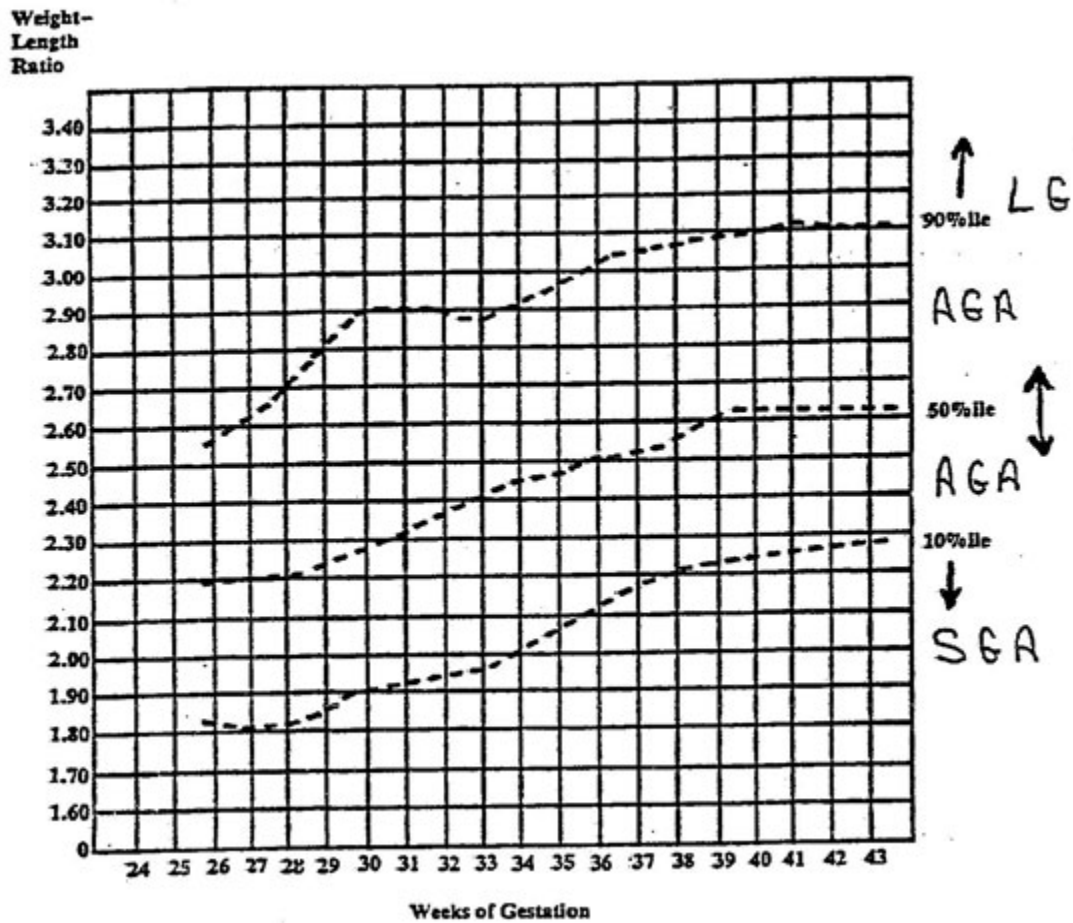


Figure 4. Classification of newborns by weight-length ratio and gestational age.

Note. Adapted from "Intrauterine Growth in Length and Head Circumference as Estimated from Live Births at Gestational Ages from 26 to 42 Weeks" by L.O. Lubchenco, C. Hansman, and E. Boyd, *Pediatrics*, 1966, 37(3), 403-416. Copyright 1966 by the American Academy of Pediatrics. Reprinted with permission.

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## PERINATAL ASSESSMENT

## TEST

Choose the one best answer for each question, unless the question states there is more than one answer. Please use pencil and return only the answer sheet to us for grading. There will be some blank spaces on the answer sheet.

1. Eclampsia is defined as hypertension, edema, proteinuria prior to the 20<sup>th</sup> week of gestation T F
2. In mild preeclampsia, the systolic blood pressure is 150 T F
3. At the 12<sup>th</sup> week of gestation, Fetal Heart Tones can be heard with the fetoscope. T F
4. At birth, the average infant is about 20 inches in length and weighs about 7 pounds. T F
5. Lactose present in the urine means that diabetes is present. T F
6. A urinary tract infection might cause symptoms of discoloration of the urine and preteinuria. T F
7. Rh determination is performed during the prenatal period only if the woman is blood type Rh negative. T F
8. Antibody screening is not necessary if this is the first pregnancy for the client. T F
9. All but one of the following are routine tests for all clients at the first prenatal visit. Which one is not?
  - a. CBC
  - b. sickle cell screen
  - c. urinalysis
  - d. hypertension screening
  - e. hemoglobin
10. At birth, the umbilical vein becomes the:
  - a. broad ligament
  - b. round ligament
  - c. obliterates completely
  - d. ductus ligament
11. The hormone Estriol is excreted:
  - a. 10<sup>th</sup> month of pregnancy
  - b. 1<sup>st</sup> month of pregnancy
  - c. in non-pregnant women
  - d. throughout pregnancy

12. Another name for the oxytocin challenge test is called the:
- a. hormone monitoring test
  - b. quickening test
  - c. stress monitoring
  - d. serological test
13. During pregnancy, the client's cardiac output may rise as much as:
- a. 10%
  - b. 20%
  - c. 40%
  - d. 50%
  - e. none of these
14. A warning sign/symptom of mild preeclampsia is:
- a. low hemoglobin
  - b. polyuria
  - c. decreased WBC's
  - d. increased proteinuria
15. Which of the following are most prone to preeclampsia? (more than one answer)
- a. woman over 35
  - b. diabetic client
  - c. Rh negative women
  - d. all obese women
  - e. a and b
16. The first 24 hours of life is the transitional period T F
17. The assessment begins with a detailed history of the mother. T F
18. In about four hours after birth, the infant's glucose should be about 90 mg/100ml. T F
19. At about 40 weeks of gestation, the average infant weight-length ratio is about 2.60 (from chart). T F
20. Rubella contracted in the first trimester, is the most dangerous for the fetus. T F
21. Tobacco smoke effects are seen only in the newborn infant. T F
22. The mother took contraceptives and became pregnant, there is no greater risk for the pregnancy. T F
23. Infants with facial nerve paralysis may need assistance during their feeding. T F
24. A fractured clavicle is one of the most common injury that occurs during delivery. T F
25. The presence of a torch infection always means that an inflammation will also be present. T F

26. Which is performed within the first 5 hours of life
- a. head circumference
  - b. respirations
  - c. complete neuro exam
  - d. readiness for feeding
  - e. all of the above
27. Which is performed in the first minute of life
- a. head circumference
  - b. respirations
  - c. readiness for feeding
  - d. b and c
  - e. all of the above
28. Which is performed only once in the first 24 hours
- a. head circumference
  - b. respirations
  - c. complete neuro exam
  - d. a and c
  - e. all of the above
29. Which is performed only once in the first 6 hours
- a. head circumference
  - b. respirations
  - c. complete neuro exam
  - d. readiness for feeding
  - e. all of the above
30. Which is performed immediately and in first 24 hours
- a. head circumference
  - b. respirations
  - c. complete neuro exam
  - d. readiness for feeding
  - e. all of the above
31. Which is a non-life-threatening anomaly?
- a. aortic stenosis
  - b. meningocele
  - c. intestinal atresia
  - d. neural tube malformation
  - e. cleft lip
32. Symptoms of toxoplasmosis in infected infants usually occur by:
- a. at birth
  - b. one year after birth
  - c. in adulthood
  - d. immediately after birth
  - e. none of these
33. A disease transmitted to the infant, having very few adverse effects, But leaves the infant a carrier is:
- a. toxoplasmosis
  - b. rubella
  - c. cytomegalovirus
  - d. hepatitis B
  - e. none of these

34. If infant is delivered vaginally with open herpes sores present, the infant will have:
- a. a 30-50% infection rate
  - b. toxoplasmosis
  - c. a CMV infection
  - d. no consequences
35. During the initial reactivity period, the heart rate:
- a. stays at 150 bpm
  - b. stays below 150 bpm
  - c. fluctuates up and down
  - d. remains stable
  - e. none of these
36. Which condition may develop if newborn's temperature falls too low?
- a. tachycardia
  - b. tachypnea
  - c. hypoxia
  - d. hypercholesterolemia
37. The most important tool used in treatment of congenital defects is:
- a. temperature regulation
  - b. surgery
  - c. heart bypass
  - d. early diagnosis
38. Which condition appears only after a few hours
- a. caput
  - b. succedaneum
39. Which condition exhibits as diffuse swelling
- a. caput
  - b. succedaneum
40. Which condition exhibits as pitting upon pressure
- a. caput
  - b. succedaneum
41. Which condition exhibits as fixed to one side cephalhematoma
- a. caput
  - b. succedaneum
42. Which condition exhibits as sharply circumscribed
- a. caput
  - b. succedaneum
43. Which is 40 weeks and 53 cm length
- a. IGA infant
  - b. AGA infant
  - c. SGA infant
44. Which is 40 weeks and 33 cm head
- a. IGA infant
  - b. AGA infant
  - c. SGA infant

45. Which is 42 weeks and 35 cm head

- a. IGA infant      b. AGA infant      c. SGA infant

46. Which is 37 weeks and 3.2 ratio

- a. IGA infant      b. AGA infant      c. SGA infant

47. Which is 42 weeks and 2.2 ratio

- a. IGA infant      b. AGA infant      c. SGA infant