Theoretical Knowledge and Skills
in the Nursing Assessment of Fetal Health
NSG3207
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Objectives

1. Discuss the nurse’s role in antepartal risk assessment.
2. Explain how fetal movement counts are used as a diagnostic tool and the significance of results.
3. Identify specific information obtained through the use of a fetal monitor.
4. Describe the criteria to define baseline fetal heart rate (FHR) and evaluate periodic changes from an electronic monitor strip.
5. Discuss the significance and implications of fetal heart rate variability and fetal heart rate accelerations.

Objectives

6. Differentiate how the non-stress test (NST) and a contraction stress test (CST) are performed, the indications for use of each, and the significance of results.
7. Describe how diagnostic ultrasound is used as a tool in fetal surveillance.
8. Describe the different types of biochemical assessments, the implications for use, how each is performed, and the significance of results.
9. Identify the components of a biophysical profile (BPP), how it is scored and the significance of results.
Objectives

10. Demonstrate the use of Leopold's Maneuvers to identify the location on the maternal abdomen where fetal heart tones (FHT's) are most likely to be heard clearly.
11. From a 10 minute monitor strip, identify the frequency and duration of contractions.
12. Differentiate the four different types of fetal heart rate decelerations, the etiology of each one, and nursing interventions to promote optimal fetal oxygenation should one occur.

Objectives

13. Evaluate a monitor strip to determine if the FHR pattern reflects a reassuring or a non-reassuring pattern.
14. Evaluate the data from a fetal monitor strip for the presence of unique or abnormal fetal heart rate patterns, the suspected etiology and nursing interventions used to manage them.
15. Discuss nursing implications of documentation of fetal heart tracings.

Antepartal Risk Assessment

- Goal is to detect potential fetal compromise and intrauterine asphyxia of the fetus so that the healthcare provider can take measures to minimize adverse reactions
Fetal movement counts (kick counts)

- Assessment of fetal activity by the mother
  A count of fewer than three fetal movements within one hour warrants further evaluation.
  No fetal movement in 10-12 hours is a significant finding.

The presence of fetal movement is generally a reassuring sign of fetal health.

Introduction to Fetal Monitoring

- Electronic Fetal Monitoring has been used since 1970's.
- Two types of FHR monitoring – external and internal.
- Specific information obtained through use of the FM gives the clinician an indirect way to assess fetal central and peripheral nervous systems and metabolic changes in utero.

Specific information obtained

- FHR Baseline
- FHR baseline variability
- Uterine tone and activity
- Fetal response
External fetal monitoring

- Ultrasound transducer works by reflecting high-frequency sound waves from a moving interface.
- Measures long-term variability
- Can be difficult to use on obese patients
- Monitoring not always continuous due to fetal movement or pt. movement.
Internal fetal monitoring

- Able to measure short term variability as well as beat to beat changes
- Requires rupture of membranes, adequate cervical dilation and presenting part low enough to allow placement of electrode
- Allows continuous FHR monitoring
- Idea of electrode concerns some parents—explain well before placing by specially trained nurses or MD

Assessment of Fetal Heart Rate

- Baseline Rate – FHR between contractions over a 10 minute period
  - Normal 110-160
  - Tachycardia > 160 for longer than 10-15 minutes
  - Bradycardia < 100 for longer than 90 seconds.

Fetal tachycardia

- FHR greater than 160 bpm lasting longer than 10 minutes
- Causes:
  - Early fetal hypoxemia
  - Maternal fever
  - Fetal anemia
  - Fetal heart failure
  - Parasympatholytic drugs (atropine)
  - Beta-sympathomimetic drugs (ritodrine)
  - Street drugs (cocaine, methamphetamines)
Nursing interventions for fetal tachycardia

- Interventions dependent on cause
  - Fluid bolus – dehydrated?
  - Maternal fever-treat with antipyretics as ordered
  - Oxygen at 8-10L

Fetal Bradycardia

- Causes:
  - Maternal hypotension
  - Prolonged umbilical cord compression
  - Beta-adrenergic drugs (propranolol; anesthetics used for epidural, spinal)
  - Late fetal hypoxemia

Nursing interventions:
  - Dependent on cause
  - Oxygen 8-10L
  - Scalp stimulation
Bradycardia

FHR Variability

- beat to beat changes in the FHR baseline. Makes upper line on monitor jagged. This is the single most important factor to assess. Average variability indicates a non-acidotic fetus and is associated with fetal wellbeing.

- Absent – visually undetectable changes
- Minimal – visually detectable but < 5 bpm changes
- Moderate – 6-25 bpm changes
- Marked - > 25 bpm changes

Absent or minimal variability

Example of absent/minimal variability
Accelerations

- increase in baseline of at least 15 bpm lasting for 15 seconds or longer.

Indicates fetal well-being

In a healthy fetus, 90% of gross fetal movements are associated with accelerations.

NST Procedure

- The patient is seated in a reclining chair or in semi-fowlers position to avoid supine hypotension.
- External fetal monitor is applied
- The strip is observed for signs of fetal activity and a concurrent acceleration of the heart rate
- Usually takes 20-30 minutes
Non-stress test (NST)

- Indications for NST
  - Maternal diabetes
  - Maternal chronic HTN
  - Hypertensive disorders of pregnancy
  - IUGR
  - Sickle cell disease
  - Maternal cyanotic heart disease
  - Postmaturity
  - History of previous stillbirths
  - Isoimmunization
  - Hyperthyroidism
  - Advanced maternal age (>35)
  - Chronic renal disease
  - Decreased fetal movement

NST interpretation

- Criteria for a reactive NST
  - Normal baseline rate
  - Variability is present
  - Two or more accelerations of 15 beats/min lasting for 15 seconds over a twenty minute period

Fetal Stimulation

- If strip reflects minimal movement, can sometimes use
  - Abdominal stimulation - “Play with baby”
  - Vibroacoustic stimulation.
  - Scalp stimulation to irritate fetus into a response.
- If a non-reactive result –
  - Retest in 24 hours
  - Contraction Stress Test
Vibroacoustic stimulation
- Use of a sound source to startle the fetus into moving.
- 5 to 10 minutes monitoring before sound initiation of 3-4 minutes.
- Monitor for 15 minutes after sound for fetal response.
- If non-reactive, repeat up to three times.
- Interpreted similar to NST

Contraction stress test (CST)
- Indications
  ✓ Nonreactive NST
- Test
  ✓ Contractions are stimulated using oxytocin or nipple stimulation.
  ✓ 3 contractions are needed in a 10 min period.
- Interpretation?

Ultrasound
- Methods
  - Abdominal
  - Transvaginal
- Indications for use-first trimester
- Indications for use-second and third trimesters
### Specific Anatomical Assessments

- Cardiac – echocardiogram – chambers, blood flow, contractility, etc.
- Nuchal translucency –
- Structural disorders -
- Gestational age assessments

### Maternal blood test

- Alpha-fetoprotein (MSAFP)
- Performed between 15-22 weeks gestation
  - High levels associated with neural tube defects
  - Low levels associated with Down’s syndrome

### Chorionic Villi Sampling (CVS)

- CVS
  - Procedure
  - Risks vs benefits
Biochemical assessment

Amniocentesis

- performed to obtain a sample of amniotic fluid, which contains fetal cells.
- A needle is inserted transabdominally under ultrasound guidance into the uterus. Amniotic fluid is withdrawn into a syringe, and various tests are then performed.

Tests performed on Amniotic fluid

- Fetal lung maturity
- Cultures
- Chromosomal studies

Complications of amniocentesis

- Maternal
- Fetal

Percutaneous umbilical blood sampling (PUBS)

- Used for fetal blood sampling and transfusion. Involves the insertion of a needle directly into the fetal umbilical vessel under ultrasound guidance.
Fetoscopy

- Visualization of the fetal fluids and fetus to ensure everything normal.

Percutaneous Umbilical Blood Sample

- Indications
  - Prenatal diagnosis of inherited blood disorders
  - Karyotyping of malformed fetus
  - Detection of fetal infection
  - Determination of the acid-base status of IUGR fetuses
  - Assessment and treatment of isoimmunization (Kleihauer-Betke test) and thrombocytopenia
  - Treatment of fetal anemia

PUBS

- Complications
  - Leaking of blood from puncture site
  - Cord laceration
  - Thromboembolism
  - Preterm labor
  - Premature Rupture of Membranes (PROM)
  - Infection
Biophysical Profile (BPP)

- A combination of ultrasound and fetal monitoring that looks at specific items related to fetal well-being.
- Areas measured
  - Amniotic fluid volume
  - Fetal breathing
  - Gross body movement
  - Fetal tone
  - Non-stress test (FHR accelerations with movement)

Leopold’s Maneuvers

- A method of determining the probable location of the fetal shoulder.
- Where in maternal abdomen is
  - Fetal head?
  - Softer buttocks tissues?
  - “Lumpy” elbows and knees?
  - Firm, smooth back – scapula?
- Four assessments – we do three of them.
- Demonstration on mannikin

Assessment of contractions

- Frequency
- Intensity
- Duration
- Resting tone
Contraction Assessments

- External monitoring
  
  Tocotransducer measures uterine activity by the pressure sensitive surface of the monitor. Can only record frequency and duration.

- Internal monitoring
  
  Intrauterine pressure catheter (IUPC) Contractions are measured in mmHg. A solid catheter with a pressure sensitive tip is placed in the uterus next to the baby. Can record intensity as well as frequency and duration.

External vs internal monitors

- Page 523 – couldn’t copy and paste!

Contraction patterns

- Generally, as labor progresses, contractions become stronger, longer, and closer together.

- Effective uterine contractions cause effacement and dilation of the cervix, and descent of the presenting fetal part.
Periodic Fetal Heart Rate Changes

- Decelerations – 4 types
  - Early
  - Variable
  - Late
  - Prolonged

Early Decelerations

- Etiology – head compression or vagal response.

- Physiology --
  - Pressure on fetal skull elevates intracranial pressure which
  - Decreases cerebral blood flow which
  - Activates central vagus nerve which
  - Produces decrease in heart rate with
  - Recovery occurring as pressure is relieved

- Appearance – mirror image of contraction

Early Decelerations cont.

- Description – decrease in FHR below baseline, occur during contractions and tracing shows a uniform shape and mirror image of uterine contractions.

- Interventions- require no interventions and are not associated with fetal compromise.
Early Deceleration

Variable Decelerations

- Etiology – suspect cord compression
  - maternal position
  - cord around neck, leg, arm, etc.
  - short cord
  - knot in cord
  - prolapsed cord

Physiology of variable decelerations

- Transitory umbilical cord compression
- Collapses umbilical vein -> producing fetal hypovolemia (causing transient cardioacceleration which causes…)
- Occludes umbilical artery
- Produces hemodynamic changes which
- Activates baroreceptors and chemoreceptors which
- Stimulates vagus nerve which produces
- Cardiodeceleration – if prolonged -> hypoxia which causes further cardiodeceleration
Variable Decelerations

- Description – characterized by a sharp drop in FHR with a "V", "U", or "W" shape. Typically occur with contractions, but can occur at any time.

- Clinical Significance – Usually are transient and correctable and not associated with low APGAR scores esp. if variability is present.

Interventions – goal is to relieve cord compression.
- Change maternal position
- If variables persist or worsen -
  - Increase IV fluids
  - Vaginal exam to check for prolapsed cord
  - Administer oxygen to mother
  - Discontinue oxytocin to reduce uterine activity
Variable Decelerations
Late Decelerations

- Etiology – uteroplacental insufficiency
  - Hyperstimulation of uterus
  - Maternal supine position
  - Pregnancy induced hypertension
  - Post maturity
  - Maternal diabetes
  - Abruptio placentae
  - Maternal cardiac disease
  - Maternal anemia

Physiology of late decels

- Uterine hyperactivity or maternal hypotension causes
- Decreased intervillous blood flow during contractions which causes
- Decreased maternal-fetal oxygen transfer which
- Produces fetal hypoxia and myocardial depression which
- Activates vagal response which
- Produces cardiodeceleration and lactic acidosis

Late Decelerations

- Description – gradual decrease in baseline beginning after the peak of the contraction with slow return to baseline after contraction is over.

- Clinical significance – untreated or persistent late decelerations are associated with fetal hypoxemia progressing to acidosis, brain damage, and death.
Late Decelerations

- Interventions –
  - Change maternal position – left lateral
  - Increase IV fluids
  - Administer oxygen via face mask at 7-8 L
  - Discontinue oxytocin
  - Termination of labor by MD if pattern cannot be corrected, especially if variability is decreased.
  - If unresolved, c/section
Late Decelerations

Prolonged Decelerations

- Etiology –
  - Pelvic exam
  - Rapid fetal descent
  - Sustained maternal valsala maneuver
  - Prolapsed cord
  - Velamentous cord insertion (fetal vessels torn)
  - Abruptio placentae
  - Placenta previa with significant maternal bleeding
Prolonged Decelerations

• Description – decelerations that decrease 15 beats below baseline or more and last longer than 2 minutes but less than 10 minutes.

• Interventions – same as with late decelerations with possible emergency c/section if FHR does not recover.

Evaluate a monitor strip

• Reassuring
  • Variability
  • Accelerations

• Non-reassuring
  • Variability
  • Accelerations
Unique tracing -- twins

Abnormal tracings

- Other fetal heart tracings
  - Sinusoidal
  - Pseudosinusoidal

Sinusoidal tracing
Psuedosinusoidal

Can be caused by medications (ex. Stadol)

Nursing implications of documentation

- Legal record of assessment of both patients.

- Communication with other health team members of patient's condition prior to the transfer of care or supporting concern for mother or infant.

- Primary nursing role of patient undergoing many tests is educator which must be reflected in documentation.