POLICY STATEMENT
The primary goal of antenatal evaluation is to identify fetuses at risk for intrauterine injury and death so that intervention and timely delivery can prevent progression to stillbirth. It should be understood however, that despite widespread use of many tests, limited evidence exists to demonstrate effectiveness at improving perinatal outcomes with application of these tests. Nurse-midwives should obtain informed consent before proceeding with any testing protocol.

BLOOD BORNE PATHOGEN
EXPOSURE CATEGORY: I (Involves exposure to blood, body fluids, or tissues)

FUNCTION: Care of Clients

EQUIPMENT:
1. Doppler
2. Non-Stress Testing

POINTS OF EMPHASIS:
In the United States, stillbirths account for more than 55% of the perinatal mortality and could potentially be prevented with an effective form of fetal testing.

Unfortunately, many barriers need to be overcome in the development of a reliable assessment of fetal well-being. First, the basis of fetal testing rests on the hypothesis that a compromised fetus undergoes a series of detectable physiological changes such as the redistribution of blood flow or decreasing unnecessary movements. However, in the third trimester, normal fetuses spend 25% of their time in a quiet sleep state. During the normal sleep state the fetal heart rate variability is reduced, and there may be infrequent breathing movements. Tests performed while a fetus is in a resting state may be incorrectly classified as an abnormal test. Therefore, when using tests to evaluate fetal condition, clinicians need to appreciate whether a fetus is simply in a temporary quiet sleep state or neurologically compromised.

Second, which pregnancies would benefit from testing is unclear. Observational studies show an increased perinatal mortality rate in high-risk pregnancies with a 10-fold difference in perinatal mortality between high-risk and low-risk groups (70/1000 vs 7/1000). The majority of pregnancies are low risk however, and where the bulk of perinatal loss occurs. If a sensitive and specific test existed then, all women would benefit from some form of fetal testing. Targeting only high-risk women would be inadequate.

Third, the prevalence of an abnormal condition has the greatest impact on the predictive capacity of an antepartum test. Although stillbirths are devastating, they are unlikely even among high-risk women and very rare among low-risk women. In many cases of an abnormal test may be more likely to indicate a false positive (healthy fetus), instead of a true positive (compromised fetus). Even in the case of high-risk pregnancies with a prevalence of 70/1000, a test that is 99% sensitive and specific only has a positive predictive value of 88%.

Finally, to be successful at preventing death, an antepartum test needs to identify a compromised fetus in enough advanced time for an intervention to be successful. No known method of assessment can predict sudden events, such as a cord accident or placenta abruption, which are frequent causes of fetal death. It is important for the nurse-midwife to keep these limitations in mind when evaluating the merits of an antenatal test of fetal well-being.

PROCEDURE:
Maternal Assessment of Fetal Activity
1. Because fetal movement evaluation can be performed by the mother each day, or multiple times daily, it has advantages over other fetal tests that cannot practically be performed this frequently.

2. Women who report a decreased fetal movement have an incidence of stillbirth that is 60 times higher than women without this complaint. Although decreased fetal movement commonly precedes fetal death, it does not necessarily indicate fetal death is imminent. Many factors other than worsening fetal condition can influence the perception of movement, including maternal activity, position, obesity, medications, gestational age, placental location, and amniotic fluid volume. Fetal movement also varies normally over the course of the day, peaking between 9pm and 1am when maternal glucose levels are falling.

3. The most commonly recommended counting technique is the count-to-ten method where the woman is instructed each day to count and record the time she feels the 10th fetal movement. Evidence has not demonstrated when one should be alarmed, although most experts currently recommend that women seek care after two hours if ten movements are not felt.

4. One study utilized the count-to-ten approach with a two hour time limit and in low-risk pregnancies this reduced perinatal mortality from 8.7 per 1000, to 2.1 per 1000.

5. Not enough evidence is available to recommend or condemn formal fetal movement counting in either low-risk or high-risk women. Our practice however, encourages its teaching to all clients at 32 weeks of pregnancy as part of empowering each woman to recognize routines in their growing baby’s activity, and reiterated at term to assess the appropriateness of expectant management in postdate pregnancies.

Nonstress Test (NST)

6. The false-negative rate for the nonstress test is low ranging from 0.19% to 1%, and when assessing the interobserver variation the proportions of agreement for normal tests were high. In contrast, the false-positive rate of a nonreactive nonstress test is as high as 55%, and the proportions of agreement among experts for equivocal/ominous tests were poor.

Biophysical Profile (BPP)

7. The BPP is a composite test that collects 5 indicators of fetal well-being, including fetal heart rate reactivity, breathing movements, gross body movements, muscular tone, and quantitative estimation of amniotic fluid volume. The assessment of fetal heart rate is accomplished by performing a nonstress test, whereas the latter 4 variables are observed using real-time ultrasonography. Two points are awarded for each parameter when present, and 0 when absent after 30 minutes of ultrasound observation. Equal weight is given to each of the 5 parameters. When each of the 4 ultrasound variables is normal, the nonstress test may be excluded as it adds little to the predictive accuracy of the BPP.

Modified BPP

8. Given that the BPP is more time consuming and requires more technical skill to perform, the modified BPP was developed. This test consists of a combination of a nonstress test as well as an ultrasound to estimate the amniotic fluid index (AFI). Typically further evaluation is performed when an abnormal result is obtained with the modified BPP.

9. The false-negative rate in one large study was 0.8 per 1000 women tested; however, the false-positive rate was high, 60% of those delivered because of an abnormal antepartum test had no evidence of fetal compromise, defined as intrapartum fetal distress, meconium-stained amniotic fluid, 5-minute Apgar scores <7, or birth weight <10th percentile for gestational age. False-positive test results led to preterm delivery in 1.5% of those tested before term.

10. Overall, inadequate data exist to recommend or not recommend the modified BPP. However, the modified BPP requires less time and expertise to perform and has a similarly reassuring false-negative rate and potentially a lower false-positive rate than the nonstress test.

Fetal Doppler Ultrasound

11. Fetal Doppler evaluation uses ultrasound to measure blood flow velocities in the fetal vessels, most commonly the umbilical artery.

12. An absence of umbilical artery diastolic flow has been shown to be an accurate clinical test with a sensitivity of 78% for detecting hypoxia and a sensitivity of 90% for detecting acidosis on fetal blood gas at delivery. The positive predictive value of absent end-diastolic flow ranges from 53% to 88% and negative predictive value is high at 98% to 100%.
13. Of all antenatal assessment methods, Doppler-based tests have been evaluated rigorously in randomized trials.
14. A meta-analysis combined 4 RCTs and demonstrated that routine umbilical artery Doppler screening of all low-risk pregnancies does not reduce the risk of perinatal death.
15. Doppler studies of the umbilical artery should be included when monitoring the fetus in high-risk pregnancies thought to be at risk of placental insufficiency.

Abnormal Fetal Test Result
16. When confronted with an abnormal fetal test result, clinicians should consider the overall clinical picture, taking into account the high possibility that the test result is falsely positive.
17. In the case of acute maternal illness, stabilizing the maternal condition and resting the fetus may be appropriate.
18. In the scenario where an abnormal test result is not associated with any evidence of worsening maternal status, a sequential approach to further evaluate the fetal condition should be used.
19. In postterm pregnancies, the decision to proceed with delivery may be easier with decreased chance of induced morbidity in the case of a false-positive result.

REFERENCES:

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Penny Lane DNP, CNM, IBCLC
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DATE: ____________________________