Antenatal Testing Guidelines

Purpose: To provide guidance for antenatal testing related to various pregnancy complications. The individual clinician should make decisions for an individual patient as to timing, frequency, and type of testing.

1. Antepartum fetal surveillance has been used in pregnancies in which the risk of antepartum fetal demise is increased.

2. Non-stress test (NST): The concordance between fetal movement and accelerations in the fetal heart rate is good evidence of fetal wellbeing. **The non-stress test should be conducted for at least 20 minutes.**
    a. NST results
        i. Reactive NST for pregnancies at 32 weeks or more: Two or more accelerations of at least 15 beats per minute above the baseline, that last for at least 15 seconds, in a 20-minute period of combined FHR and uterine activity monitoring.
        ii. Reactive NST for pregnancies less than 32 weeks: Two or more accelerations of at least 10 beats per minute above the baseline, that last for at least 10 seconds, in a 20-minute period of combined FHR and uterine activity monitoring.
        iii. Nonreactive NST: Lack of sufficient FHR accelerations over a 40-minute period.
    b. Frequency of NSTs**: There are no large clinical trials to guide the frequency of testing, and thus, the optimal testing frequency remains unknown; it depends on several factors and should be individualized and based on clinical judgment.**
    c. Decelerations
        i. Variable decelerations that are nonrepetitive and brief (less than 30 seconds) are not associated with fetal compromise or need for obstetric intervention. Variable decelerations may be observed in 50% of NSTs.
        ii. Repetitive variable decelerations (at least three in 20 minutes), even if mild, have been associated with increased risk of cesarean delivery for nonreassuring intrapartum FHR pattern.
        iii. Fetal heart rate decelerations during NST that persist for 1 minute or longer are associated with markedly increased risk for both cesarean delivery for nonreassuring intrapartum FHR pattern and fetal demise.
        iv. We recommend prolonged fetal heart monitoring in the presence of repetitive or prolonged (>1 min) fetal heart rate decelerations during NST. We also recommend evaluating amniotic fluid volume. We do not recommend using biophysical profile as the first step to assess fetal heart rate decelerations.

3. Biophysical Profile (BPP): Consists of NST combined with four observations made by real-time ultrasonography.
    a. Components of BPP include amniotic fluid assessment, fetal breathing, movement and tone. Two points are assigned for each component of the test if performed

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within the 30 minutes of testing. If the fetus does not perform a component of the exam, or if oligohydramnios is noted, 0 points are assigned for the missing component(s).

4. Modified BPP: Combines the NST and amniotic fluid volume assessment.
    a. Normal modified BPP result: NST is reactive and the amniotic fluid volume is greater than 2 cm in the deepest vertical pocket.
    b. Abnormal modified BPP result: Either the NST is nonreactive or the amniotic fluid volume in the deepest vertical pocket is 2 cm or less (ie, oligohydramnios is present).

5. Umbilical artery Doppler velocimetry: A technique of fetal surveillance for the growth-restricted fetus. **Currently there is no evidence that umbilical artery Doppler velocimetry provides information about fetal well-being in the fetus with normal growth. We do not recommend performing umbilical artery Doppler studies in normally grown fetuses.**
    a. Flow velocity waveforms in the umbilical artery of normally grown fetuses differ from those of growth restricted fetuses. Specifically, the umbilical flow velocity waveform of normally growing fetuses is characterized by high-velocity diastolic flow, whereas in growth-restricted fetuses, there is decreased umbilical artery diastolic flow.
    b. Commonly measured flow indices:
        i. Systolic to diastolic ratio (S/D)
        ii. Resistance index (S-D/S)
        iii. Pulsatility index (S-D/A
    c. Randomized studies generally have defined *abnormal flow* as either absent or reversed end-diastolic flow.
    d.

Table 1. Suggested Antenatal Fetal Surveillance with Antenatal Testing and Ultrasound.

Diagnosis	Initiation of Antenatal Testing	Antenatal Testing Frequency		Growth US
		Weekly NST	2x weekly NST, NST+AFI or Weekly BPP	
Maternal				
Advanced Maternal Age				
Age 35-39	36 weeks	X		30, 36 weeks
Age 40+	36 weeks		X	Q4 weeks
Alloimmunization: Kell antibodies or titer of 1:16 for all other antibodies	32 weeks		X	Q4 weeks
Antiphospholipid Antibody Syndrome	32 weeks		X	Q4 weeks
Cholestasis	32 weeks		X	Q4 weeks
Diabetes, Pre-gestational	32 weeks		X	Q4 weeks
Diabetes, Gestational				

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Diet controlled	40 weeks		X	Q4 weeks
PO medication	32 weeks		X	Q4 weeks
Insulin	32 weeks		X	Q4 weeks
Diagnosis	**Initiation of Antenatal Testing**	**Antenatal Testing Frequency**		**Initiation of Growth US**
		Weekly NST	**2x weekly NST, NST+AFI or Weekly BPP**	
Hypertension, Chronic				
No medication	32 weeks	X		Q4 weeks
Medication	32 weeks		X	Q4 weeks
Hypertension, Gestational	At diagnosis		X	Q4 weeks
Thyroid Disorders				
Hyperthyroidism, controlled	Individualize			Q4-6 weeks
Hyperthyroidism, uncontrolled	32 weeks		X	Q4 weeks
Hypothyroidism, controlled	Not indicated			Not indicated
Hypothyroidism, uncontrolled	32 weeks		X	Q4 weeks
IVF conception	36 weeks	X		30, 36 weeks
Maternal cyanotic heart disease	32 weeks		X	Q4 weeks
Obesity				
Pre-pregnancy BMI 35-39.9	37 weeks	X		30, 36 weeks
Pre-pregnancy BMI ≥40	34 weeks	X		30, 36 weeks
Pre-eclampsia	At diagnosis		X	Q2-4 weeks
Renal Disease, chronic	32 weeks		X	Q4 weeks
Sickle cell disease				
Uncomplicated	32 weeks	X		Q4 weeks
Complicated	32 weeks		X	Q4 weeks
Substance Use	36 weeks	X		30, 36 weeks
Systemic lupus erythematosus	32 weeks		X	Q4 weeks
Thrombophilia	Not indicated			Not indicated
Fetal				
FGR				
AC <10% or EFW <10%, normal Doppler	At diagnosis		X	Q2 weeks
Any FGR, abnormal Doppler	See FGR protocol			
Fetal anomalies	Individualize			Q4 weeks
Fetal congenital heart disease	Individualize			Q4 weeks
Fetal genetic abnormalities	Individualize			Q4 weeks

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Diagnosis	Initiation of Antenatal Testing	Antenatal Testing Frequency		Initiation of Growth US
		Weekly NST	2x weekly NST, NST+AFI or Weekly BPP	
Multiple gestations				
DiDi, uncomplicated	36 weeks	X		Q4 weeks
DiDi, complicated	Individualize			Q2-4 weeks
MonoDi, uncomplicated	32 weeks		X	Q4 weeks
MonoDi, complicated	Individualize		X	Q2-4 weeks
Triplets, uncomplicated	32 weeks		X	Q2-4 weeks
Triplets, complicated	Individualize			Q2-4 weeks
Obstetric				
Abnormal serum markers	36 weeks	X		30, 36 weeks
Post Dates	40 weeks		X	N/A
Previous IUFD				
Prior loss <28 weeks	Individualize			Q4 weeks
Prior loss >28 weeks	32 weeks		X	Q4 weeks
Previous FGR with delivery <37 wks	32 weeks	X		Q4 weeks
Previous PreE with delivery <37 wks	32 weeks	X		Q4-6 weeks
Placental/Cord Abnormalities				
Chorioangioma	32 weeks		X	Q4 weeks
Chronic placental abruption	Individualize			Q4 weeks
Marginal cord insertion	Not indicated			Not indicated
Oligohydramnios (MVP < 2 cm)				
Diagnosed <36 weeks	At diagnosis		X	Q2-4 weeks
Diagnosed >36 weeks	Deliver			
Polyhydramnios				
AFI 25-29.9 cm or MVP 8-11.9 cm	32 weeks	X		Q4 weeks
AFI >30 cm or MVP ≥12 cm	32 weeks		X	Q2-4 weeks
Single Umbilical Artery	36 weeks	X		Q4-6 weeks
Umbilical vein varix	32 weeks		X	Q4 weeks
Vasa previa	Individualize			Q4 weeks
Velamentous cord insertion	36 weeks	X		Q4 weeks

Table 2. Interpretation of BPP (within 30 minutes)

Fetal variable	Normal behavior (score=2)	Abnormal behavior (score=0)

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Fetal breathing movements	One or more episodes of more than 30 seconds duration, within 30 min BPP time frame. Hiccups count.	Completely absent breathing or no sustained episodes. Continuous breathing without cessation.
Body or limb movements	At least three discrete body or limb movements in 30 minutes. Includes fine motor movements, rolling movements, but not REM or mouthing movements	Less than 3 body/limb movements in a 30 minute observation period.
Fetal tone/posture	One or more episodes of active extension with rapid return to flexion of fetal limbs and brisk repositioning/truck rotation. Opening and closing of hand, mouth, kicking	Low-velocity movement only. Incomplete flexion, flaccid extremity positions, abnormal fetal posture. Must score = 0 when FM completely absent.
Amniotic fluid evaluation	At least one pocket ≥2 cm with no umbilical cord.	No cord-free pocket ≥ 2 cm.
Non-stress test	At least two episodes of fetal acceleration of ≥15 beats/minute and of ≥15 seconds duration. Normal mean variation (computerized FHR interpretation). Accelerations graded for gestation.	Insufficient accelerations, absent accelerations, or repetitive or prolonged decelerations. Mean variation < 5 on numerical analysis of NST

Table 3. Biophysical Profile Scoring

BPP Score	Interpretation	Predicted PNM/1000*	Recommended Management
10/10 8/8 8/10 (AFV-normal)	No evidence of fetal asphyxia present	<1/1000	No acute intervention on fetal basis. Serial testing indicated by disorder-specific protocols.
8/10 (oligohydramnios)	Chronic fetal compromise possible	89/1000	For absolute oligohydramnios, prove normal urinary tract, disprove asymptomatic rupture of membranes.
6/10 6/8	Equivocal test, fetal asphyxia is not excluded	Average 61/1000 (depends on progression)	Consider repeat testing immediately, before assigning final value. If repeat score is 10/10, manage as 10/10. If immediate repeat testing is not available, repeat test in 24 hours. For persistent 6/10 at term, deliver. If preterm, further evaluation is indicated.
4/10	Acute fetal asphyxia likely. If oligohydramnios, acute or chronic asphyxia very likely.	91/1000	Deliver by obstetrically appropriate method with continuous monitoring.
2/10	Acute fetal asphyxia, most likely with chronic decompensation.	125/1000	Deliver for fetal indications (usually cesarean section)

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0/10	Severe, acute and chronic asphyxia virtually certain.	600/1000	Deliver immediately by cesarean section

PNM- perinatal mortality. Per 1,000 live births, within 1 week of test result shown, without intevention.
*For scores of 0, 2, or 4, intervention should begin virtually immediately, provided the fetus is viable.

References:

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