

BREAK THIS PRACTICE HABIT

Nonstress test and maximal vertical pocket vs the biophysical profile: Equivocal or equivalent?

Fetal surveillance testing orders should be based not on habit but on an individualized care plan that minimizes patient burden and increases adherence

Sheetal Gaurang Sheth, MD

IN THIS ARTICLE

Antenatal testing costs

[this page](#)

Maternal age and stillbirth risk

[page 19](#)

Modified BPP use

[page 24](#)

CASE 1 Pregnant patient endures extensive wait and travel times to have antenatal testing

Pregnant at age 35 without comorbidities, Ms. H was instructed to schedule weekly biophysical profiles (BPP) after 36 weeks' gestation for advanced maternal age. She receives care at a community office 25 miles from the hospital where she will deliver. Ms. H must complete her antenatal testing at the hospital where the sonographer performs BPPs. She sees her physician at the nearby clinic and then takes public transit to the hospital. She waits 2 hours to be seen then makes her way back home. Her prenatal care visit, which usually takes 30 minutes, turns into a 5-hour ordeal. Ms. H delivered a healthy baby at 39 weeks. Unfortunately, she was fired from her job for missing too many workdays.

Antenatal testing has become routine, and it is costly

For the prescriber, antenatal testing is simple: Order a weekly ultrasound exam to reduce the risk of stillbirth, decrease litigation, generate

income, and maximize patient satisfaction (with the assumption that everyone likes to peek at their baby). Recommending antenatal testing has—with the best intentions—become a habit and therefore is difficult to break. However, the American College of Obstetricians and Gynecologists (ACOG) recognizes that “there is a paucity of evidenced-based recommendations on the timing and frequency of antenatal fetal surveillance because of the challenges of conducting prospective trials in pregnancies complicated by stillbirths and the varying conditions that place pregnancies at high risk for stillbirth. As a result, evidence for the efficacy of antenatal fetal surveillance, when available, is largely circumstantial.”¹

Antenatal testing without an evidence-based indication can be costly for the health care system, insurance companies, and patients. Many clinics, especially those in rural communities, do not have the equipment or personnel to complete antenatal testing on site. Asking a pregnant patient to travel repeatedly to another location for antenatal testing can increase her time off from work, complicate childcare, pose a financial burden, and lead to nonadherence. As clinicians, it is imperative that we work with our patients to create an individualized care plan to minimize these burdens and increase adherence.

Antenatal fetal surveillance can be considered for conditions in which stillbirth is reported more frequently than 0.8 per 1,000.



Dr. Sheth is Assistant Professor of Obstetrics and Gynecology and Medical Director of Labor and Delivery, The George Washington University Hospital, Washington, DC.

The author reports no financial relationships relevant to this article.

doi: 10.12788/obgm.0180

CONTINUED ON PAGE 19

Advanced maternal age and stillbirth risk

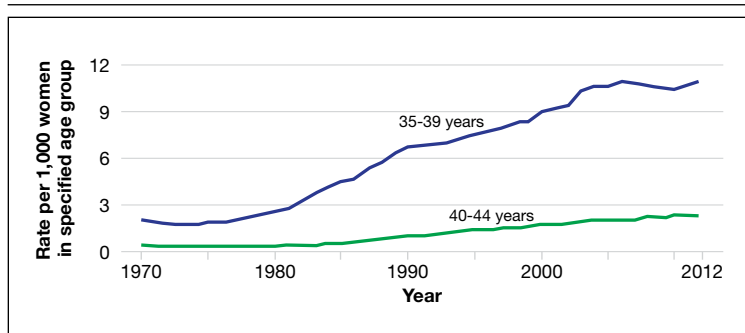
One of the most common reasons for antenatal testing is advanced maternal age, that is, age older than 35. According to the Centers for Disease Control and Prevention and the National Vital Statistics System, from 2000 to 2012, 46 states and the District of Columbia (DC) reported an increase in first birth rates for women aged 35 to 39. Thirty-one states and DC saw a rise among women aged 40 to 44 in the same period (FIGURE).²

Advanced maternal age is an independent risk factor for stillbirth, with women aged 35 to 39 at 1.9-fold increased risk and women older than age 40 with a 2.4-fold higher risk compared with women younger than age 30.³ In a review of 44 studies including nearly 45,000,000 births, case-control studies, versus cohort studies, demonstrated a higher odds for stillbirth among women aged 35 and older (odds ratio [OR], 2.39; 95% confidence interval [CI], 1.57-3.66 vs OR, 1.73; 95% CI, 1.6-1.87).⁴ Now, many women older than age 35 may have a concomitant risk factor, such as diabetes or hypertension, that requires antenatal testing. However, for those without other risk factors, nearly 863 antenatal tests and 71 inductions would need to be completed to reduce the number of stillbirths by 1. Antenatal testing for women older than age 35 without other risk factors should be individualized through shared decision making.⁵ See the ACOG committee opinion for a table that outlines factors associated with an increased risk of stillbirth and suggested strategies for antenatal surveillance after viability.¹

CASE 2 Patient with high BPP score and altered fetal movements delivered for nonreassuring fetal heart rate

Ms. Q was undergoing weekly BPPs for diet-controlled gestational diabetes and a prepregnancy body mass index (BMI) of 52. At 37 weeks' gestation, she had a BPP score of 8/8. However, it took almost 30 minutes to see 2 discrete body or limb movements. Ms. Q mentioned to the nurse taking her vitals after the BPP that the baby's movements had changed over the previous few days, especially after contractions. Ms. Q then completed a nonstress test

FIGURE First birth rates for women aged 35-39 generally increased from the mid-1970s to 2012, while steady increases for women 40-44 began later in the early 1980s²



SOURCE: CDC/NCHD, National Vital Statistics System

(NST); she had 2 contractions and 2 fetal heart rate decelerations, each lasting approximately 60 seconds. Ms. Q was sent to labor and delivery for prolonged monitoring, and she was delivered that day for a nonreassuring fetal heart rate tracing. Meconium-stained amniotic fluid and a tight triple nuchal cord were noted at delivery.

BPP considerations

While considered an in-depth look at the fetal status, BPPs may not predict overall fetal well-being during acute changes, such as umbilical cord compression or placental abruption. BPPs take longer to complete, require a trained sonographer, and include components like fetal breathing that may be influenced by such factors as nicotine,⁶⁻⁸ labor,⁹ rupture of membranes,¹⁰ magnesium sulfate,¹¹ and infection.¹²

If medically indicated, which antenatal surveillance technique is right for your patient?

Frequently used antepartum fetal surveillance techniques include maternal perception of fetal movement or "kick counting," NST, BPP, modified BPP, contraction stress test (CST), and umbilical artery Doppler velocimetry.

Worldwide, the most common form of antenatal surveillance is fetal kick counting.

FAST TRACK

While considered an in-depth look at the fetal status, BPPs may not predict overall fetal well-being during acute changes, such as umbilical cord compression or placental abruption

TABLE Sample reimbursement rates, 2021

Cost of modified BPP	Cost of BPP
\$45.00	\$112.00
\$72.40	\$185.69
\$102.87	\$299.07
\$82.00	\$246.58
\$75.75	\$299.51
\$99.69	\$275.68

Abbreviation: BPP, biophysical profile.

FAST TRACK

Perhaps the initial antepartum surveillance test of choice should be the modified BPP, with the BPP used in cases in which the results of a modified BPP are abnormal

It is noninvasive, can be completed frequently, may decrease maternal anxiety, may improve maternal-fetal bonding, and is free.¹³ According to the results of a 2020 meta-analysis of 468,601 fetuses, however, there was no difference in perinatal death among patients who assessed fetal movements (0.54%) and those who did not (0.59%).¹⁴ There was a statistically significant increase in induction of labor, cesarean delivery, and preterm delivery among patients who counted fetal movements. Women who perceive a decrease in fetal movement should seek medical attention from a health care provider.

An evaluation for decreased fetal movement typically includes taking a history that focuses on risk factors that may increase stillbirth, including hypertension, growth restriction, fetal anomalies, diabetes, and substance use, and auscultation with a fetal Doppler. In the absence of risk factors and the presence

of a normal fetal heartbeat, pregnant women should be reassured of fetal well-being. In a pregnancy at greater than 28 weeks, a 20-minute NST can be completed as well; this has become part of the standard workup of decreased fetal movement in developed countries. A reactive NST indicates normal fetal autonomic function in real time and a low incidence of stillbirth (1.9/1,000) within 1 week.¹⁵

Additionally, by measuring the amniotic fluid volume using the largest maximal vertical pocket (MVP), clinicians can gain insight into overall uteroplacental function. The combination of the NST and the MVP—otherwise known as a modified BPP—provides both short-term acid-base status and long-term uteroplacental function. The incidence of stillbirth in the 1 week after a modified BPP has been reported to be 0.8/1,000, which is equivalent to stillbirth incidence using a full BPP (0.8/1,000).¹⁶ The negative predictive value for both the modified BPP and the BPP is 99.9%—equivalent.

The case for modified BPP use

The modified BPP requires less time, is less costly (cost savings of approximately 50%; **TABLE**), does not require a specialized sonographer, and can be performed in local community clinics.

Perhaps the initial antepartum surveillance test of choice should be the modified BPP, with the BPP used in cases in which the results of a modified BPP are abnormal. ●

References

- American College of Obstetricians and Gynecologists' Committee on Obstetric Practice, Society for Maternal-Fetal Medicine. Indications for outpatient antenatal fetal surveillance: ACOG committee opinion no. 828. *Obstet Gynecol.* 2021;137:e177-197.
- Mathews TJ, Hamilton BE. First births to older women continue to rise. NCHS Data Brief, No. 152. Hyattsville, MD: National Center for Health Statistics; 2014.
- Fretts RC, Schmittiel J, McLean FH, et al. Increased maternal age and the risk of fetal death. *N Engl J Med.* 1995;333:953-957.
- Lean SC, Derricott H, Jones RL, et al. Advanced maternal age and adverse pregnancy outcomes: a systematic review and meta-analysis. *PLoS One.* 2017;12:e0186287.
- Fretts RC, Elkins EB, Myers ER, et al. Should older women have antepartum testing to prevent unexplained stillbirth? *Obstet Gynecol.* 2004;104:56-64.
- Manning F, Wyn Pugh E, Boddy K. Effect of cigarette smoking on fetal breathing movements in normal pregnancies. *Br Med J.* 1975;1:552-553.
- Manning FA, Feyerabend C. Cigarette smoking and fetal breathing movements. *Br J Obstet Gynecol.* 1976;83:262-270.
- Gennser G, Marsal K, Brantmark B. Maternal smoking and fetal breathing movements. *Am J Obstet Gynecol.* 1975;123:861-867.
- Boylan P, O'Donovan P, Owens OJ. Fetal breathing movements and the diagnosis of labor: a prospective analysis of 100 cases. *Obstet Gynecol.* 1985;66:517-520.
- Kivikoski AI, Amon E, Vaalamo PO, et al. Effect of third-trimester premature rupture of membranes on fetal breathing movements: a prospective case-control study. *Am J Obstet Gynecol.* 1988;159:1474-1477.
- Peaceman AM, Meyer BA, Thorp JA, et al. The effect of magnesium sulfate tocolysis on the fetal biophysical profile. *Am J Obstet Gynecol.* 1989;161:771-774.
- Vintzileos AM, Campbell WA, Nochimson DJ, et al. The fetal biophysical profile in patients with premature rupture of the membranes—an early predictor of fetal infection. *Am J Obstet Gynecol.* 1985;152:501-516.
- Liston RM, Bloom K, Zimmer P. The psychological effects of counting fetal movements. *Birth.* 1994;21:135-140.
- Bellussi F, Po' G, Livi A, et al. Fetal movement counting and perinatal mortality: a systematic review and meta-analysis. *Obstet Gynecol.* 2020;135:453-462.
- Freeman RK, Anderson G, Dorchester W. A prospective multi-institutional study of antepartum fetal heart rate monitoring. I. Risk of perinatal mortality and morbidity according to antepartum fetal heart rate test results. *Am J Obstet Gynecol.* 1982;143:771-777.
- Miller DA, Rabello YA, Paul RH. The modified biophysical profile: antepartum testing in the 1990s. *Am J Obstet Gynecol.* 1996;174:812-817.