

40. Home Uterine Activity Monitoring

RECOMMENDATION

There is insufficient evidence to recommend for or against home uterine activity monitoring (HUAM) in high-risk pregnancies as a screening test for preterm labor, but recommendations against its use may be made on other grounds (see *Clinical Intervention*). HUAM is not recommended in normal-risk pregnancies.

Burden of Suffering

Preterm birth is a leading cause of perinatal morbidity and mortality in the U.S. Preterm neonates account for at least half of the mortality and morbidity among newborns without congenital anomalies.¹ These conditions represent a leading cause of years of potential life lost before age 65.² Preterm births generate large societal costs in providing neonatal intensive care and long-term treatment for complications.³ Both primary and secondary preventive measures have been proposed for the prevention of prematurity. Primary prevention includes efforts to reduce risk factors for prematurity, such as cessation of tobacco, alcohol, and other drug use, and programs to improve nutrition, socioeconomic conditions, and prenatal care. Secondary prevention involves the early detection and treatment of preterm labor.

Accuracy of Screening Tests

The rationale behind screening for preterm labor is the assumption that the risk of preterm birth can be reduced significantly by the prompt initiation of treatment (e.g., rest, hydration, tocolytic therapy). These measures are of potential value in prolonging pregnancy only in those cases involving idiopathic preterm labor and not in medically indicated preterm births (e.g., preterm rupture of membranes, antepartum hemorrhage, fetal distress). Tocolytic medications are generally ineffective after substantial cervical dilation (>2–3 cm) and effacement have occurred. Because patients and physicians may have difficulty in recognizing the early signs of preterm labor, many patients arrive at the hospital with advanced cervical dilation and effacement and/or with ruptured membranes. Such delays in detection are thought to limit the effectiveness of tocolysis.

Screening for earlier detection of preterm labor has therefore been proposed. The principal screening tests are self-palpation and tocodynamometry. Programs to improve the early detection of preterm labor have centered on educating women about the symptoms of preterm labor and on teaching self-palpation to help them detect the increasing rate of uterine contractions which often precedes preterm labor.⁴ Studies of these measures have produced mixed results. Some studies have shown that self-palpation has poor sensitivity in detecting preterm labor. One study reported that only 15% of contractions were detected by patients and that fewer than 11% of pregnant women were able to identify half of their recorded contractions.⁵

Although tocodynamometry is usually performed in the hospital, home uterine activity monitoring (HUAM) has been advocated as an ambulatory screening test for preterm labor in high-risk women. The home tocodynamometer consists of a pressure sensor that is held against the abdomen by a belt and a recording/storage device that is carried by a belt or hung from the shoulder. Uterine activity is typically recorded by the patient for 1 hour, twice daily, while performing routine activities. The stored data are transmitted via telephone to a practitioner, where a receiving device prints out the data. Patients are often contacted by, or have access to, personnel who can address monitoring problems.

The sensitivity and specificity of HUAM are uncertain, due to lack of data and the absence of a reference standard. External tocodynamometers, whether in the hospital or home, can produce inconsistent wave amplitudes when measuring uterine contractions, depending on the location of the instrument, the tension on the belt, thickness of adipose tissue, and other factors. Contractions of mild intensity can be confused with background noise. Studies suggest that HUAM performs similarly to monitoring devices used in the hospital, detecting 1.1–2.2 contractions for every contraction detected by conventional devices,^{6,7} and there is good correlation between HUAM results and contractions detected by intrauterine pressure catheters.⁸ There appears to be substantial variation among physicians in the interpretation of tocodynamometry tracings.^{7,9}

Effectiveness of Early Detection

A nonrandomized observational study¹⁰ and six randomized controlled trials^{11–18} of women at risk for preterm labor have compared birth outcomes with and without the use of HUAM. Three trials^{13,15,17} found no significant effect on the incidence of preterm birth or low birth weight, but sample size may have been inadequate to detect a difference. An observational study¹⁰ and four other trials^{14–16,18} reported a significant reduction in the incidence of preterm birth, neonatal morbidity and mortality, or low birth

weight in pregnancies monitored by HUAM. In four of these studies,^{10,14,16,18} HUAM-monitored women received more intensive nursing or telemetry personnel contact than did women in the control groups, making it unclear whether it was the device or the nursing contact that was responsible for the improved outcome. Overall, the studies showing benefit also lacked randomization, had high attrition and exclusion rates, or suffered from other design limitations.

Four studies^{10,11,14,16} found that HUAM-monitored women were less likely to experience preterm cervical dilation, effacement, or ruptured membranes and were more likely to be eligible for long-term tocolysis. Reported reductions in these surrogate measures, however, are of uncertain value in inferring an effect on clinical outcomes. The overall evidence shows rather consistently that the combination of HUAM and frequent provider telephone contact produces better outcomes than standard care.

There are no known direct adverse effects from HUAM. The technology involves some inconvenience, and surveys suggest that some women reject the device because of its impact on their lifestyle.¹⁹ There is little evidence of other adverse effects. Studies have shown that HUAM-monitored women attend no more than one extra physician visit per pregnancy than do unmonitored women.¹⁰ Another theoretical adverse effect is unnecessary hospitalization or administration of tocolytic drugs to women who have abnormal home tocodynamometry data but are not in preterm labor. Objective evidence regarding the incidence of this problem is unavailable.

Recommendations of Other Groups

In 1989²⁰ and again in 1992,²¹ the American College of Obstetricians and Gynecologists concluded that HUAM should remain investigational and should not be recommended for routine clinical use. That position was maintained in a recent technical bulletin.^{21a} In 1989, the National Institute of Child Health and Human Development concluded that the existing evidence was not convincing that HUAM, independent of vigorous nursing support and other interventions, was effective in assessing the risk of preterm labor or in preventing preterm birth.²² In a 1989 survey, 86% of the experts on an American Medical Association Diagnostic and Therapeutic Technology Assessment panel concluded that the effectiveness of HUAM was investigational, indeterminate, or unacceptable.²³ In 1991, the Food and Drug Administration licensed the marketing of a HUAM device for women who have had a previous preterm delivery.²⁴ A 1992 technology assessment by the Agency for Health Care Policy and Research concluded that current data did not support widespread use of HUAM or suggest its superiority over other methods for reducing the incidence of preterm births.²⁵

Discussion

The cost implications of HUAM are potentially great but have been incompletely evaluated in published research. Some studies have reported that average charges for HUAM-monitored women are \$5,000–\$11,000 lower than those for unmonitored women, presumably because of savings achieved by reduced neonatal intensive care.^{26–28} The cost-effectiveness of HUAM cannot fully be determined, however, until its clinical effectiveness has been demonstrated. Moreover, it remains unclear whether the money, personnel, and professional time required to provide this technology would divert resources from other potentially effective measures for the primary prevention of preterm births.

CLINICAL INTERVENTION

There is insufficient evidence to recommend for or against HUAM as a screening test for preterm labor in high-risk pregnancies (pregnancies with risk factors for preterm labor), but recommendations against its use may be made on other grounds, including its costs and inconvenience (“C” recommendation). HUAM is not recommended for normal-risk pregnancies (without risk factors for preterm labor) (“D” recommendation).

Note: See also the U.S. Preventive Services Task Force background paper on this topic: U.S. Preventive Services Task Force. Home uterine activity monitoring for preterm labor. *JAMA* 1993;270:369–376.

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