Activity Restriction in Pregnancy

A 31-year-old G2P0101 who delivered her previous child at 28 weeks’ gestation due to spontaneous preterm labor presents for a transvaginal cervical length ultrasound (U/S) at 18 weeks’ gestation. Her prenatal course has been uncomplicated and she has been receiving intramuscular progesterone therapy since 17 weeks’ gestation. On the U/S she is found to have a cervical length of 1.6 cm. The patient states that in her last pregnancy she was placed on activity restriction when she had symptomatic preterm labor at 27 weeks’ gestation. She asks if she should be placed on “bed rest” again because of her short cervical length today.

What is restriction of activity in pregnancy?

Restriction of activity, once used often for pregnant and postpartum women, is currently a proposal for a number of potential pregnancy morbidities. These include, but are not limited to: preterm contractions, arrested preterm labor, short cervix, preterm premature rupture of membranes (PPROM), elevated blood pressure, preeclampsia, intrauterine growth restriction (IUGR), placenta previa, threatened abortion, and multiple gestation.1 The terms “bed rest” and “activity restriction” are often used synonymously, but can differ to a great extent in clinical practice. Most antepartum inpatients undergo “bed rest” as defined by Fox et al., that is, limited ambulation of not more than 1 to 2 hours per day with bathroom use and bathing permitted.2 In general, the term “activity restriction” is preferable to “bed rest.” There is variability in when, why, and to what extent activity restriction is assigned, with varying degrees of stringency. Consistency is important for both clinical and research purposes.3

How common is it for obstetric providers to recommend activity restriction in pregnancy?

Survey data from several studies indicate that the prescription of activity restriction is a common practice among both ob/gyns and maternal-fetal medicine subspecialists, despite the fact that many obstetric providers surveyed did not expect the practice to prevent adverse outcomes.1,4

Are there risks associated with activity restriction in pregnancy?

The practice of activity restriction was called into question when the physiologic consequences of prolonged, strict activity restriction were first documented in the 1950s. Lack of weightbearing activity results in loss of muscle mass, bone mass, plasma volume, and cardiovascular capacity in a phenomenon now known as “deconditioning.” Physiologic changes can be clinically significant after only a few days of immobility.4,12 Changes such as those described below are well documented in nonpregnant patients placed on activity restriction, and have been demonstrated to varying degrees in pregnant patients. High-quality data on the full extent of physiologic changes in pregnant women placed on activity restriction, however, are lacking.

Nonambulatory patients have an increased risk of deep venous thrombosis (DVT). Pregnant women are known to be at increased risk of DVT and other thrombotic morbidities such as pulmonary embolism (PE), with an incidence rate of 0.8 to 1.72 per 1000 pregnancies (as a comparison, the incidence rate in the general population is 0.1 to 0.5 per 1000 per year).13,14 Kovacevich and colleagues reported a DVT rate of 15.6/1000 in pregnant women placed on bed rest,
versus a rate of 0.8/1000 in a control group of pregnant women who were not placed on bed rest \( (P < 0.0015) \)\(^\text{17}\). Although another retrospective cohort study failed to associate bed rest with increased rates of DVT or PE\(^\text{18}\), a third found an elevated risk of PE in patients on bed rest\(^\text{19}\). Overall, the data demonstrate an increased risk of thromboembolic events in patients placed on activity restriction.

Bone demineralization and muscle atrophy are well-documented side effects of bed rest in nonpregnant patients. Lack of compressive force on weight-bearing bones, increased bone turnover due to altered maternal calcium homeostasis, and maternal hormonal changes are thought to place pregnant patients at greater risk of accelerated bone loss. Indeed, several studies have found not only that women placed on bed rest are at higher risk of bone mineral density loss\(^\text{20}\) but also that markers of bone turnover are significantly higher in these women at 34 weeks’ gestation\(^\text{21}\). Muscle atrophy from deconditioning has been documented in antepartum women placed on bed rest through an increased time to re-oxygenation after exercise in the gastrocnemius muscle; maternal complaints of soreness and difficulty with mobility were also frequently reported in this group\(^\text{22}\).

Evidence suggests that restriction of activity is associated with a higher rate of gestational diabetes mellitus (GDM) among women admitted to the hospital for antepartum management of pregnancy-related complications. One retrospective study found that the risk of development of GDM was increased 1.04 times for every day a pregnant woman remained in the inpatient unit\(^\text{23}\). More study is necessary in this area, but elevated blood glucose levels have been well-documented in nonpregnant patients placed on activity restrictions\(^\text{10}\). The concern that pregnant women on activity restriction may be at higher risk of development of GDM is biologically plausible.

Along with the potential physical harms to the woman associated with activity restriction in pregnancy, there is an increased incidence of lower birth weights, maternal anxiety and depression, loss of income, and adverse psychological effects on the family\(^\text{5}\).

**Does activity restriction in pregnancy help prevent preterm birth?**

Few clinical trials have been performed that assess the effects of activity restriction (versus no restriction) on pregnancy complications. Only 1 trial has met criteria for a Cochrane review addressing bed rest in singleton pregnancies for the prevention of preterm birth. This study randomly assigned women at risk of preterm birth to bed rest versus no treatment or a placebo intervention. No differences were found between the 2 groups with regards to preterm birth rate before 37 weeks’ gestation (7.9% in the intervention group vs 8.5% in the control group, RR 0.92, 95% CI, 0.62–1.37)\(^\text{24,25}\).

Elliott and colleagues conducted a randomized controlled trial in which women with preterm labor (≥6 contractions per hour at time of admission) and a negative fetal fibronectin test were assigned to activity restriction or normal activity at time of hospital discharge. No differences were seen in preterm delivery rates between the 2 groups (44 vs 39%, \( P = 0.478 \))\(^\text{26}\).

Grobman and colleagues found that preterm birth at less than 37 weeks’ gestation appears to be more common when patients are placed on any kind of activity restriction, whether pelvic, work or non-work rest, in both inpatient and outpatient settings\(^\text{8}\). “Any activity restriction” was defined as being placed on any type of rest. Their study involved nulliparous women with incidentally diagnosed short cervix (<30 mm by mid-trimester scan) randomized to treatment with 17-α hydroxyprogesterone caproate or placebo. After controlling for potential confounding factors, they found an increase in risk of delivery before 37 weeks’ gestation (OR 2.37; 95% CI, 1.60–3.53) as well as an increased risk before 34 weeks’ gestation among women placed on activity restriction. These data are consistent with a retrospective cohort study of women with cervical length < 25 mm and showed a correlation between hospitalization and cervical shortening (\( P = 0.005 \))\(^\text{27}\).

No study to date has identified improvements in neonatal outcomes in women with short cervix or threatened preterm labor who undergo activity restriction\(^\text{7,28}\). However, there is evidence of higher rates of neonatal complications, including lower birth weight and earlier gestational age at delivery, and a higher likelihood of development of motion sickness and allergies later in life\(^\text{7,29–31}\).

**Are there other pregnancy conditions that may potentially benefit from activity restriction?**

Hypertensive disorders of pregnancy, PPROM, multiple gestation, and impaired fetal growth are among the most common reasons for antepartum hospital admission and triggers for an obstetric provider’s recommendation of activity restriction\(^\text{7}\).

With regard to hypertensive disorders, the potential for decrease in systolic blood pressure and subsequent, although theoretical, improvement in
placental perfusion associated with activity restriction could potentially outweigh the risks of DVT and deconditioning. However, the only randomized controlled trials showing improvement in outcomes compared women with preeclampsia who were assigned to bed rest with women who underwent immediate delivery, which does not allow independent analysis of activity restriction as an intervention.31,32

A 2006 Cochrane review on the subject of prevention of preeclampsia in women at moderate risk of developing the disorder (hypertension after 26 weeks’ gestation, with or without proteinuria) concluded that modest restriction of activity, with 4 to 6 hours per day of rest, may be associated with reduced risk of preeclampsia. Small sample size and uncertain study quality prevented generalization of these data and the authors concluded that there was insufficient evidence to recommend the practice.33

Women with PROM are currently managed with inpatient admission to be close to neonatal and obstetrical services due to the unpredictability of labor and the potential for rapid delivery, development of infection, or fetal compromise. Often these women are also placed on activity restriction or bed rest in an effort to increase latency until delivery and to prevent umbilical cord prolapse. However, there are no studies to date examining the effect, if any, on pregnancy outcomes.

Women with multiple gestation are at an increased risk of preterm birth. Routine inpatient bed rest was once offered routinely to such patients in middle to late pregnancy. Seven randomized clinical trials have been conducted that included 713 women assigned to routine inpatient bed rest versus hospitalization only if complications developed. These trials did not demonstrate any reduction in preterm birth or perinatal mortality. The only detectable benefit was a decrease in the number of neonates born with birth weight < 2500 g, suggesting that bed rest may be a benefit to fetal growth in this population.34

Few studies have examined less-commonly-reported maternal outcomes in women with multiple gestations who were placed on activity restriction, such as weight gain and indicators of mental health status. Maloni and colleagues found that maternal stressors, symptomatic side effects, and depressive symptoms all increased, while maternal weight gain was suboptimal, in patients placed on hospital bed rest.35

Bed rest has not been shown to be effective for the prevention of preterm birth and should not be routinely recommended.

IUGR is often attributed to placental insufficiency, and activity restriction and/or bed rest is often prescribed in an effort to improve placental perfusion.36 However, a Cochrane review found only a single randomized controlled trial that allocated women with growth-restricted fetuses to either bed rest in the hospital or work restriction at home (no subjects were allocated to normal activity). No differences were found in infant birth weight, Apgar scores, cord pH, or operative delivery rate. The reviewers noted that the small sample size (N = 101) may have been insufficient to unmask differences between groups, but nonetheless noted that they were unable to recommend the practice of hospital bed rest for growth restriction.37

What do professional societies recommend regarding activity restriction in pregnancy?

The American College of Obstetricians and Gynecologists states that bed rest has not been shown to be effective for the prevention of preterm birth and should not be routinely recommended (Level B evidence).38 The Society of Obstetricians and Gynaecologists of Canada states that increased rest at home in the third trimester (Level I-C evidence) or reduction of workload and stress (Level III-C evidence) may be useful for women at risk of developing preeclampsia. Strict bed rest in the hospital for women diagnosed with preeclampsia is not recommended (Level I-D evidence).39 The National Collaborating Centre for Women’s and Children’s Health, in collaboration with the Royal College of Obstetricians and Gynaecologists, states that bed rest has not been shown to be of benefit and should not be offered to women with gestational hypertension or preeclampsia.40 No other national recommendations exist.

Summary

The practice of routine use of activity restriction or bed rest during pregnancy to improve maternal or neonatal outcomes is not supported by available data. In addition, there are potential risks specifically associated with activity restriction and bed rest. A recent commentary has argued that routine use of these interventions should be restricted to formal clinical trials.1 We recommend against the routine use of activity restriction or bed rest during pregnancy for any indication (Grade 1B, strong recommendation with moderate quality of evidence).42
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REFERENCES