

Occupational Guidance for Physical and Shift Work During Pregnancy: A Review

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Abstract

An increasing number of women in the United States continue to work throughout their pregnancies. The Advanced Practice Registered Nurse (APRN) must provide individualized counseling for pregnant workers that incorporates the best evidence and abides by legal regulations. APRNs may have limited clinical experience in advising pregnant women about occupational work risks. A systematic review was undertaken to determine if long working hours, shift work, heavy lifting and prolonged standing adversely affect pregnancy outcomes. Overall, a low to moderate risk (RR 1.01 to 3.0; OR 0.73 to 6.2) exists for adverse birth outcomes among the pregnant worker whose job requires working long hours, night shift or heavy physical effort. An evidence-based clinical practice guideline is described.

BACKGROUND

Women have increasingly become a larger part of today's workforce. To assure nondiscriminatory job protection for pregnant workers, the National Women's Law Center recommends that a health care employer pay particular attention to these vital federal laws: the Americans with Disabilities Act (ADA), the Pregnancy Discrimination Act, and the Family Medical Leave Act. The ADA requires employers to make reasonable accommodations for employees with disabilities if the accommodations can be made without undue hardship to the employer. Pregnancy by itself is not considered a disability under the ADA, but pregnancy-related impairments may be considered disabilities if they significantly limit a major life activity such as walking, lifting, or digesting. Importantly, in 2008, the ADA Amendments Act (ADAAA) extended the ADA's definition of disability to temporary impairments including pregnancy-related impairments including hypertension, severe nausea, sciatica, or gestational diabetes.¹ Such conditions are entitled to reasonable accommodations under the ADA.

The Pregnancy Discrimination Act (PDA) guides the provider by barring discrimination on the basis of pregnancy and requires employers to treat pregnant women like they treat other employees who are comparable in their ability or

inability to work. An employer cannot restrict pregnant workers in their job duties simply because of pregnancy but must allow the employees to work as long as they are able to perform their jobs. A significant purpose of the PDA was making sure the employers treat pregnant workers the same as others who have conditions that affect the employee's ability to work. Thus, workplace discrimination against pregnant women is prohibited by Title VII of the Civil Right Act of 1964, as amended by the PDA.² The law was interpreted by the United States (US) Supreme Court in the landmark case of *International Union v. Johnson Controls*, 499 U.S. 187.² The court ruled that fetal protection policies are against federal law and that employers cannot treat women differently because they may become pregnant; nor may they treat pregnant women differently because of their pregnancy. In sum, the pregnancy must be handled like any other illness or disability, and the provider must not impose any restrictions and act in a paternalistic mode unless the employee is requesting the restrictions, such as no heavy lifting.

The Family and Medical Leave Act (FMLA) offers rights to eligible employees, defined as those who have worked at least 1,250 hours in the last 12 months for an employer with 50 or more employees.¹ Eligible employees have the right to take up to 12 weeks of job-protected, unpaid leave to care

for a new child. The FMLA also allows employees to take job-protected, unpaid leave for a serious health condition that causes the employee to be unable to perform the functions of the position. Pregnancy or prenatal care would be included in the definition of serious health condition.

Therefore, the APRN needs to consider regulations as well as the latest evidence based recommendations for physical activity and shift work during pregnancy to prevent potential perinatal complication of preterm labor, spontaneous abortion, and low birth weight (LBW). However, no comprehensive guideline was found to direct provider risk assessment and advisement of patients about work activities during pregnancy. Practice considerations were:

1) to identify low to moderate associated risk for working greater than 40 hours per week (overtime), working extended shift and night work scheduling, and participating in heavy physical work, bending or prolonged standing during pregnancy; 2) to counsel pregnant women exposed to work hazards that the above exposures have been identified as low to moderate risk for increasing pre-eclampsia, pregnancy-induced hypertension, delivering a small for gestational age baby (SGA), having intrauterine growth retardation (IUGR), delivering a low birth weight baby, preterm birth, and spontaneous abortion (SAB); and 3) to recommend appropriate work restrictions when they are indicated.

AIM

The aim of this review was to identify the best evidence for work activity advisement for US pregnant women who are exposed to four identified physical and shift work risks and transform that information to a clinical practice guideline.

METHOD

A narrative review of the evidence was employed to guide counseling for pregnant patients with work roles requiring physical labor and shift scheduling. Clinical guidance was drawn from published related guidelines from the National Guideline Clearinghouse (NGC), Centers for Disease Control and Prevention (CDC), National Institute for Occupational Safety and Health (NIOSH), American College of Obstetricians and Gynecologists (ACOG), and Society of Obstetricians and Gynaecologists of Canada (SOGC). Grey literature and hand searches for relevant matches for this query in occupational health journals were also completed.

Next, a systematic review of electronic databases was

undertaken for publications from January 2006 to February 2014. The 7 databases searched were PubMed, Cumulative Index to Nursing and Allied Health Literature (CINAHL), ERIC, PsycINFO, Google Scholar, Scopus, and the Cochrane Library. Search strategies included using the search terms shift work and pregnancy outcomes with the Boolean connector “AND”. Additional search terms were added to each database searched with the Boolean connector “OR” and included: preterm birth, gestational age, small for gestational age, fetal growth restriction, pregnancy complications, pre-eclampsia, reproductive health, work schedule tolerance, work, workload, stillbirth, spontaneous abortion. Clarifying search terms added for shift work were work, workload, work schedule tolerance. Advanced database search limiters included (inclusion criteria) only peer-reviewed articles published in the English language about female human beings. Articles were excluded from the review (exclusion criteria) if no pregnancy outcomes were reported or if participants had multiple-birth pregnancies, a history of chronic illnesses, or were not employed during their reported pregnancy.

In summary, 13,506 articles were initially identified; 23 documents met the authors’ agreement for complete review based on title and abstract content. The majority of publications retrieved did not report investigations or the pregnancy outcomes addressed by the query’s purpose of identifying physical or shift work risk during pregnancy. In particularly, numerous articles regarding work stress and depressions risks to pregnancy outcomes were not included. After full document evaluation, 2 articles were excluded as their focus was on the pathophysiology of pregnancy. Two authors (NS and PW) independently assessed the 21 publications for the quality of the evidence and recommendation grades guided by standardized criteria of the US Preventive Services Task Force (USPSTF).³ Specifically, the evidence was ranked on a 3-point scale of Good, Fair and Poor. The highest rank of Good equated to effects on health outcomes measured by strong well-designed studies; Fair denoted sufficient evidence with some limitations of study design; and Poor ranking indicated insufficient evidence to conclude a recommendation. The USPSTF3 recommendation scale used was a 5-letter grade (A, B, C, D, or I), ranging from the highest certainty of net benefit (A), to not recommending (D), or insufficient evidence (I) to support clinical practice recommendations. These authors developed an evidence table and recommendation ratings by authors for primary pregnancy outcomes and work condition. Statistical risk ratios (RR or

OR) were compared for primary outcomes as reported by the article authors. The evidence table is displayed in Table 1.

Table 1

Working Women's Selected Occupational Risk Factors and Pregnancy Outcomes Evidence and Recommendations

Authors/year of publication	Primary Study Outcomes for the Identified Pregnancy Risks of Long Working Hours, Shift Work, Prolonged Standing, and Heavy Physical Activities and Lifting/Bending/Climbing	USPSTF Quality of Evidence*	USPSTF Grade of Recommendation**
Abeysena, et al., 2009	Risk factors for SGA were shift work and exposure to physical and chemical hazards during 1 st trimester (OR 1.47; CI 0.81-2.67), 2 nd trimester OR 2.25; CI 0.99-5.07) and 3 rd trimesters OR 3.31 CI 1.34-8.15). Standing and walking greater than or equal to 4 hours per day for all trimesters ranged from OR 0.88-1.26; CI ranges 0.55-2.02. Standing greater than 2.5 hours per day OR range was 0.85-1.34; CI ranges were 0.54-2.15.	GOOD	C
Bonde, et al., 2013	Risks of miscarriage for long working hours (RR 1.36; CI 1.5-1.49), shift work ranges from (RR 1.12-1.51; CI 0.96-1.42), lifting (RR 1.02; CI 0.73-1.44), standing (RR 1.6; CI 1.1-2.3).	GOOD	A
Bonzini, et al., 2007	Working hours (RR 1.31; CI 1.16-1.47); shiftwork (RR 1.20; CI 1.01-1.42); standing (RR 1.28; CI 1.11-1.47); and lifting (RR 1.5) during pregnancy were associated with preterm birth. Risk for SGA was working hours (OR 1.59-2.10; CI 0.6-7.0); shift work (RR 1.07; CI 0.96-1.19); standing OR 2.0; CI 0.7-5.4).	GOOD	A
Bonzini, et al., 2009	Risks for preterm delivery for trunk bending greater than one hour per shift during 1 st trimester (RR 1.25; CI 0.69-2.26), 2 nd trimester RR 1.47; CI 0.80-2.71) and 3 rd trimesters RR 2.92 CI 1.27-6.70. Night shift plus standing, walking, or kneeling/squatting, or lifting weights through out pregnancy was a pooled OR range of 1.20-1.25.	GOOD	A
Bonzini, et al., 2011	Overall, any risk of PTD (RR 1.16; CI 1.00-1.33), LBW RR 1.27; CI 0.93-1.74), or SGA (RR 1.12; CI 1.03-1.22) arising from shift work in pregnancy is small.	GOOD	A
Both, et al., 2010	Demanding physical activity in the 2 nd trimester including shift work (OR 1.14; 0.65-2.01), night shift work (OR 1.80; CI 0.77-4.20) was associated with preterm birth.	FAIR	C

Table 1 Cont'd

Burdorf, et al., 2014	Handling and lifting loads 5 kg, 25 kg, or prolonged standing has better pregnancy outcomes for PTB; low risk effect on birth weight for handling 5kg (OR 1.43; CI 0.82-0.84).	GOOD	A
Chang, et al., 2009	Day/evening rotating work schedule (OR 1.12; CI 0.69-1.82) and greater than 40 hours worked (OR 1.06; CI 0.82-1.37) had no significant affect PHH or pre-eclampsia.	GOOD	B
Croteau, et al., 2006	Shiftwork or at least 2 conditions has risk of SGA (OR 1.43); standing alone for 4-6 hours (OR 1.4; CI 1.0-1.9); irregular shift work alone (OR 1.5; CI 1.0-2.1).	GOOD	B
Lawson, et al., 2009	Night work increases risk of Preterm birth before 32 weeks (RR 3.0; CI 1.4-6.2).	GOOD	B
Lee, et al., 2012	Lifting heavy items (>5kg) during pregnancy is associated with risk of SAB (OR 3.39; CI 2.06-5.60).	GOOD	A
Li, et al., 2010	Occupation was the proxy for occupational exposure. Packers, loaders and warehouse working women had increases in preterm infants (OR 1.18; CI 1.06-1.33); building caretakers and cleaners (OR 1.15; CI 1.06-1.26).	GOOD	C
Lin, et al., 2011	Day/night 12 hour shiftwork increase risks for LBW (250g) are moderate to high (OR 4.3; CI 1.1-16.8).	GOOD	B
Meerovic, et al., 2014	Occupational lifting (> 200kg) increased risk (RR 1.43; CI 1.13-1.80) for preterm birth.	GOOD	B
NHS, Royal College of Physicians, 2009	Guideline: Physical and shift work in pregnancy: Occupational aspects of management. Long working hours: SGA and PTD up to (OR 1.47); shift work: PTD and SAB (RR 1.2; CI 1.01-1.42); Prolonged standing: SAB and PTD (RR 1.5) or less; Heavy physical activities and lifting/bending/climbing: PTD (RR 1.3) or less.	GOOD	A
Niedhammer, et al., 2009	Being exposed to two or more occupational exposures affected birth weight less than 3000g (OR 2.44; CI 1.17-5.08), less than 2500 g (OR 4.65; CI 1.08-20.7), and preterm labor (OR 5.18; CI 1.00-27.01).	FAIR	B
Palmer, et al., 2013	PTD was associated to long working hours (RR 1.18; CI 1.05-1.33), shift work (RR 1.04; CI 0.94-1.15), standing (RR 1.13; CI 0.99-1.29), lifting (RR 1.02; CI 0.90-1.15) and physical workload (RR 1.10; CI 1.07-1.11). SGA was affected by long working hours (RR 1.04; CI 0.94-1.16), shift work (RR 1.01; CI 0.92-1.10), standing (RR 1.07; CI 0.94-1.22), lifting (RR 1.03; CI 0.73-1.15), and physical workload (RR 1.00; CI 0.81-1.18).	GOOD	A

Table 1 Cont'd

Quansah, et al., 2010	Shift work increases risk for SAB (OR 1.44; CI 0.86-1.95).	GOOD	A
Snijder, et al., 2012	SGA was associated with night shift (OR 0.75; CI 0.17-3.08), PTD (OR 1.29; CI 0.46-3.65), LBW (OR 1.23; CI 0.28-5.41). Long periods of standing affect SGA (OR 0.95; CI 0.63-1.45), PTD (OR 0.95; CI 0.65-1.40), LBW (OR 1.02; CI 0.60-1.73). Walking affects SGA (OR 1.22; CI 0.79-1.84), PTD (OR 0.85; CI 0.54-1.33), LBW (OR 0.86; CI 0.46-1.60). Lifting affects SGA (OR 1.85; CI 0.78-4.88), PTD (OR 1.26; CI 0.70-2.24), LBW (OR 1.86; CI 0.44-7.77). Long working hours was associated with SGA (OR 1.29; CI 0.81-2.25), PTD (OR 1.32; CI 0.85-2.03), LBW (OR 1.20; CI 0.66-2.18).	GOOD	B
Van Thiemstein, et al., 2014	Shiftwork has risk of Preterm Birth (OR 1.74; CI 1.12-2.69).	GOOD	B
Whelan, et al., 2007	First trimester SAB in first trimester with long work hours (RR 1.5; CI 1.3-1.7) and night shifts (RR 1.6; CI 1.3-1.9).	GOOD	A

Note: IQR = interquartile range; OR = odds ratio reported; RR = relative risks reported; CI = 95% Confidence Intervals; LBW = low birth weight; PHH = pregnancy induced hypertension; PTD = preterm delivery; SAB = Spontaneous abortion; SGA = small for gestational age.

*US Preventive Services Task Force (USPSTF) Quality of Evidence (Good, Fair, or Poor).

** USPSTF Recommendation Grades (A, B, C, D, or I) (2012). <http://www.uspreventiveservicestaskforce.org/uspsf/grades.html#post>

FINDINGS

This review of the epidemiological studies included pregnancy outcomes among women who were dealing with shift work and risk of pre-term delivery, shift work and small for gestational age and low birth weight, shift work and preeclampsia and pregnancy-induced hypertension, as well as shift work and spontaneous abortion and miscarriage. The shift and physical work advisement recommendations were based on 21 studies; 4 were systematic and/or meta-analyses and the remaining 16 were primarily large cohort studies. More than 120,000 pregnant workers from the Australia, Canada, United Kingdom, United States, Ireland, Netherlands, Sweden, South Korea, Taiwan, and Sri Lanka were studied.

Shift Work and Risk of Preterm Delivery

Shift work and risk of preterm delivery included 7 cohort studies, four meta-analysis studies, a systematic review, a case control, and a cross-sectional study. Bonzini¹² studied preterm delivery and showed little association (OR: 1.20-1.25) with long work hours, lifting, standing, or shift work. Further, Both et al.⁶ found that demanding physical exertion in the second trimester (OR 1.14; 95% CI 0.65-2.01) was only weakly associated with duration of gestation or survival. The study's strength is the potential for findings to be used for producing a policy guideline for physical activity of pregnant women. Both and colleagues⁶ strongly encouraged that in the absence of either medical or obstetric complications, pregnant women may be advised to safely continue their normal daily physical activities. For most daily physical activities, such as exercise and sports that the woman is conditioned to doing, no associated adverse birth outcomes were found. In addition, Palmer⁷ supported the benefits of physical activity, which might make the women feel more energetic and improve their labor and delivery outcomes.

Interestingly, Quansah¹⁷ found that nurses were at increased risk (OR 1.44; 95% CI 0.06-1.95) of adverse pregnancy outcomes, and the strength of the association was similar (OR 1.2-1.87) in 37 well-designed studies in the meta-analysis by the Royal College of Physicians⁸. In addition, Whelan¹⁰ discovered inconsistent evidence as to whether work schedule, which includes rotating shifts, can affect reproductive outcomes. Quansah et al.¹⁷ recommended further studies to determine whether hormonal disturbances are attributed to night work and whether such work possibly affects pregnancy outcomes.

Bonzini et al.⁵ evaluated whether shift work had an adverse impact on the outcomes of pregnancy. The researchers concluded that the evidence (OR 1.07-1.5) was not sufficiently compelling to justify mandatory restrictions of any of the activities. However, these researchers prudently advised against long working hours, prolonged standing, and heavy physical work, particularly in late pregnancy. Also assessing the evidence related to shift work and risk of preterm delivery, Palmer and colleagues⁷ meta-analysis of 113 studies determined low risk (RR 1.23) for preterm delivery strengthening the recommendation that restriction in physical and shift work be the preference of the pregnant woman and not mandated by the primary care provider.

Shift Work and Small for Gestational Age and Low Birth Weight

Niedhammer et al.²⁴ conducted a cohort study that included 1,124 pregnant women, to determine potential associations between working 40 hours or more a week, shift work, and fetal birth weight of 3,000 grams or less. Being exposed to at least 2 of the occupational factors significantly predicted fetal birth weight of less than 3,000 grams (OR 2.44; 95% CI 1.17-5.08). An association was found between having at least 2 factors and fetal weight less than 2,500 grams (OR 4.65; 95% CI 1.08-20.7) accompanied by preterm delivery. However, other variables, which included smoking and alcohol consumption, were also included in the risk analysis. There was no published risk ratios for pregnant women in the general population not exposed to long work hours or shift work.

To evaluate shift work exposure on childbearing and birth weight, a retrospective analysis of semiconductor factory women workers was investigated.¹⁶ The study showed that persistent rotating shift (day/night 12 hour shiftwork) exposure was significantly associated with decreased childbearing and lighter newborn birth weights of women workers. Lin and colleagues¹⁶ recommended that prenatal evaluations are especially necessary for mothers with persistent day-night rotating shifts. Newborns within the lightest birth weight quintile were more likely to be born to mothers with exposure to persistent rotating shifts (OR 4.3; 95% CI 1.1-16.8). Future research suggested was to determine if having a smaller baby affects future outcomes for either the baby or mother. Additional research should compare pregnancy outcomes of women who are and are not performing shift work.

A systematic review with a meta-analysis of studies

involving shift work and pregnancy outcomes by Bonzini et al.¹³ showed that, overall, shift work in pregnancy was associated with only a small risk of preterm delivery (RR 1.16; 95% CI 1.00-1.33), LBW (RR 1.27; 95% CI 0.93-1.74), and SGA (RR 1.12; 95% CI 1.03-1.22). In a separate systematic study, Bonzini et al.¹² found no statistically significant associations with SGA, or small abdominal circumference, and preterm delivery showed small association with long work hours, lifting, standing, or shift work (OR 1.20-1.25). Abeyseena et al.¹⁹ endorsed that all risk factors, including shift work, are modifiable. Bonzini et al.¹² recommended, as a preventive measure, avoiding shift work in an effort to maintain an adequate gestational weight gain during pregnancy. Further, Snijder et al.⁹ concluded that long periods of standing and long working hours per week during pregnancy negatively influenced intrauterine growth (OR 1.29; 95% CI 0.81-2.25). Lastly, Croteau et al.¹⁴ agreed that certain occupational conditions experienced by pregnant women could increase their risk of having a SGA infant, but importantly, preventive measures could reduce the risk.

Shift Work and Spontaneous Abortion

Bonde et al.⁴ systematically reviewed studies dealing with shift work, long working hours, and activities such as lifting, standing, and physical workload, which all were postulated to increase the risk of miscarriage. The review results were mixed; working fixed night shifts was associated with a moderately increase for miscarriage (RR 1.51). While the findings do not provide a robust case for mandatory restrictions work hours, shifts or physical workload, the authors recommend advising women against work requiring high levels of any such exposures. Night shift only working schedule was also found to impose a 60% risk for spontaneous abortion in Niedhammer and colleague's²⁴ cohort study. Therefore, women with at-risk pregnancies would benefit from receiving tailored individual counseling to reduce occupational exposure.

In a single retrospective cross-sectional comparative survey involving 1,000 workingwomen Lee et al.²³ found that handling heavy items during pregnancy was associated with an increased risk of spontaneous abortion (OR 3.39; 95% CI 2.06-5.60). A probability of bias in these moderately high results exists. The survey on handling heavy objects was unclear in explaining whether something heavier than 11 pounds (5 kilograms) had been handled challenging the survey's validity. Another limitation was that many of the spontaneous abortions accounted for in the study were due to

preexisting health conditions or lifestyle factors that were not considered. In summary, these authors agree with the findings of Bonzini et al.¹³ which indicate that any effects of shiftwork on preterm delivery, small for gestational age, and low birth weights are still likely to be small.

IMPLICATIONS FOR PRACTICE

While adverse pregnancy outcomes are only low to moderately linked to the 4 identified physical and work exposures, those occupational risks should be identified and monitored for throughout the working woman's pregnancy. The evidence does not support routine mandatory work restrictions. Instead, a patient-provider collaborative case-by-case approach is recommended to reduce risk exposure. Table 2 lists an example of physical and shift work screening questions that may assist in monitoring for risks.

Table 2

Physical and Shift Work Screening Questions

Quick Screen for Physical and Shift Work Risk:

- Do you have more than one job?
- Do you work more than 40 hours a week?
- Do you frequently work mandatory or voluntary overtime?
- Do you work night shift or swing shifts?
- Do you stand for more than 3 to 4 hours each shift?
- Does your job involve physical effort such as lifting objects greater than 25 pounds?
- Does your job include bending over at the waist (more than an hour a day)?

Note: Positive responses indicate a need for a detailed work risk assessment and consideration for work restrictions or referral.

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Health care providers can use the available evidence when advising healthy working women who have a singleton pregnancy about her physical and work shift pregnancy risk potential for:

Long Working Hours

- Overall, long working hours affect only a low to moderate risk (RR 1.04-1.36; OR 1.20-1.32) for LBW, SGA, IUGR, and preterm birth.⁴⁻¹⁰ [GOOD; GRADE A]
- Long working hours are inconsistently (OR 1.3-1.06) associated with an increased risk of pre-eclampsia and PIH.^{5,8,11} [GOOD; GRADE A]

Shift Work

- Shift and night work is associated with a low to moderate risk (RR 1.07-3.0; OR 0.73-4.3) for adverse pregnancy outcomes.^{4-9,12-18} [GOOD; GRADE A]

Prolonged Standing

- In general, prolonged standing for greater than three hours per day results in no more than a low to

moderate risk (RR 1.07-2.0; OR 0.95-1.34) for adverse pregnancy outcomes.^{4,5,7-9,14,19} [GOOD; GRADE A]

Heavy Physical Activities and Lifting/Bending/Climbing

- Generally, during the first 34 weeks of pregnancy, work activities to which the woman is accustomed prior to pregnancy offers a low to moderate risk (RR 1.02-1.43; OR 0.85-3.39) of adverse pregnancy outcomes.^{4-9,19-22} [GOOD; GRADE A]
- Trunk bending for more than one hour a day after 34 weeks gestation offers a moderate risk (RR 1.25) for reduced fetal head circumference.¹² [FAIR; GRADE C]
- There is limited evidence of risk (OR 3.39) for spontaneous abortion from heavy lifting.²³ [FAIR; GRADE B]

Multiple Risk Exposures

- A combination of risk exposures is associated with higher relative risks for adverse pregnancy outcomes than the individual risk exposures alone. Being exposed to two or more risk exposures was found for birth weight less than 3000 grams (g) (OR 2.44), less than 2500 g (OR 4.65); and preterm labor (OR 5.18).^{12,14,19,24} [GOOD; GRADE B]

Advisement Strategies

Once the patient's shift and/or physical work risks are identified, an individualized patient-centered plan to lower the exposure can be designed.

- With the patient's permission, collaborate with the employer's occupational health physician, APRN, nurse, or human resource representative to facilitate risk reduction.^{4,14,19}
- Counsel the pregnant worker on the dual demands of career and childbearing/childrearing and need for sleep, nutrition, and physical activity during pregnancy and postpartum.^{4,14,19}
- Advise the patient that she may be able to return to work after 4-6 weeks if she had an uncomplicated vaginal delivery, and 8 weeks if she had an uncomplicated Cesarean delivery.²⁵
- Provide pregnancy wellness education, resources, or referral for support and guidance. An example of educational material is the March of Dimes resources.
- Follow-up with the patient throughout pregnancy assessing for work activity complications (e.g., IUGR).^{4,14,19}

The following guideline outlines strategies in determining risk and the need for work restrictions or modifications for pregnant workers (Table 3). Additional resources are suggested in Table 4 to assist in designing the patient-centered plan of care. The guideline outline can be adapted for use in any practice setting and serve as a template for the electronic medical record.

Table 3

Perform a focused assessment.	<ul style="list-style-type: none"> Obtain obstetrical/gynecological history to verify a prognosis of normal pregnancy. Assess current employment, job title, and job satisfaction. Conduct an occupational health interview. Determine work schedule, responsibilities, recent changes, or promotions. Obtain information of work physical activity assessments including type, frequency, intensity, duration and compare to pre-pregnancy activity levels.^{4,14,19,24}
Identify potential work related risk factors.	<ul style="list-style-type: none"> Long work schedule is defined as greater than 40 hours per week that includes extended day and extended week schedules.^{4,5,7} Multiple employments (e.g., full time job plus part time employment or several part-time jobs). Frequent mandatory or voluntary overtime scheduled. Shift work is defined as any schedule other than 0700-1700, 5 days a week.²⁷ Night work, swing shifts and rotating or permanent off-hour shifts with limited recovery time (e.g., employee with less than 3 days between shift swings).²⁷ Scheduled overtime maybe mandatory or voluntary overtime and occurs when the employee is working over and above that specified time for full-time employment. Climbing stairs is described as repetitive stair climbing when the employee climbs stairs 4 or more times in an 8-hour shift.²⁸ Bending or stooping is trunk bending for greater than 1 hour per day in late pregnancy.¹² Manual lifting during pregnancy should consider lifting patterns such as the distance objects are held in front of the body while lifting and the height the object is lifted from the floor. Heavy lifting is described as lifting 25 pounds or more.⁹ Prolonged hours standing is greater than 3 or 4 hours of continuous standing.⁷
Determine if a work restriction is necessary during pregnancy.	
Make recommendations to employers for reasonable accommodation for any necessary work restrictions based on the above risk factors.	<ul style="list-style-type: none"> Physical activity <ul style="list-style-type: none"> In an uncomplicated normal pregnancy, the following work schedule restrictions may be followed: <ul style="list-style-type: none"> Sedentary activities until 40 weeks or beginning of labor, Light activities until 38 weeks, Moderate activities until 32 weeks, Heavy activities until 26 weeks, or Very heavy activities until 20 weeks.^{5,43,48} Manual lifting <ul style="list-style-type: none"> Maximum recommended weight for infrequent lifting during

Table 3 Cont'd

	pregnancy ranges from 17 to 36 pounds for the first 20 weeks and from 17 to 26 pounds for greater than 20 weeks. ²⁹ For repetitive short duration and long duration lifting refer to <i>Recommended weight limits in early and late pregnancy for 3 lift frequency patterns</i> . ^{39,20}
Render a placement decision in compliance with American with Disabilities Act and the Family Medical Leave Act regarding the woman's physical ability to do a particular job or the need for job protected unpaid leave related to pregnancy or prenatal care.	
Recognize the patient's legal protection against pregnancy discrimination and the Title VII of the Civil Right Act of 1964, as amended by the Pregnant Workers under the ADA.	

Resources

Sidebar: Resources

Legal Issues

- American with Disabilities Act (ADA) <http://www.ada.gov/>
- Family Medical Leave Act (FMLA) <http://www.dol.gov/whd/fmla/>
- Title VII of the Civil Right Act of 1964 <http://www.eeoc.gov/laws/statutes/titlevii.cfm>
- The U.S. Equal Employment Opportunity Commission. 2011. *Employer Best Practices for Workers with Caregiving Responsibilities*. Available at: <http://www.eeoc.gov/policy/docs/caregiver-best-practices.html>

Physical Activity Assessment

- American Medical Association (AMA). 2012. *AMA guidelines for continuation of various job tasks during pregnancy*. Available at: http://ihealth.org/images/hal-doc-up/AMA_guidelines.pdf
- Canadian Society for Exercise Physiology. *Physical activity readiness: medical examination for pregnancy*. Available at: <http://www.csep.ca/cmfiles/publications/pap/papmed-xpreg.pdf>
- National Institute for Occupational Safety and Health (NIOSH). *Revised NIOSH Lifting Equation – assessment tool for estimating recommended weight limits for two-handed manual lifting*.²⁹ Available at: <http://www.crgonomics.com.au/niOSH.htm>
- NIOSH. *Manual Lifting during Pregnancy Chart - Recommended weight limits in early and late pregnancy for three lift frequency patterns*.^{29,30}
- The American College of Obstetricians and Gynecologists – *FAQ: Exercise During Pregnancy*. Available at: www.acog.org

CONCLUSIONS

The best evidence for work activity advisement for pregnant women in the US was obtained from an extensive review of the literature, professional organization guidelines, and federal law. Overall, the occupational exposures of long work hours, shift work, prolonged standing, or heavy lifting/bending carry risk ranges of low to moderately (RR 1.01 to 3.0; OR 0.73 to 6.2)⁴⁻²⁴ for adverse pregnancy outcomes of low birth weight, small for gestational age, and preterm delivery. Limited evidence was found linking those same occupational exposures with spontaneous abortion and negligible evidence for pre-eclampsia and pregnancy induced hypertension. Multiple risk exposures have an additive influence, increasing the woman's risk potential for adverse pregnancy outcomes.

Advising healthy pregnant working women about physical labor and shift work is facilitated by a comprehensive practice guideline. These authors have described work advisement recommendations and a guideline for clinical practice. Using evidence-based guidelines could reduce inconsistent practice advisement for work related physical activity among pregnant women.

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