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BEST PRACTICES IN MIDWIFERY

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USING THE EVIDENCE TO IMPLEMENT CHANGE

BARBARA A. ANDERSON
JUDITH P. ROOKS
REBECA BARROSO
EDITORS

CHAPTER SIX

EVIDENCE-BASED MIDWIFERY CARE FOR OBESE CHILDBEARING WOMEN

Laura A. Aughinbaugh and Nicole S. Carlson

THE RISKS OF OBESITY IN CHILDBEARING

The United States is in the midst of an obesity epidemic that has rapidly evolved over the past 25 years (Centers for Disease Control and Prevention [CDC], 2015). Currently, more than 60% of adults in the United States are overweight or obese (Flegal, Carroll, Kit, & Ogden, 2012). One third of childbearing-age women are obese with higher rates among racial and ethnic minority groups:

- 31.9% obesity overall
- 34.4% among Hispanic women
- 58.5% among non-Hispanic Black women (Flegal et al., 2012)

The trend in maternal obesity in the United States is consistent with other developed nations (Vahratian, Zhang, Troendle, Savitz, & Siega-Riz, 2004; World Health Organization [WHO], 2015; Yeh & Shelton, 2005; Zhang, Troendle, Savitz, & Siega-Riz, 2004). Overweight and obesity are linked to numerous health conditions, including cardiovascular disease, diabetes, musculoskeletal disorders, and some cancers (WHO, 2015).

The WHO identifies Class I obesity as body mass index (BMI) greater than 30 kg/m^2; Class II obesity as BMI greater than or equal to 35 kg/m^2, and Class III obesity as BMI greater than or equal to 40 kg/m^2 (WHO, 2015). When a woman meets the criteria of Class I obesity prior to pregnancy, her pregnancy has increased risks for both her child and herself. If the woman's BMI prior to pregnancy is Class III, the likelihood of less than optimal outcomes is even greater as both she and her offspring may experience short-term and long-term adverse health conditions. Significant social factors associated with obesity in women of childbearing age are lower formal educational attainment, low household income, and inadequate health insurance status (Vahratian et al., 2004). See Tables 6.1 and 6.2 for studies of the literature on childbearing outcomes related to obesity.

TABLE 6.1 Short-Term Health and Situational Risks of Obesity in Childbearing: A Synthesis of the Literature

Risk	Studies
First trimester miscarriage	Lashen, Fear, and Sturdee (2004); Ramsay, Greer, and Sattar (2006)
Limitations with ultrasound	Phatak and Ramsay (2010); Troya-Nutt et al. (2003); Yeh and Shelton (2005)
Limitations with conventional care	ACOG (2013); Hawkins, Koonin, Palmer, and Gibbs (1997); Hood and Dewan (1993); Ockenden (2008); Saravanakumar, Rao, and Cooper (2006); Swan and Davies (2012)
Gestational diabetes	Bhattacharya, Campbell, Liston, and Bhattacharya (2007); Sebire et al. (2001)
Gestational hypertensive disorders	Bhattacharya et al. (2007); Sebire et al. (2001)
Induction of labor	Sebire et al. (2001)
Slower progress of labor	Vahratian et al. (2004)
Cesarean delivery	Chu et al. (2007a)
Emergency cesarean delivery	Sebire et al. (2001)
Wound infection	Myles, Gooch, and Santolaya (2006); Sebire et al. (2001)
Prematurity	Bhattacharya et al. (2007)
Thromboembolic disorders	Larson, Sorensen, Gislum, and Johnsen (2007)
Macrosomnia	Cedergren (2004); Sebire et al. (2001)
Shoulder dystocia	Cedergren (2004)
Admission to NICU	Sebire et al. (2001)
Maternal postpartum hemorrhage	Bhattacharya et al. (2007); Sebire et al. (2001)
Maternal depression	Dotlic et al. (2014); Usha-Kiran, Hemmadi, Bethel, and Evans (2005)
Breastfeeding difficulties	Amir and Donath (2007); Lepe, Bascardi-Gascon, Castaneda-Gonzalez, Perez-Morales, and Jimenez-Cruz (2011); Mok et al. (2008); Rasmussen and Kjolhede (2004)
Congenital anomalies	O'Reilly and Reynolds (2013); Rasmussen et al. (2008); Stothard et al. (2009)
Stillbirth	Chu et al. (2007b)
Neonatal death	Chu et al. (2007b); Kristensen, Vestergaard, Wisborg, Kesmodel, and Secher (2005)

(*continued*)

TABLE 6.1 Short-Term Health and Situational Risks of Obesity in Childbearing: A Synthesis of the Literature (*continued*)

Risk	Studies
Preterm labor, both medically induced and spontaneous	Cnattingius et al. (2013); Suidan, Apuzzio, and Williams (2012)
Prolonged pregnancy, cervical ripening failure	Arrowsmith, Wray, and Quenby (2012); Bogaerts, Witters, Van den Bergh, Jans, and Devlieger (2013); Bhattacharya et al. (2007)
Increased risk of postpartum hemorrhage	Bloomberg (2011); Wetta et al. (2013)
Delayed lactogenesis (> 60–72 hours)	Lepe et al. (2011)
Postpartum depression and anxiety	Molyneaux, Poston, Ashurst-Williams, and Howard (2014)
Newborn depressed innate and adaptive immune response	Wilson and Messaoudi (2015)

NICU, neonatal intensive care unit.

Source: Aughinbaugh and Carlson (2016).

TABLE 6.2 Long-Term Risks of Obesity in Childbearing: A Synthesis of the Literature

Risk	Studies
Infertility	Ramsay et al. (2006); Kelly et al. (2001); Zain and Norman (2008)
Long-term obesity—mother and chronic illness	WHO (2015); Rasmussen and Yaktine (2009)
Long-term obesity and diabetes of the child	O'Reilly and Reynolds (2013)
Cardiovascular disease of the child	O'Reilly and Reynolds (2013)
Higher incidence diabetes and asthma to children born to obese women	Wilson and Messaoudi (2015)
Stress incontinence for the mother	Dwyer, Lee, and Hoy (1988)
Parenting a child born prematurely or born with birth defects	Lindbald, Rasmussen, and Sandman (2005); Ray (2002); Kirk (1999)

Source: Aughinbaugh and Carlson (2016).

The increasing rates of overweight and obesity in women of childbearing age, combined with the risks of poor outcomes for the mother–child dyad, make it imperative for midwives to be aware of the evidence. In this chapter, evidence-based best practices for the preconception, antepartum, intrapartum, and

postpartum care of the obese woman are described. In addition, in providing care to the normal-weight pregnant woman with a history of gastric surgery for weight loss, the midwife needs to be cognizant of unique clinical considerations that deviate from routine care.

OBESITY PRIOR TO PREGNANCY

Preconception Concerns

The most ideal time to reduce obesity-associated risks is prior to pregnancy (American College of Obstetricians & Gynecologists [ACOG] 2013; Jevitt, 2009; Modder & Fitzsimons, 2010). A pregnancy complicated by obesity is at greater risk for fetal neural tube defects (NTDs; Rasmussen, Chu, Kim, Schmid, & Lau, 2008; Stothard, Tennant, Bell, & Rankin, 2009). However, there is strong evidence that obese women who take high doses of folic acid supplementation prior to pregnancy can minimize the risk of NTDs (Lumley, Watson, Watson, & Bower, 2001; Modder & Fitzsimons, 2010; Mojtabai, 2004; Rassmussen et al., 2008; Scholl & Johnson, 2000).

Midwifery Best Practices

During preconception/well-woman visits, the midwife needs to obtain accurate height and weight measurements, determine BMI, and tactfully discuss BMI outside the defined limits as a risk in pregnancy. To supplement the discussion, the obese woman should be given written material. The ACOG has a number of excellent patient education fact sheets available online. (See www.acog.org/Resources-And-Publications/Patient-Education-FAQs-List.)

The woman contemplating pregnancy should begin supplementation with folic acid. ACOG guidelines (ACOG, 2013) and the joint guidelines of the Centre for Maternal and Child Enquiries (CMACE) and the Royal College of Obstetricians and Gynaecologists (RCOG; Modder & Fitzsimons, 2010) agree on an increased preconception folic acid dose for obese women. To prevent NTDs, women with a BMI greater than or equal to 30 kg/m^2 should supplement with 5 mg of folic acid daily, as compared to 4 mg daily among normal-weight women.

ANTEPARTUM OBESITY

Antepartum Concerns

Gestational Diabetes

Women with a pregnant BMI greater than or equal to 30 kg/m^2 are at greater risk for developing gestational diabetes mellitus (GDM: Bhattacharya et al., 2007; Sebire et al., 2001).

Congenital Anomalies

Obese women are at greater risk of giving birth to an infant with a congenital anomaly. Ultrasonography is a cost-effective and widely available tool for evaluating fetal well-being, screening and detection of fetal anomalies, and assessing potential aneuploidy. However, the accuracy of ultrasonography is not equivalent across all BMI categories as the distance from the image and the presence of adipose tissue disrupt the clarity of the image. In 1990, Wolf, Sokol, Martier, and Sador conducted a prospective study (n = 1,622 singleton pregnancies) at a mean gestational age of 28.5 weeks. All the fetuses were anatomically normal. High BMI was the best predictor of poor ultrasound visualization. With increasing gestation or increasing examination length of time, visualization of organs did not improve. Despite significant advances, ultrasound technology is still unable to adequately navigate through adipose tissue.

In 2015, Tsai, Loichinger, and Zalud published a meta-analysis identifying the challenges in the use of ultrasound among obese pregnant women. The authors confirmed that, in detecting certain congenital anomalies and aneuploidy, maternal obesity makes ultrasound less useful as a screening tool. Especially in the second trimester, there may be suboptimal visualization as a result of the increased thickness of the abdominal wall (Tsai et al., 2015).

The limitations of ultrasound to detect fetal anomalies and aneuploidy markers, in combination with the significant increase in rates of fetal anomalies, make it logical to offer the *triple screen* or *quad screen*. These serum analyte tests screen the mother's blood for biochemical markers for certain fetal anomalies and aneuploidy. The analytes measured are pregnancy-associated plasma protein (PAPP-A), alpha-fetoprotein (AFP), unconjugated estriol (uE3), beta-human chorionic gonadotrophin (beta-hCG), and inhibin A (inhA). The concentrations of these markers in the maternal serum are expressed in a gestation-specific multiple of the median (MoM). The levels of these markers are constantly changing during pregnancy, making the testing time specific. The testing results are dependent upon maternal age, race, single versus multiple gestation, maternal diabetes mellitus, in vitro fertilization, smoking, and previous testing. The most significant variable, however, is maternal weight. The increased blood volume in the women with higher BMIs decreases the concentration of analyte levels (Tsai et al., 2015).

Place and Type of Birth

Although the safety and cost-efficiency of out-of-hospital birth, as well as vaginal birth after cesarean (VBAC) for low-risk pregnancy, has been established, obesity increases the level of risk for women contemplating either an out-of-hospital birth or a VBAC. With the increase in the level of BMI and in the number of VBAC attempts, the safety index decreases for the obese pregnant woman (Jevitt, 2009; Modder & Fitzsimons, 2010).

Currently available data indicate that, even if VBAC is successful, the neonatal risks are increased (Belogolovkin et al., 2012). In addition, medical costs and the rate of puerperal infections are increased (Edwards, Harnsberger, Johnson,

Treloar, & Cruz, 2003). However, the authors of a recent study concluded that VBAC success is increased among overweight and obese women who lose weight between the first and second pregnancy (Callegari, Sterling, Zelek, Hawes, & Reed, 2014).

Consideration of Intrapartum Anesthesia

The greatest risks for both regional and general anesthesia complications occur in the obese pregnant woman with BMI greater than or equal to 40 kg/m^2 (ACOG, 2013; Jevitt, 2009; Modder & Fitzsimons, 2010). With regional anesthesia, the woman with a BMI greater than or equal to 40 kg/m^2 may have problems with positioning, distorted anatomical landmarks, and significant layers of adipose tissue that can interfere with anesthesia placement (ACOG, 2013). With general anesthesia, the woman can have difficult or failed endotracheal intubation from edema and excessive tissue in the airway (ACOG, 2013).

Pregnancy After Bariatric Surgery

As the obesity epidemic increases among women of childbearing age, so has bariatric surgery. According to the American Society for Metabolic and Gastric Surgery, there were 179,000 gastric weight-loss surgeries performed in 2013, 50% of the surgeries among women of childbearing age (18–45 years old; Maggard et al., 2008). Women with exclusively Class III obesity (BMI 40 or above) or Class I and II obesity (BMI 30–39) in conjunction with one or more co-morbid conditions are eligible for gastric weight-loss surgery. Co-morbid conditions include insulin-resistant type 2 diabetes mellitus, chronic hypertension, hyperlipidemia, obstructive sleep apnea, osteoarthritis, or cardiovascular disease (Landsberger & Gurewitsch, 2007).

Gastric procedures to enhance weight loss are either constrictive or malabsorptive. The constrictive procedures (the lap-band or gastric sleeve) changes the capacity and emptying time of the gastrointestinal tract. The malabsorptive procedure (Roux-en-Y gastric bypass) changes the absorption of macro- and micronutrients. Both the constrictive and malabsorption procedures alter sensations of hunger and satiety (Landsberger & Gurewitsch, 2007).

Women who conceive and give birth after gastric weight-loss surgery have specific risks depending upon which gastric procedure was performed (Maggard et al., 2008). Essentially, the procedures that cause malabsorption tend to cause greater weight loss while also causing significantly more nutrient deficiency (Landsberger & Gurewitsch, 2007). The literature is evolving on this topic.

The literature on pregnancy after weight-loss surgery (PWLS) addresses whether risk increases, decreases, or just differs with pregnancy. At this juncture, the studies on PWLS are observational and must be appraised with caution. In a meta-analysis, Galazis, Docheva, Simillis, and Nicolaides (2014) found that, compared to matched controls, in PWLS women there was a reduction in large-for-gestational-age (LGA) neonates, a decrease in incidences of preeclampsia, and a decrease in gestational diabetes. However, the authors also found that there were increases in maternal anemia, small-for-gestational-age (SGA) neonates, preterm birth, and admission to the neonatal intensive care unit

(NICU) in the PWLS women and their newborns (Galazis et al., 2014). The authors concluded that there was no significant difference between PWLS women and matched controls for perinatal mortality or incidence of cesarean section delivery (Galazis et al., 2014).

With both constrictive and malabsorption procedures, outcomes for both the PWLS mother and her child are slightly less risky compared to the woman whose pregnancy is complicated by obesity, providing the PWLS mother has adequate nutrition and vitamin supplementation to offset malabsorption (Maggard et al., 2008). However, it must be noted that many women who have undergone gastric surgery still have BMIs greater than or equal to 30 kg/m^2 despite significant weight reduction. The likelihood of complications related to gastric surgery is small but can include internal hernia and obstruction of the small intestine, pouch rupture, necrosis of gastric remnants, and slippage of the band or sleeve. Because both restrictive and malabsorptive procedures change hunger and satiety sensations, both protein and micronutrient deficiencies are likely to occur, especially in the first 18 months postprocedure and possibly long-term (Landsberger & Gurewitsch, 2007).

Best Practices in Midwifery During the Antepartum Period

Nutrition and Glucose Management

At the first prenatal visit, accurate height, weight, and BMI should be obtained and recorded. Based on the woman's BMI, the midwife should explain appropriate weight gain and the risks associated with obesity in pregnancy (ACOG, 2013; Jevitt, 2009; Moddler & Fitzsimons, 2010). The 1-hour 50-g glucose tolerance test should be administered in the first trimester or at the first pregnancy encounter to all women with prepregnancy obesity. If the result is negative, the test should be repeated at 26 to 28 weeks gestation (ACOG, 2013; Jevitt, 2009). British guidelines recommend that women with prepregnancy obesity complete a 75-g 2-hour glucose tolerance test at 24 to 28 weeks gestation (Modder & Fitzsimons, 2010). The WHO recommends that all women have a glucose screen at 24 to 28 weeks gestation (1999).

Monitoring for Congenital Anomalies and Fetal Well-Being

The midwife needs to counsel the obese pregnant woman about options available for screening for congenital anomalies, including information about the limitations of ultrasound among pregnant obese women (ACOG, 2013; Jevitt, 2009; Modder & Fitzsimons, 2010). These limitations include less accuracy in detection of aneuploidy markers. With the obese woman, the ultrasonagrapher needs to use higher frequency and lower frequency probes, image brightness alternation, and scanning where there is less subcutaneous fat (the umbilical window or suprapubic/under the pannus; Tsai et al., 2015). Despite the limitations of maternal serum analyte testing, the midwife should offer this testing to all obese pregnant women as the rates of congenital anomalies in this population are increased (ACOG, 2013; Jevitt, 2009; Modder & Fitzsimons, 2010).

Planning for Place and Type of Birth

Women with a prepregnancy BMI greater than or equal to 35 should plan to give birth in a hospital for maternal and fetal safety. As for women with BMI between 30 and 34, individual risk assessment can determine the safety of out-of-hospital birth (Modder & Fitzsimons, 2010). The increased risks of both shoulder dystocia and postpartum hemorrhage should be considered when offering hydrotherapy or water birth. In water-birth conditions, the midwife may be limited with maneuvers and must be ready for the possibility of having to lift the woman out of the tub without her full cooperation. For obese women requesting VBAC, the midwife must inform the women and family of both maternal and neonatal risks, especially with very high BMI (Jevitt, 2009).

Discussion About Intrapartum Anesthesia

If needed, the ACOG (2013) recommends regional rather than general anesthesia for the obese pregnant woman. The midwife should counsel the woman on anesthesia options and limitations as well as request, if at all possible, an anesthesia consultation prior to the onset of labor.

Midwifery Care of the Post-Bariatric Pregnant Woman

Women should wait at least 12 to 18 months after bariatric surgery before attempting pregnancy (ACOG, 2013). Once pregnancy occurs, the midwife should request a nutrition consultation (Jevitt, 2009). The PWLS woman should be screened for anemia by measuring serum iron, ferritin, folate, and vitamin B_{12} levels. In addition, serum levels of calcium, phosphate, and 25-OH vitamin D should be assessed and, if abnormal, parathyroid hormone levels should be tested. If serum albumin levels are low, the woman may have insufficient protein intake and will need dietary counseling (Landsberger & Gurewitsch, 2009).

As with the pregnant obese woman, the midwife should recommend that the PWLS woman with a prepregnant BMI of 30 or higher be screened for gestational diabetes in the first trimester or at the first prenatal encounter (Jevitt, 2009). Most PWLS women cannot tolerate the 50-g glucose tolerance test because this technique is likely to cause dumping syndrome. Instead, a viable option is to test fasting blood glucose level and 2-hour postprandial glucose level using cut-offs of 95 and 120, respectively (Landsberger & Gurewitsch, 2007).

LABOR, BIRTH, AND OBESITY

Compared to normal-weight women, initiation and progression of labor in obese women are more difficult and more likely to result in unplanned cesarean section (Chu et al., 2007a; Poobalan, Aucott, Gurung, Smith, & Bhattacharya, 2009). Although comprehensive guidelines for the intrapartum care of obese women do not yet exist, reported clinical studies demonstrate that careful labor management strategies can decrease the potential for unnecessary interventions,

including unplanned cesarean section (Abenhaim & Benjamin, 2011; Leeman & Leeman, 2003).

Cervical Ripening

Obesity may cause delay in cervical ripening at the end of pregnancy (Wendremaire et al., 2012). In general, obese women have lower Bishop scores in late pregnancy compared to nonobese women (Zelig, Nichols, Dolinsky, Hecht, & Napolitano, 2013). These women are more likely to have prolonged pregnancies (> 41 weeks; Arrowsmith, Wray, & Quenby, 2011; Usha-Kiran et al., 2005) and comorbidities such as hypertension and pre-eclampsia (Mission, Marshall, & Caughey, 2013). Obese women are more than twice as likely to have induced labor compared to nonobese women (Sebire et al., 2001). In addition, induction is twice as likely to fail because they may start the induction with low Bishop scores (< 3; Gauthier et al., 2011; Zelig et al., 2013).

Labor Progression

Time of labor lengthens as maternal BMI increases, with labors (4–10 cm) among morbidly obese nulliparous women lasting up to 7 hours longer than those of nonobese women (Carlhäll, Källén, & Blomberg, 2013; Hirshberg, Levine, & Srinivas, 2014; Kominiarek et al., 2011; Walsh, Foley, & O'Herlihy, 2011). Slow labor in obese women was initially thought to be caused by excess adipose tissue causing obstruction of the pelvis in late labor and at birth (Crane, Wojtowycz, Dye, Aubry, & Artal, 1997). More recent findings are that labor in obese women is actually slowest during latent and early first-stage labor, from 4 to 7 cm of cervical dilation (Fyfe et al., 2011; Kominiarek et al., 2011; Vahratian et al., 2004).

Obese women are more likely than normal-weight women to have slightly larger babies. Yet in studies that control for maternal diabetes, heavier fetal weight is not associated with labor arrest or slowing of the labor curve (Verdiales, Pacheco, & Cohen, 2009; Zhang, Bricker, Wray, & Quenby, 2007). Slow labor progress in the obese woman is theorized to be the result of abnormalities in the powers of labor, or myometrial dysfunction. Multiple physiologic alterations appear to cause inefficient myometrial contraction in obese women (Bogaerts et al., 2013; Parkington et al., 2014; Zhang et al., 2007). Cervical exams in obese women, especially morbidly obese women, can be difficult for both woman and provider. Excess vaginal and perineal adipose tissue can obscure pelvic landmarks, leading to the impression that fetal station is artificially high (Schmied, Duff, Dahlen, Mills, & Kolt, 2011).

Second-Stage Labor and Birth

Once obese women reach the second stage of labor, their vaginal birth rate is the same as normal-weight women's (Buhimschi, Buhimschi, Malinov, & Weiner, 2004; Robinson et al., 2011). Second-stage labor is not lengthened in obese women (Kominiarek et al., 2011). In fact, multiparous obese women have significantly

shorter second-stage labors compared to multiparous, nonobese women (source). Maternal obesity is not an independent risk factor for shoulder dystocia (Tsur, Sergienko, Wiznitzer, Zlotnik, & Sheiner, 2012). However, obesity combined with gestational diabetes is associated with a 70% increased risk of shoulder dystocia (Catalano et al., 2012).

Best Practices in the Intrapartum Period

Cervical Ripening

When caring for the obese woman during labor induction, the midwife should provide anticipatory guidance that the process may take several days (Gauthier et al., 2011). As with all women undergoing induction of labor, cervical ripening methods should be continued until the obese woman achieves active labor or the Bishop score is greater than or equal to 6 (source). When choosing a cervical ripening agent for the obese woman, the midwife should avoid dinoprostone (Cervidil or Prepidil), as this agent has a 50% failure rate among obese women. With these cervical ripening agents, there are no differences in nonreassuring fetal heart rate tracing, NICU admission, or postpartum hemorrhage (Suidan, Rondon, Apuzzio, & Williams, 2015). Vaginal examination should be minimized during cervical ripening among obese women, as the longer length of labor may increase their risks of developing chorioamnionitis (Briese, Voigt, Wisser, Borchardt, & Straube, 2010).

Labor Progression

Some obese women feel stigmatized and humiliated during labor by their clinicians (Furber & McGowan, 2011). It is crucial that the midwife sensitively supports obese women through labor. Because their labors may proceed more slowly than normal-weight women, obese women frequently have a more lengthy admission in early labor, augmentation with synthetic oxytocin (Pitocin), artificial rupture of membranes, and unplanned cesarean birth (Abenhaim & Benjamin, 2011; Carlson & Lowe, 2014a). Oxytocin augmentation, the leading treatment for slow labor, is less likely to end with vaginal birth in obese women compared to normal-weight women (Usha-Kiran et al., 2005). Adjusting synthetic oxytocin dosage for maternal BMI is not practiced, although several studies of induction protocols show that obese women require longer administration times, larger total doses, and greater per minute titrations to achieve cervical change or vaginal delivery in comparison with normal-weight women (Hill, Reed, & Cohen, 2014; Pevzner, Powers, Rayburn, Rumney, & Wing, 2009; Walsh et al., 2011). The midwife should be prepared for the increased likelihood of postpartum hemorrhage when synthetic oxytocin is used.

The higher a woman's BMI at the time of labor, the slower her labor is likely to proceed. In the presence of reassuring maternal and fetal status, midwives can encourage the obese woman to rest, ambulate, and use hydrotherapy or massage in early labor. In most obese women, it is best to delay hospital admission until the active phase of labor, usually after 6 cm (Kominiarek et al., 2011). Because

obese women have longer labors, the midwife should avoid frequent vaginal exams: using these evaluations only when labor progress is abnormally slow in view of the woman's BMI or if other problems are suspected. Artificial rupture of membranes should be avoided and, if used, should be performed only with the active phase of labor. If synthetic oxytocin augmentation is used, it is important that the midwife allows more time for cervical change than with nonobese women.

Monitoring fetal heart rate and contraction characteristics is often challenging in obese women, especially when BMI is greater than or equal to 35 kg/m^2. Obese women are eligible for intermittent fetal heart rate monitoring as per the Association of Women's Health, Obstetric and Neonatal Nurses (AWHONN) high-risk guidelines (AWHONN, 2015). If continuous fetal heart rate monitoring is needed, abdominal fetal electrocardiogram, if available, is more reliable than ultrasound Doppler systems (Cohen & Hayes-Gill, 2014). Internal fetal heart rate monitoring is very reliable, yet should be avoided because it may increase obese women's already higher risk of chorioamnionitis (Briese et al., 2010).

Obese women's labor contractions can be monitored externally using palpation, tocodynamometer, or electrohysterogram (EHG; Cohen & Hayes-Gill, 2014). Intrauterine pressure catheters (IUPCs) provide the most accurate contraction monitoring but require membranes to be ruptured for insertion, which, like internal fetal heart rate monitoring, increases the obese women's already higher risk of the potential for chorioamnionitis (Euliano et al., 2013). When continuous contraction monitoring is necessary, EHG provides a reliable, noninvasive contraction-monitoring alternative to IUPC and is not affected by obesity. The midwife should be cautious when using IUPC to judge the adequacy of contractile force in obese women. Although the IUPC readings in late first-stage labor are equivalent to nonobese women, obese women still require more time than nonobese women to make cervical changes (Chin, Henry, Holmgren, Varner, & Branch, 2012). Watchful waiting is the key to successful labor assistance when working with obese women (Carlson & Lowe, 2014b).

Second-Stage Labor and Birth

Genital tract trauma following vaginal birth is not increased among obese compared to nonobese women, even among nulliparas (Gallagher et al., 2014). Because gestational diabetes risk rises with each increase in BMI and the current GDM screening fails to identify some women who are diabetic, midwives should be especially vigilant for possible shoulder dystocia. With increased risk of both shoulder dystocia and postpartum hemorrhage among the obese women with gestational diabetes, water birth is a concern because the maneuvers used by the midwife are limited in water and tubs (Jevitt, 2009). Because birth is more frequently complicated in obese women with BMI greater than or equal to 35 kg/m^2, neonatal intensive care services should be available (Modder & Fitzsimons, 2010). When caring for the morbidly obese woman, it is important that the midwife alerts consulting physicians and hospital teams so that arrangements can be made to acquire special hospital beds or special tables, blood products, and extra personnel in the birth or operating room, if necessary.

OBESITY IN THE POSTPARTUM

Postpartum Hemorrhage

The obese pregnant woman is at greater risk for atonic and nonatonic postpartum hemorrhage (Bloomberg, 2011; Wetta et al., 2013). Establishing intravenous (IV) access may be more complicated in women with obesity and access should be established before it becomes imperative (Modder & Fitzsimons, 2010).

Postnatal Thromboprophylaxis

The obese woman is at greater risk for thromboembolism during the postpartum period. The risk of thromboembolism increases even further in the event of an operative delivery, prolonged hospitalization, or immobility (Larson et al., 2007).

Breastfeeding and Lactation

Obese women are at greater risk for poor breastfeeding outcomes with poor initiation and duration rates, difficult positioning, and impaired lactogenesis (Amir & Donath, 2007; Lepeet al., 2011; Mok et al., 2008; Rasmussen & Kjolhede, 2004).

Depression and Anxiety

Pregnancy is a time of emotional vulnerability and increased need for social support. Higher BMI both before and at the end of the childbearing cycle is positively associated with depression. Social support may be lower, reaching lowest levels among morbidly obese women (Dotlic et al., 2014).

Postpartum Follow-Up Care

The prime time to decrease the risks of obesity and pregnancy is prior to the pregnancy itself. A modest 10-pound weight loss prior to a subsequent pregnancy has shown to decrease the likelihood of gestational diabetes in the subsequent pregnancy (ACOG, 2013). Obese women with a history of gestational diabetes have a significant risk of developing type II diabetes after pregnancy even though the diabetic state often does not develop for several years (Bellamy, Casas, Hingorani, & Williams, 2009; Kim, Newton, & Knopp, 2001; Lauenborg et al., 2004).

Best Practices in the Postpartum

Postpartum Hemorrhage

Women with BMI greater than or equal to 40 kg/m^2 should have IV access established prior to the third stage of labor. The midwife should consider active management of the third stage of labor (AMTSL), including prophylactic misoprostol for women with BMI greater than or equal to 30 (Modder & Fitzsimons, 2010). Use of synthetic oxytocin in obese women may require higher titrations to produce

desired results, but postpartum hemorrhage risk is increased and preparations should be in place.

Postpartum Thromboprophylaxis

All women with prepregnancy BMI greater than or equal to 30 should be encouraged to ambulate as soon as possible after the birth. Thromboprophylaxis, depending on mode of delivery and other risk factors, is recommended (ACOG, 2013; Jevitt, 2009; Modder & Fitzsimons, 2010). For women with a BMI of 40, full postnatal thromboprophylaxis should be prescribed regardless of the mode of delivery. Fractionated and low molecular weight heparin for postnatal thromboprophylaxis is recommended (ACOG, 2013; Modder & Fitzsimons, 2010).

Breastfeeding and Lactation

Lactation can facilitate weight loss. Decreasing caloric intake by 500 cal/d during breastfeeding does not affect the quality or quantity of the mother's milk. The midwife should request a lactation specialist referral immediately in the postpartum period to promote maternal confidence and address potential lactation difficulties (Jevitt, Hernandez, & Groer, 2007; Modder & Fitzsimmons, 2010).

Depression and Anxiety

The midwife should administer the Edinburgh Postnatal Depression Scale (or use a similar validated tool) in the postpartum period to identify obese women at risk for depression (Jevitt, Zapata, Harrington, & Berry, 2006).

Postpartum Follow-Up

Women with BMI greater than or equal to 30 kg/m^2 and the diagnosis of gestational diabetes should have a diabetic surveillance at 6 weeks postpartum and be screened for insulin-resistance risk factors at least annually. Attention to diet and exercise is essential to decrease BMI prior to a subsequent pregnancy (ACOG, 2013; Jevitt, 2009; Modder & Fitzsimons, 2010).

CASE STUDY 6.1 USING THE EVIDENCE FOR BEST PRACTICE: EXEMPLAR

Best Practices With the Obese Pregnant Woman

M.K. is a 31-year-old, single, Caucasian primigravida. She seeks care at a midwifery-run clinic in rural Appalachia staffed by three midwives who attend births at the local community hospital. Two obstetricians at the hospital provide consultation, collaboration, and referral.

At her first visit, M.K. is 10 weeks gestation by last normal menstrual period and the midwife calculates her current BMI to be 39 kg/m^2. M.K. states that she probably

(*continued*)

CASE STUDY 6.1 USING THE EVIDENCE FOR BEST PRACTICE: EXEMPLAR (*continued*)

has lost 5 to 10 pounds over the last month as a result of nausea and occasional episodes of heartburn. Adhering to best-practice guidelines for the care of obese women during pregnancy, the midwife counsels M.K. about the risks associated with obesity in pregnancy for her and her child, including the limitations of ultrasound. The midwife informs M.K. about ways to decrease some risks by minimizing weight gain and ensuring daily intake of a prenatal vitamin daily, 5 mg of folic acid, and 10 mcg of vitamin D. The midwife discusses adequate physical activity during pregnancy and refers M.K. to a dietician for guidance on food choices to maximize nutrition and minimize weight gain. In addition to obtaining HgbA1C as part of the initial labs, the midwife also advises having a 50-g glucose tolerance test done now and again at 26 weeks gestation. A maternal serum marker screening is scheduled and the midwife explains the test in light of maternal obesity. The midwife also provides anticipatory guidance on planned place of birth.

M.K.'s pregnancy proceeds uneventfully and, at 39 weeks gestation, she arrives at the hospital with spontaneous rupture of membranes and clear amniotic fluid. Her total pregnancy weight gain has been 11 pounds, her blood pressure has remained normotensive, and all blood sugar screenings have been normal. Keenly aware that M.K.'s prepregnancy BMI was 39 kg/m^2, the midwife consults with the obstetrician on call. M.K.'s initial assessment reveals normal vital signs, category 2 fetal heart tracing, cervix at 4 cm, 100% effacement, and fetal head at zero station with estimated fetal size 8.5 to 9.0 pounds. The midwife and obstetrician agree to watchful waiting because it is likely that M.K.'s labor progression will be slower than normal as a result of her obesity. The midwife notifies the anesthesiologist on-call and the nurse places an IV access lock. M.K.'s labor progresses slower than expected but her vital signs remain stable and her baby tolerates labor well. At 15 hours after admission, M.K.'s cervix is completely dilated and she feels the urge to bear down. After 25 minutes of spontaneous pushing, M.K. gives birth to a vigorous infant weighing 9 pounds, 1 ounce and sustains a first-degree perineal laceration. The midwife institutes AMTSL while M.K. and her infant have skin-to-skin contact. The infant nurses well and the midwife orders lactation consultation as needed to help M.K. with breastfeeding. The midwife encourages M.K. to ambulate as soon as possible.

At her 6-week postpartum visit, M.K. is exclusively breastfeeding, has lost 15 pounds since the time of birth, and feels well. The Edinburgh Postnatal Depression Scale is within defined limits, as is her 75-g glucose tolerance test. The midwife praises M.K. and counsels her about weight management during the postpartum period and prior to subsequent pregnancies. The midwife also encourages M.K. to follow up with her primary care physician for periodic evaluation of blood sugars.

With careful midwifery management, M.K. has had a healthy pregnancy and infant.

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