Obesity

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Author: Dr. Nancy Eriksen

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Preconception Care of the Obese Patient

Overview

Obesity is the most common health problem in women of reproductive age with significant health risks over their lifetime. It is also associated with decreased fertility and adverse pregnancy outcomes. Obstetrician-gynecologists are the most common physician that women of reproductive age will see, resulting in an opportunity for OB/GYN's to make an impact on the future health of women with obesity.

The most recent prevalence of obesity in 2017 among women age 20-39 years is 36.5% and disproportionately affects minority women. The highest rate of obesity is seen in non-Hispanic black women (54.8%) and Hispanic women (50.6%). The lowest rate was in non-Hispanic Asian women (14.8%) followed by non-Hispanic white women (38%) (1). It is estimated that if the rate of obesity increases at its current rate one half of all reproductive age women will be obese by 2030 (2).

Since obesity is a common condition among reproductive-aged women who may not see other health care providers, OB/GYN's should attempt to address weight issues with their obese patients (3,4). Asking women whether they are worried about their weight or interested in weight loss will help identify those who are receptive to a discussion about weight management. If an obese woman is considering pregnancy (or not using contraception) ACOG recommends preconception counseling about the maternal and fetal risks of obesity in pregnancy including GDM, hypertension, preeclampsia, Cesarean delivery, and postpartum weight reduction (3). Counseling should be conducted in a nonjudgmental, honest and respectful manner.

Definition

The WHO defines Obese BMI categories as (5):

CATEGORY	**BMI**
Class I	30-34.9
Class II	35-39.9
Class III (severe)	40 or greater

Additionally, super obesity is defined as a BMI of **50 or greater** (6).

Health risks of obesity

In 2008 the Obesity Society defined obesity "as a chronic disease with extensive and well-defined pathologies, including illness and death." (7). This position was then adopted by the AMA in 2013 (Obesity Act of 2013). Some of the leading causes of preventable death among adults are obesity-related conditions such as heart disease, stroke, type 2 diabetes, hypertension, GERD, NASH, and some types of cancer (endometrial, breast, colon) (8). Excess weight also increases the risk of liver and gallbladder disease, obstructive sleep apnea (OSA), osteoarthritis, and gynecologic problems such as PCO, anovulation, and infertility (3).

Obese women are also at increased risk of many pregnancy related complications. Hypertension, preeclampsia, and GDM are twice as likely to occur in obese women. Preterm birth is increased, although this is likely due to obesity related complications. Labor induction, labor dysfunction, and risk for Cesarean delivery are also higher in obese women. Women who undergo surgery are at increased risk of blood loss (> 1000 ml), infection, thromboembolism, wound dehiscence, and complications from anesthesia (3).

Fetuses of obese women are also at higher risk of complications. Rates of macrosomia are double for obese women (14%) compared to nonobese women (8%). Congenital anomalies have also been reported to occur more commonly, in particular neural tube defects (NTD's) (9). Stillbirth among obese women is also higher than normal weight women, although the mechanism for this is not clear.

Long-term risks for the offspring of obese women include an increased risk of metabolic syndrome and childhood obesity. Maternal obesity has also been linked to altered behavior in children including an increased risk of autism spectrum disorders, childhood developmental delay, and ADHD (9).

Super obesity

The prevalence of super-obese women (BMI > 50) is reported to be 1.8% in non-diabetic and 2.3% in diabetic patients in the U.S. (10). Additionally, the number of super obese individuals is growing 5 times faster than the other obese categories.

Maternal super obesity is associated with a significant increase in maternal complications including preeclampsia (10-14%), GDM (20%), failed TOLAC, Cesarean delivery (50-60%), and ICU admission (1.3 – 6%) compared to women who were obese (BMI 30-49.9) (6, 10-13). Women undergoing a Cesarean have an increased risk for failed intubation, increased risk of general anesthesia (7%-10) and increased operative time. However, there is no increase in intraoperative complications, transfusions rate, or return to the OR (10, 14-15). Fetal complications are also greater in superobese women including macrosomia, neonatal hypoglycemia, and admission to the NICU (6,10,14). They are at increased risk for VTE and wound infection (9).

BMI and Infertility

Obesity in women is associated with ovulatory dysfunction, including PCOS, altered oocyte and endometrial functions, and reduced ovarian responsiveness to agents that induce ovulation. Obesity also appears to alter the endometrial receptivity during IVF as women with a BMI > 35 have a 25% lower live birth rate compared to women with a BMI < 35 (16). Because of the pregnancy related complications associated with maternal obesity, the American Society of Reproductive Medicine suggests that obese women wishing to conceive should consider a weight management program that focuses on preconception weight loss to a BMI < 35 (16). The most recent Committee Opinion on Obesity and Reproduction states “weight management is best achieved through a lifestyle modification program that combines dietary modification, physical activity, and behavioral interventions, including psychological, behavioral, and stress management strategies.” (16).

Lifestyle intervention

Lifestyle modification is the first line approach for managing obesity. Individuals with a BMI of 30 or higher should be counseled regarding diet and exercise and referred to a comprehensive lifestyle physician or program that includes behavioral interventional treatment (17-20). The American College of Lifestyle Medicine (ACLM) certifies providers in evidence-based lifestyle therapeutic approaches to prevent, treat, and oftentimes reverse lifestyle -related chronic disease. The lifestyle medicine approach includes a predominately whole food plant-based diet, regular physical activity, adequate sleep, stress management, and avoidance of risky substances that promote health and prevent disease (21). The most successful programs promote an intensive therapeutic lifestyle change meeting weekly for several months and model a team approach including the provider, nurse, behavioral coach, dietician, and cooking demonstrations (22-24).

Other aspects of caring for the obese patient include screening for OSA and metabolic diseases and referral to other specialists as needed (e.g. cardiologist, endocrinologist, REI, physical therapy, occupational therapy). Women should also be counseled to engage in moderate intensity physical activity (such as brisk walking) 5 times a week for at least 30 minutes each time (25).

ACOG and IOM recommend that women obtain a BMI < 30 before attempting pregnancy in order to reduce the maternal and fetal complications associated with obesity (26-27).

The American College of Lifestyle Medicine (ACLM) recommends 6 months of treatment with a lifestyle modification program before referring patients for surgical intervention for weight loss. Lifestyle change treatments should not be considered failed without trying an intensive immersion program or the patient having declined it. Modest reduction in weight can have significant impact on chronic disease. Weight loss of 3-5% can lead to improvements in triglycerides, glucose, HgA1C, and lower the risk of developing diabetes. And a weight loss of greater than 5% can improve hypertension, dyslipidemia, and reduce the need for medications even in patients with diabetes (19).

Bariatric surgery has been used in patients with whom lifestyle management has failed or who decline lifestyle management as a means of reducing weight prior to conception. Although it does reduce the incidence of

preeclampsia and fetal macrosomia, it does not reduce the risk of obesity related adverse pregnancy outcomes to the level of non-obese women (28). Currently, it is recommended that women postpone pregnancy for one year after bariatric surgery, when the rapid weight loss period has stabilized. Bariatric surgery is not currently recommended during pregnancy or breastfeeding, due to the increased nutritional demands of breastfeeding.

Pregnancy, however, provides a unique window of opportunity to offer lifestyle interventions to women, as part of prenatal care. The ability to improve outcomes on behalf of their babies provides some women the added intrinsic motivation to engage and actively participate in lifestyle changes.

Evidence based recommendations for preconception counseling in obese women (3,9,17-20, 25-27)

- Provide information concerning maternal fetal risks of obesity
- Reduce weight to a BMI < 30
- Screen for OSA with referral for a sleep study with a positive screen
- Refer to a lifestyle physician/program
- Refer to other specialties as needed
- Engage in moderate physical activity totaling 150 min/week
- Obtain screening labs: TSH. Free T4, HgA1C, CBC with diff, CMP, total cholesterol, LDL, HDL, triglycerides, hsCRP, Vitamin D and folic acid level

Adverse Pregnancy Outcomes

Maternal mortality in a large cohort was reported to be 50% higher in obese women than among non-obese mothers (29). In addition, there are numerous maternal and fetal adverse outcomes which are summarized in the Table below (9):

MATERNAL	FETAL
Cardiac dysfunction	Congenital anomalies
Gestational Hypertension	Macrosomia
Preeclampsia	Spontaneous abortion
Preterm Delivery	Birth trauma
Labor dysfunction	Stillbirth
Cesarean Delivery	
Postpartum Hemorrhage	
Endometritis	
Wound rupture/infection	
GDM	
VTE	

Numerous congenital anomalies are increased in obese women with the most common reported to be NTD's (9).

Table 2. Increases in Congenital Anomalies in Obese Versus Nonobese Gravidas ⇦

Congenital Anomaly	Increased Risk
Neural tube defects	OR, 1.87; 95% CI, 1.62–2.15
Spina bifida	OR, 2.24; 95% CI, 1.86–2.69
Cardiovascular anomalies	OR, 1.30; 95% CI, 1.12–1.51
Septal anomalies	OR, 1.20; 95% CI, 1.09–1.31
Cleft palate	OR, 1.23; 95% CI, 1.03–1.47
Cleft lip and palate	OR, 1.20; 95% CI, 1.03–1.40
Anorectal atresia	OR, 1.48; 95% CI, 1.12–1.97
Hydrocephaly	OR, 1.68; 95% CI, 1.19–2.36
Limb reduction anomalies	OR, 1.34; 95% CI, 1.03–1.73

Pregnancy Management

Labs

Obese women should be screened for diabetes in the first trimester and again at 24-26 weeks' gestation if the initial screen is negative (9). In addition to the normal prenatal lab's consideration should be given to obtaining a TSH, folic acid and vitamin D level if not done in the prior 6-12 months. If the patient is obese with a history of bariatric surgery, please refer to the ACOG practice bulletin on Bariatric Surgery and Pregnancy (No. 105, June 2009).

Referrals

i. Dietician- Discuss healthy food choices/lifestyle, possible need for protein/nutrient supplementation if overall diet is nutrient deficient or if s/p gastric bypass
ii. Pulmonologist- Sleep Study/OSA study
iii. Occupational Therapy- for patients with morbid obesity who may have difficulty with self-care, they can recommend long-handled reachers/brushes, etc, to aid in self-hygiene, even prior to delivery. This may be mandatory after delivery, esp. if by cesarean.
iv. Physical Therapy- especially if having increase in low back/joint pain or for post-surgical recovery
v. Anesthesiology consult- For all patients with BMI of 40 or greater, 35 or greater, with comorbidities (HTN, Diabetes, Cardiac disease), as the anesthesia risk class increases with these conditions
vi. Psychiatry- if needed (esp. if anxiety/depression)
vii. Other specialists as needed by comorbidities (cardiology, endocrinology, etc.)

Gestational weight gain

Pregnant women should be counseled that excessive weight gain is associated with an increased risk of adverse outcomes, in particular, preeclampsia, macrosomia, Cesarean delivery, and postpartum weight retention, and that limiting weight gain can lower those risks. The 2009 IOM guidelines currently recommends no more than a 11-20- lb. weight gain for women with a singleton and a BMI > 30 (27). Obese women with a twin gestation should limit weight gain to 25-42 lbs. Dietary consultation should be considered for all pregnant women to facilitate achievement of IOM goals for weight gain during pregnancy.

Exercise during pregnancy

All pregnant women should be encouraged to engage in 150 minutes/week of moderate intensity exercise (25). Safe exercises in pregnancy include walking 30 min daily, running, swimming, gentle low-impact aerobics (as long as no risk of falls). Exercise may help limit weight gain, improve glycemic control if diabetic, reduce stress, and improve fitness for labor/recovery if cesarean required. If not previously exercising at all, the patient may start with smaller increments of walking, and slowly add to her distance/time. Maintain adequate hydration, stop if having chest/abdominal pain, contractions, etc.

Genetic Screening

Obesity limits the interpretation of first and second trimester screening. An increased BMI hinders the ability to accurately measure a nuchal translucency (NT) or nasal bone and increases the need for transvaginal ultrasound. Studies report up to a 20% failure rate in obtaining a NT measurement in morbidly obese women (30).

Second trimester screening is also affected by maternal obesity due to the dilutional affects by larger blood volumes in obese women, leading to lower analyte levels with increasing maternal weight. Detection of ONTD's and trisomy 18 improve when maternal serum analytes are adjusted for maternal weight (31) However, weight adjustment does not improve the detection of Down syndrome. Many laboratories adjust for weight up to 270 lbs. Women weighing more than 270 lbs. are adjusted using coefficients for 270 lb women, thus theoretically decreasing the detection rate of NTD's and increasing false positives for trisomy 18 (31).

Obese women are also more likely to have low fetal fraction of cell free DNA or failed testing, especially at an early gestational age. Since failed testing increases the probability of fetal aneuploidy, obese women should be counseled about the limitations of cell free DNA testing and its implications prior to testing.

In general, traditional aneuploidy screening with serum analytes should be considered in the obese gravida because there is a much lower risk of test failure than with cell free DNA testing.

Diagnostic testing with either CVS or amniocentesis appears to have similar loss rates in women with a BMI < 40. However, in women with a BMI > 40, compared to women with a BMI < 25, the loss rate after amniocentesis is higher (OR 2.2) after adjusting for maternal age (32). Thus, women with a BMI > 40 should be counseled that amniocentesis may expose them to a higher risk of fetal loss.

Ultrasound imaging

Confirmation of gestational age using first trimester ultrasound is key in the obese patient due to limitations in confirming uterine size on physical exam.

And due to the increased risk of congenital anomalies in women with a BMI > 30, a detailed fetal anatomic survey should be done no earlier than 20 weeks' gestation (76811). Obesity also limits the effectiveness of visualization of congenital anomalies with suboptimal visualization noted in greater than 50% of initial studies (33). Suboptimal visualization of the heart anatomy (4-chamber view and outflow tracts) is particularly difficult in obese gravida (34). The detection of fetal anomalies also diminished with increasing BMI (33).

Techniques that can help improve the ability to have adequate visualization of fetal anatomic structures include: using lower transmission frequencies and harmonic imaging, Sims left lateral position scanning from the flank or groin, scanning under the panniculus above the pubic bone, scanning at the periumbilical or iliac fossa area, and transvaginal approach to visualize intracranial anatomy with cephalic presentation (35). Additionally, improvement in the visualization of intracardiac anatomy (4-chamber, outflow tracts, 3VTV) has been demonstrated using a combination of first trimester ultrasound (13 0/7 to 15 6/7 weeks) with transabdominal and/or transvaginal approach combined with second trimester ultrasound in 96% of women with a BMI > 40 (36).

AIUM does not recommend referral for a fetal echocardiogram unless an abnormality is suspected in obese women in whom there is suboptimal visualization of the normal 4-chamber view and outflow tracts (AIUM Practice Paramenter for the Performance of Fetal Echocardiography 2019-online only). However, ISUOG does recommend referring the patient for a fetal echocardiogram in the same situation. Finally, consideration should be given to fetal MRI in women who have suboptimal visualization of fetal anatomy related to abnormal aneuploidy testing (37). The BCM Perinatal Guidelines committee recommends considereation of referral for a fetal echocardiogram if 2 attempts to assess fetal cardiac anatomy have resulted in suboptimal visualization.

Antepartum Surveillance

An increase in BMI is associated with an increased risk of still birth with the adjusted odds ratio ranging from 1.37 in overweight women to 3.14 in women with a BMI ranging 40-49.9 (38). The highest risk is in women with super obesity (BMI >50) with an adjusted OR of 5.04. In addition, the risk of stillbirth in obesity increases with increasing gestational age. Compared with normal weight women, the fetal death rate among obese women at 28-36 weeks using hazard ratio was 2.1, for 37-39 weeks the hazard ratio was 3.5 and at 40 weeks or more the hazard ratio was 4.6 (39). At this time, it is unknown what the pathophysiology is of unexplained fetal demise in obese women. The most recent ACOG Practice Bulletin on Obesity states “even though stillbirth rates are higher in obese gravidas, there is no clear evidence showing a clear improvement in pregnancy outcomes with antepartum surveillance, and a recommendation cannot be made for or against routine antenatal fetal surveillance in obese women” (9). The BCM Perinatal Guidelines Committee recommends the following (please refer to “Antepartum Surveillance Management Guidelines”):

	GA to initiate testing	**Frequency**	**Delivery Time**
Obesity -Prepregnancy BMI 35 - 39.9 kg/m^2 -Prepregnancy BMI ≥ 40 kg/m^2	 37 weeks 34 weeks	Once weekly	individualized to situation (can await spontaneous labor)

Delivery recommendations

Obesity alone is not an indication for induction of labor, however retrospective data suggest that elective labor induction after 39 weeks is associated with reduced maternal and infant morbidity among obese women without other comorbidity and is not associated with an increased risk of Cesarean delivery (40,41). Medically indicated cesareans should be scheduled no sooner than 39 weeks, earlier for standard medical indications based on comorbidities. When scheduling inductions/cesareans, the L&D Charge RN should be informed, as special equipment may be used (such as the inflatable mattress to facilitate transfers), and additional nursing/ancillary staff may be needed to safely care for the patient during labor and delivery.

Intrapartum management

Increasing BMI, particularly in the nulliparous patient has been associated with a longer first stage of labor, increased risk for birth trauma (even when adjusted for macrosomia and diabetes), increased risk of Cesarean, and increased risk for postpartum hemorrhage after vagina delivery (but not Cesarean)(9). In a large multicenter cohort study of obese women, it was observed that the majority of obese women attempting vaginal delivery were successful, especially if they had previously delivered vaginally (42). Obese women desiring TOLAC have a lower success rate of 68% compared to 79.9% in normal weight women (9).

Special equipment, preparation and additional personnel are required to safely care for patients and a high BMI, especially when moving a patient is necessary. During labor and delivery, patients may require emergent Cesarean delivery, positional adjustment for fetal resuscitation, skin or leg retraction. If an epidural is in place, staff must often move the patient due to loss of motor function. The Occupational Safety and Health Administration (OSHA) recommends that no employee lift over 35 lbs. without assistance. The following are strategies to help safely move and transition patients:

- Ensure availability of appropriate birthing beds/other equipment to care for obese patients (e.g. large chairs and wheelchairs, larger BP cuffs, motorized lifts for gurneys)
- Use labor beds and stirrups designed to accommodate the obese patient
- Place inflatable air-mattresses under the patient to assist with movements from one bed to another (such as from a labor bed to OR table)
- Ensure adequate staff to patient ratio to permit assistance with leg support, skin retraction, suprapubic pressure if needed
- Utilize wide elastic bands to keep external monitors in place to avoid discomfort and skin irritation

Anesthesia

Maternal obesity also presents a challenge for management of anesthesia. Historically, up to 75% of anesthesia-related maternal deaths occurred among obese women, with the greatest risk being failed intubation (43). Outpatient consultation with anesthesia service should be considered in the 3rd trimester for obese women with obstructive sleep apnea and/or a BMI > 40 (> 35 at TCH PFW).

The risk of epidural failure is greater in obese women; therefore, early labor epidural placement should be considered. General anesthesia also poses a risk due to potential for difficult intubation. Preoxygenation and fiberoptic equipment to help with intubation should be considered and available should they be needed (9).

Operative Intervention

Antibiotic prophylaxis is routinely recommended prior to skin incision, although the optimal dosing in obese patients is unclear. Specific recommendations are difficult to establish because of lack of evidence of decreased surgical site infection with higher dosage strategies in obese women (9). Surgical prophylaxis for Cesarean deliveries performed at Ben Taub Hospital and Texas Children's Pavillion for Women recommend Cefazolin 3 gms in patients weighing > 120 kg (see hospital-specific infection reduction bundles).

If cesarean is required counsel the patient early that it may require a periumbilical vertical skin incision. The optimal skin incision for primary Cesarean in Class II and III obese patients is still debated and is left to the discretion of the surgeon. Most authors favor a transverse incision after either retracting the panniculus cephalad or caudad depending on the individual patient. In order to get better surgical exposure, one author recommends the Alexis-O self-retaining retractor (43). Closure of the subcutaneous tissue with a depth > 2 cm significantly decreases the incidence of wound infection. However, the use of subcutaneous drains is linked with a greater incidence of post-operative wound infections (9).

Postpartum Considerations

Immediate routine care

All obese women should use SCD's until there is adequate ambulation. Patients with a BMI > 35 at delivery who have a Cesarean birth and those with a BMI > 40 at delvery who have a vaginal birth and a prolonged hospitalization should receive prophylactic Lovenox for VTE prevention if there are no contraindications (see perinatal guideline: Venous Thromboembolism in Pregnant/Postpartum Women: Prevention, Early Diagnosis and Treatment [May 2019]).

viii. Patients with Cesarean should have a 1 week wound check. PT/OT consults should be considered for ambulation, transfers, ADL/IADL (including peri/wound care and basic hygiene). If the patient has OSA consider placing on BiPAP while in the hospital. All patient should be encouraged to breastfeed as there are additional benefits of reducing weight retention

ix. Sleep
    1. In accordance with the American Academy of Pediatrics, safe sleep habits should be encouraged (Avoid co-sleeping).
    2. Co-sleeping increases the risk of neonatal suffocation and may be increased in patients with OSA.

x. Postpartum visit
    1. Labs outlined in Table 1 should be obtained. If the patient had GDM a 2-hour GTT is recommended at 6 weeks.
    2. Contraception

Women with obesity can be offered all hormonal contraceptive methods with reassurance that efficacy of hormonal contraception is not significantly affected by weight (44). Consideration should be given to progestin-only and LNG-IUD in obese women who are older than 35 years of age. These methods may also be beneficial if the patient has AUB or endometrial hyperplasia by stabilizing and protecting the endometrium (44). In general, the IUD is most reliable, but higher dose DepoProvera may be considered. Norethindrone only pill may be used in early postpartum period, but likely higher risk of failure.

Women who have had bariatric surgery that compromises the absorption of oral medications (Roux-en-Y or biliopancreatic diversion) should not use oral contraception (combined hormonal or progestin-only) because efficacy may be impaired (44). There are no concerns for use of oral contraception in women who had a restrictive type of bariatric surgery (banding, sleeve gastrectomy). Non oral methods of contraception can be used without restriction.

Lifestyle interventions

Postpartum is a critical period for intervention to prevent long term weight gain, as excess weight gain during pregnancy and weight retention at one year postpartum, are strong predictors of obesity in the next 10 years (45). Pregravid obesity is associated with early termination of breastfeeding, postpartum anemia, and depression (9).

Obese women should be counseled regarding the risks of postpartum weight retention and referred for a lifestyle modification program that includes dietary counseling, exercise, and behavioral counseling including stress management. Postpartum counseling should also encourage breastfeeding and the long-term benefits of weight loss and reduction of adverse pregnancy outcomes should they desire for more children.

How to approach an obese patient in a nonjudgemental way (46)

b. General
    i. Avoid stigmatizing language
        1. The terms “morbidly obese”, “fat”, and “obese” have been found to be the most stigmatizing language
        2. Instead use terms such as “weight problem”, “unhealthy weight”, and “high BMI” which have been found to be the least offensive language
    ii. Exhibit empathy, sensitivity, and support
    iii. Use motivational interviewing to encourage healhy lifestyle changes
        1. Express emphathy and avoid arguments
        2. Develop discrepancies
            a. Example: “You have told me you want to avoid having to take insulin for your diabetes but you also told me you don’t have time to exercise. Why do you think its hard for you to find time to do any physical activity? Can you think of some ways of increasing your physical activity in smaller intervals throughout the day?
        3. Roll with resistance and provide feedback
            a. When patients express reasons for not changing behavior, help them find ways to succeed

        b. Example: “I know you are tired but could you walk 5-10 minutes at a time during break time and your lunch break?”
    4. Support self -efficacy
        a. “Lets talk about what you can do to be more physically active”
iv. Convey your support no matter what decisions they make about their health

c. Ask the patient questions that lead to a meaningful conversation about her current or future health concerns
    i. Questions to assess if the patient is concerned about her current or future health
        1. What concerns do you have about your health?
        2. Tell me about your current lifestyle. How would you describe your eating habits? What type of physical activity do you do and how often? How are you sleeping? How do you handle stress?
        3. What are your health goals for this coming year? And how can I support you in meeting your goals?
        4. Are you planning to get pregnant in the near future and if so, are you interested in leaning more about how to have a healthier pregnancy?
    ii. Questions to assess if the patient is concerned about the future health of her child and pregnacy outcomes
        1. What does a healthy pregnancy look like for you?
        2. What are your concerns about your pregnnacy?
        3. How can I support you during your pregnnacy?
        4. Are you interested in learning more about lifestyle changes that can improve your health and the health of your baby?
d. Use current health concerns as a segway to assess interest in lifestyle modification
    i. Current co-morbidity such as DM, HTN, autoimmune disease, etc.
        1. Are you interested in learning more about how lifestyle change can help you get off your medications or even reverse disease?
        2. If they are not interested use the opportunity to educate them about your concerns for the health of their fetus, adverse pregnancy outcomes, and future health of the woman
e. When patients indicate interest in modifying their lifestyle:
    i. Be supportive of their goals and desire to change
    ii. Work with each woman to help ensure she meets her health goals
    iii. Refer to online resources, apps, dietician, and other physicians as needed

Table 2: Evidence-based recommendations for management of obesity in pregnancy

Timing in Pregnancy	Recommendations	References
Initial Visit	• Use BMI at first visit to counsel regarding weight gain (BMI > 30 target weight gain is 11-20 lbs) • Counsel regarding adverse pregnancy outcomes • Screen for GDM during first trimester and again at 24-28 weeks if initial screen is negative • Screen for depression • Screen for OSA-refer for sleep study if positive • Refer for OT/PT or other specialties as needed • Labs-TSH, vitamin D, folate level • Low dose ASA (initiate between 12-28 weeks) • Counsel regarding moderate intensity exercise 150 min/week	6, 9, 17, 25, 47
Ante-partum	• First trimester US to document heart anatomy (4-chamber, 3VTV); use TVUS as needed • 20 week detailed scan (76811)-counsel about limitations of US in BMI > 30 • Consider referral for fetal echocardiogram if heart anatomy is not visualized • Consider 3rd trimester growth scan • Weekly antenatal testing beginning at 36 weeks gestation • Anesthesia consult for women with OSA or BMI > 50 • Deliver after 39 weeks gestation, or earlier for standard medical indications	9, 36-37, 48
Intra-partum	• Anesthesia consult on admission to L&D if BMI > 40 or BMI >35 with co-morbidities • Have fiberoptic equipment available to help with intubation when indicated	9
Operative Delivery	• Skin incision is surgeon preference • Retract panniculus cephalad or caudad • Consider Alexis O self-retaining retractor • Avoid subcutaneous drains • Have inflatable mattress available to facilitate patient transfers	9, 43
Post-partum	• Use SCD's until patient has adequate ambulation • Prophylactic Lovenox, if no contraindications, based on delivery BMI and mode of delivery • Refer for OT/PT to facilitate ambulation • Consider BiPAP while in the hospital for patients with OSA • Encourage patient to breastfeed • Wound check at 1 weeks postop for cesarean delivery • Hormonal contraception is not significantly affected by weight • Women with Bariatric surgery that affect absorption of oral meds (Roux-en-Y or biliopancreatic diversion) are not candidates for OCP • Consider progestin only and LNG-IUD in obese women> 35 years of age • Screening labs 6 weeks postpartum: TSH, Free T4, HgA1C, CBC with diff, CMP, total cholesterol, LDL, HDL, triglycerides, hsCRP, Vitamin D, and folic acid level • Counsel patients on risks of postpartum weight retentions with goal of BMI < 30 prior to her next pregnancy • Refer patient to a lifestyle medicine physician/program	9, 17-20, 26-27, 44

Resources

Food

WIC	800-942-3670

BrighterBites (www.brighterbites.com). Brighter bites delivers free fresh fuit and vegetables to area schools.

Houston Food Bank (www.houstonfoodbank.com)	713-223-3700

Lifestyle Medicine Physicians

Bellaire- Bandana and Munush Chawla MD (Int Med)	713-592-8900
Cypress- Dorothy Serna MD (FP)	281-807-5300
Lufkin- Charles Evans MD (FP)	936-699-5433
Houston-Baxter Montgomery (Cardiologist)	713-599-1144

BCM Sleep Medicine

713-798-3300

Baylor Pulmonology

(BTGH OSA) Minkyung Kwon MD 713-798-2400

References

1. Prevalence of obesity among adults and youth: United States, 2015-2016. NCHS Data Brief No. 288 October 2017. https://www.cdc.gov/nchs/data/databriefs/db288.pdf
2. Wang Y, Beydoun MA, Liang L, et al. Will all Americans be overweight or obese? Estimating the progression and cost of the US obesity epidemic. Obesity 2008; 16:2323-30.
3. Clinical Updates in Women's Health Care. Obesity. Vol XIII (1); January 2013 (reaffirmed 2018).
4. Phipps MG, Son S, Zahn C, et al. Women's preventative services initiatives well -woman chart. Obstet Gynecol 2019; 134:465-9.
5. WHO. Obesity: preventing and managing a global epidemic. WHO Technical Report Series 2000;894. http://www.who.int/nutrition/publications/obesity/WHO_TRS_894/en/.
6. Hartge D, Spiegler J, Schroeer A, et al. Maternal super-obesity. Arch Gynecol Obestet 2016; 293:987-992.
7. Council of the Obesity Society. Obesity as a disease: The Obesity Society Council resolution. Obesity 2008; 16:1151.
8. Jastreboff et al. Obesity as a Disease: The Obesity Society 2018 Position Statement. Obesity 2019; 27:7-9.
9. ACOG Practice Bulletin No. 156. Obesity in Pregnancy. December 2015.
10. Marshall NE, Guild C, Cheng YW, et al. Maternal superobesity and perinatal outcomes. Am J Obstet Gynecol 2012; 206(5):417.
11. Dennis AT, Lamb KE, Story D, et al. Associations between maternal size and health outcomes for women undergoing cesarean section: a multicenter prospective observational study (The MUM SIZE Study). BMJ Open 2017;7e015630.
12. Smid MC, Dotters-Katz SK, Vaught AJ, et al. Maternal super obesity and risk for intensive care unit admission in the MFMU Cesarean Registry. Acta Obstat Gynecol Scand 2017;9: 976-983.
13. Belogolovkin V, Crisan L, Lynch O, et al. Neonatal outcomes of successful VBAC among obese and super-obese mothers. J Mat-Fetal & Neonatal Med 2012;25(6):714-8.
14. Sullivan EA, Dickinson JE, Vaughan GA, et al. Maternal super-obesity and perinatal outcomes in Australia: a national population-based cohort study. BMC Pregnancy and Childbirth 2015; 15:322-32.
15. Smid MC, Vladutiu CJ, Dotters-Katz SK, et al. Maternal obesity and major intraoperative complications during cesarean delivery. AJOG 2017; 216:614. e1-7.
16. Practice Committee of the American Society of reproductive Medicine. Obesity and reproduction: a committee opinion. Fertil Steril 2015; 104:1116-26.
17. USPSTF. Obesity in adults: Screening and management. Recommendations for primary care practice 2012. June 2012. Available from https://www.uspreventiveservicestaskforce.org/Page/Document/UpdateSummarayFinal/obesity-in-adults-screening-and-management.
18. CMS. Decision Memo for Intensive Behavioral Therapy for Obesity. 2011 November 29,2011. Available from: https://cms.gov/medicare-coverage-database/details/nca-decision-memo.aspx?&NcaName=Intensive%20Behavioral%20Therapy%20for20%Obesity&bc=ACAAAAAA/AAA&NCAId=253.
19. Jensen, M.D. et al. 2013 AHA/ACC/TOS guideline for the management of overweight and obesity in adults: a report of the American College of cardiology/American Heart Association Task Force on Practice Guidelines and The Obesity Society. Circulation 2014;129 (25 Supp2):S102-38.
20. ACLM. What is Lifestyle Medicine. 2015. Available from: https://www.lifestylemedicine.org/What-is-Lifestyle-Medicine.
21. Lianov L., Johnson M. Physician competencies for prescribing lifestyle medicine. JAMA 2010;304(2):202-3
22. Barnard RJ, et al. Responses of non-insulin dependent diabetic patients to an intensive program of diet and exercise. Diabetes Care 1982; 5(4):37-4.
23. Diehl HA. Coronary risk reduction through intensive community-based lifestyle intervention: The Coronary Health Improvement Project (CHIP) experience. Am J Cardiol 1998;82(10b):83t-87t.
24. Ornish D, et al. Intensive lifestyle changes for reversal of coronary artery disease. JAMA 1998;280(23):2001-7.

25. ODDHP. 2018 Physical Activity Guidelines Advisory Committee Scientific Reprot.health.gov. 2018. https://health.gov/paguidelines/second-edition/report.
26. ACOG Committee Opinion No. 762. Prepregnancy Counseling. Obstet Gynecol 2019; 133(1):e78-89.
27. Institute of Medicine. Weight Gain during pregnancy: reexamining the guidelines. Washington, D.C. The National Academies Press; 2009.
28. Vreboscg L, Bel S, Vansant G, et al. Maternal and neonatal outcome after laparoscopic adjustable gastric banding: a systematic review. Obes Surg 2012; 22(10:1568-1579.
29. Lewis G. Why mothers die 2000-2002 The Sixth report of the Confidential Enquiries into Maternal Deaths in the United Kingdom. Published 2004.

http://www.hqip.org.uk/assets/NCAPOP-Linrary/CMACE-Reports/33.-2004-Why-Mothers-Die-2000-2002-The-Sixth-Reprot-of-the-Confidential-Enquires-into-Maternal-Deaths-in-the-UK.pdf

30. Thornburgh LL, Mulconry M, Post A, et al. Fetal nuchal translucency thickness evaluation in the overweight and obese gravid. Ultrasound Obstete Gynecol. 2009; 33:665-669.
31. Racusin D, Stevens B, Campbell G, et al. Obesity and the risk and detection of fetal malformations. Semin Perinatol. 2012 June; 36(3):213-221.
32. Harper LM, Cahill AG, Smith K, et al. Effect of maternal obesity on the risk of fetal loss after amniocentesis and chorionic villus sampling. Obstet Gyncol .2012;119:745-751.
33. Dashe JS, McIntire DD, Twickler DM. Maternal obesity limits the ultrasound evaluation of fetal anatomy. J Ultrasound Med 2009; 28:1025-30.
34. Hendler I, Blackwell SC, Bujold E, et al. Suboptimal second trimester ultrasonographic visualization of the fetal heart in obese women: should we repeat the examination? J Ultrasound Med 2005; 24:1205-1209.
35. Rose NC. Genetic screening and the obese gravida. Clin Obstet Gynecol 2016; Mar;59(1):140-7.
36. Majeed A, Abuhamad A, Romary L, et al. J Ultrasound Med 2019;38:2057-2063.
37. International Society of Ultrasound in Obstetrics and Gynecology. ISUOG practice guidelines: sonographic screening examination of the fetal heart. Ultrasound Obstet Gynecol 2013; 41:348-359.
38. Jacob L, Kostev K, Kalder M. Risk of stillbirth in pregnant women with obesity in the United Kingdom. Obesity Research & Clinical Practice 2016; 10:574-579.
39. Nohr EA, Bech BH, Davies MJ, et al. Prepregnancy obesity and fetal death: a study within the Danish National Cohort. Obstet Gynecol 2005; 106:250-9.
40. Gibbs Pickens C, et al. Term elective induction of labor and pregnancy outcomes ampong obese women and their offspring. Obstet Gynecol 2018; 131(1):12-22.
41. Kawakita T, et al. Nonmedically indicated induction in morbidly obese women is not associated with an increased risk of Cesarean delivery. Am J Obstet Gynecol 2017; 217(4): 451.e1-451.e8.
42. Clark-Ganheart CA, Reddy UM, Kominiarek MA, et al. Pregnancy outcomes among obese women and their offspring by attempted mode of delivery. Obstet Gynecol 2015;126:987-993
43. Gunatilake RP and Perlow JH. Obesity and pregnancy: clinical management of the obese gravida. AJOG 2011; (2):106-119.
44. ACOG Practice Bulletin. Use of Hormonal Contraception in Women with Coexisting Medical Conditions # 206,2019. Obstet Gynecol 133(2): e128-149.
45. Rooney B, Schauberger C. Excess pregnancy weight gain and long-term obesity: one decade later. Obstet Gynecol 2002; 100:245-252.
46. ACOG. Ethical considerations for the care of the patient with obesity. #763. Obstet Gynecol 2019;133:e90-396.
47. LeFevre ML. USPSTF. Low dose aspirin use for the prevention of morbidity and mortality from preeclampsia: U.S. Preventative Services Task Force Recommendation Statement. Ann Int Med 2014;161(11):819-26.
48. Lee VR, Darney B G, Snowden J M, et al. Term elective induction of labor and perinatal outcomes in Obese women: Retrospective cohort study. BJOG 2016; 123 (2):271-8.