VA/DOD CLINICAL PRACTICE GUIDELINE FOR THE MANAGEMENT OF PREGNANCY

Department of Veterans Affairs
Department of Defense

QUALIFYING STATEMENTS

The Department of Veterans Affairs and the Department of Defense guidelines are based upon the best information available at the time of publication. They are designed to provide information and assist decision making. They are not intended to define a standard of care and should not be construed as one. Neither should they be interpreted as prescribing an exclusive course of management.

This Clinical Practice Guideline is based on a systematic review of both clinical and epidemiological evidence. Developed by a panel of multidisciplinary experts, it provides a clear explanation of the logical relationships between various care options and health outcomes while rating both the quality of the evidence and the strength of the recommendation.

Variations in practice will inevitably and appropriately occur when clinicians take into account the needs of individual patients, available resources, and limitations unique to an institution or type of practice. Every healthcare professional making use of these guidelines is responsible for evaluating the appropriateness of applying them in the setting of any particular clinical situation.

These guidelines are not intended to represent Department of Veterans Affairs or TRICARE policy. Further, inclusion of recommendations for specific testing and/or therapeutic interventions within these guidelines does not guarantee coverage of civilian sector care. Additional information on current TRICARE benefits may be found at www.tricare.mil or by contacting your regional TRICARE Managed Care Support Contractor.

Version 3.0 – 2018

Prepared by:

The Management of Pregnancy Work Group

With support from:

The Office of Quality, Safety and Value, VA, Washington, DC
&
Office of Evidence Based Practice, U.S. Army Medical Command

Version 3.0 – 2018

Based on evidence reviewed through May 2017

Table of Contents

I. Introduction

The Department of Veterans Affairs (VA) and the Department of Defense (DoD) Evidence-Based Practice Work Group (EBPWG) was established and first chartered in 2004, with a mission to advise the "…Health Executive Council on the use of clinical and epidemiological evidence to improve the health of the population across the Veterans Health Administration and Military Health System," by facilitating the development of clinical practice guidelines (CPGs) for the VA and DoD populations.[1] This CPG is intended to provide healthcare providers with a framework by which to evaluate, treat, and manage the individual needs and preferences of pregnant women, thereby leading to improved clinical outcomes.

In 2009, the VA and DoD published a CPG for the Management of Pregnancy (2009 Pregnancy CPG), which was based on evidence reviewed through December 2007. Since the release of that guideline, a growing body of research has expanded the general knowledge and understanding of pregnancy and its management. Consequently, a recommendation to update the 2009 Pregnancy CPG was initiated in 2016. The updated CPG includes objective, evidence-based information on the management of pregnancy. It is intended to assist healthcare providers in all aspects of care for a pregnant woman. The system-wide goal of developing evidence-based guidelines is to improve patients' health and well-being by guiding health care providers who are taking care of pregnant women along the management pathways that are supported by evidence. The expected outcome of successful implementation of this guideline is to:

- Assess the condition of the mother and baby and determine the best management method in collaboration with the mother and, when possible and desired, other family and caregivers
- Optimize the mother and baby's health outcomes and improve quality of life
- Minimize preventable complications and morbidity
- Emphasize the use of patient-centered care (PCC)

II. Background

A. Description of Pregnancy

Pregnancy is the reproductive time during which a developing fetus grows inside of the uterus. It is a time of dramatic change for a developing fetus and a woman's body. Most pregnancies are uncomplicated and labor results in a normal vaginal birth with a healthy mother and baby. Rarely, complications arise, which have the potential to lead to lifelong implications. As the fetus continues to develop throughout the course of the pregnancy, the gestational age at birth can help predict outcomes (Table 1).[2-4]

While pregnancy and birth are normal physiological events, pregnancy is a period of increased risk for a range of conditions. It is also a time of great interaction with the healthcare system, affording an opportunity to optimally manage chronic health conditions and provide preventative care. The healthcare team's goal is to maintain or improve the mother's health to foster normal and healthy development of the baby, culminating in a full-term birth. The physical, psychological, and social support that the mother receives during her pregnancy can help reduce health problems in her and the child's life. Evidence-based care during pregnancy can have a life-long impact on both mother and baby.

Table 1. Gestational Age at Birth Predicts Offspring Outcomes [2-5]

Term	Gestational Age at Birth	Outcomes
Preterm	<37 weeks	Increased risk for adverse outcomes such as respiratory, gastrointestinal, and neurologic
Late preterm	34 0/7 - 36 6/7 weeks	Decreased risk for adverse outcomes compared to other preterm infants, but increased risk for adverse outcomes compared to term infants
Early-term	37 0/7 - 38 6/7 weeks	Increased risk of adverse outcomes, particularly respiratory, compared to full-term infants
Full-term	39 0/7 - 40 6/7 weeks	Fully developed lungs, brains, and livers; have better health outcomes than infants born outside of this time period
Late-term	41 0/7 -41 6/7 weeks	Increased risk of adverse neonatal outcomes compared to full-term infants
Post-term	>41 6/7 weeks	Increased risk of adverse neonatal outcomes compared to full-term infants

B. Epidemiology and Impact in the General Population

a. Rates of Reproduction

In 2014, there were 3,978,497 registered births in the United States (U.S.).[6] In general, between 1990 and 2014, rates of reproduction in the U.S. have decreased.[7] Women have also been giving birth at later ages. Mean age at first delivery increased from 24.9 years in 2000 to 26.3 years in 2014. Changes were most pronounced between 2009 and 2014.[8] There are many possible drivers for the decrease in rates of reproduction in the past few decades and the increasing number of deliveries later in women's lives, such as women's increasing prioritization on education and establishing careers prior to having children and improved access to contraception and reproductive health services.

b. Pregnancy Complications

Although there have been advances in medicine and medical technologies over the past 25 years, maternal pregnancy-related mortality and morbidity have been increasing. Common complications that can occur during pregnancy include maternal obesity or excessive weight gain, mental health conditions (e.g., depression, anxiety, posttraumatic stress disorder [PTSD]), hyperemesis gravidarum, anemia, gestational diabetes mellitus (GDM), and hypertensive disorders of pregnancy (e.g., gestational hypertension, preeclampsia, eclampsia).[9]

Pregnancy-related deaths (approximately 600 each year) occur due to reasons such as heart conditions, infections, bleeding, blood clots, and high blood pressure triggered or exacerbated by pregnancy. Severe maternal morbidity affects approximately 65,000 women in the U.S. each year. The risk of morbidity doubled between 2000 and 2010 which is likely related to a number of factors, such as increased maternal age, pre-pregnancy obesity, preexisting chronic conditions, and an increasing number of cesarean deliveries.[10]

Some complications that arise during pregnancy, such as ectopic pregnancy, may require immediate attention while others are more chronic. Regardless of the type of complication, each requires the appropriate level of medical support, which may vary depending on the pregnant woman's current environment. Once a woman has delivered her baby, she may struggle with breastfeeding in the context of

unpredictable and demanding work schedules. Federal laws addressing breastfeeding in the workplace exist but are relatively new.[11]

In contrast, the infant mortality rate has declined 15% between 2005 and 2015, from 6.86 infant deaths per 1,000 live births to 5.82.[12] The Centers for Disease Control and Prevention (CDC) indicated the following were the five leading causes of infant death in 2014:[13]

- Birth defects
- Preterm birth or low birth weight
- Maternal complications of pregnancy
- Sudden infant death syndrome (SIDS)
- Unintentional injuries (e.g., accidental suffocation)

From 2005 to 2014, congenital malformations remained the leading cause of infant death, although congenital malformations declined by 11% during that period. Preterm birth rates rose over 20% from 1990 (10.6%) through 2006 (12.8%). The preterm birth rate then declined from 2007 through 2014 from 10.4% to 9.6%, but increased slightly to 9.6% in 2015. Increases in preterm births were seen among non-Hispanic black and Hispanic women.[14]

Cesarean birth may be planned for breech presentation, prior uterine surgery, or as a response to unexpected maternal or fetal complications such as abnormal labor or a concerning fetal heart rate.[15] Cesarean delivery is a major surgery with associated risks (e.g., risk of infection, hemorrhage). Cesarean delivery requires a longer period for maternal recovery than vaginal birth and has also been associated with neonatal complications, primarily respiratory.[15] There has been a downward trend in cesarean births between 2009 (32.9%) and 2015 (32.0%). The rate of low-risk cesarean births (defined as nulliparous, term, singleton, vertex cesarean deliveries to women having a first delivery) also declined from 2009 (28.0%) to 2015 (25.8%).[16]

C. Pregnancy in the Department of Defense and the Department of Veterans Affairs Populations

a. Location of Care

This VA/DoD Pregnancy CPG is relevant to providers within the DoD and VA healthcare systems as well as in the broader community due to the way in which pregnancy care is provided through these systems. Pregnant Service Members and their dependent spouses can receive their pregnancy care through the DoD healthcare system or civilian providers within the community. As VA does not provide routine prenatal or pregnancy care on-site, pregnancy care is provided in the community via referral. Each VA medical center has a maternity care coordinator who fosters communication between the pregnant woman, non-VA providers, and the VA facility and who is responsible for monitoring care delivery, coordinating care, and tracking outcomes of VA-funded services.

Due to the nature of the provision of pregnancy care, ongoing care coordination and communication between VA/DoD providers and any community obstetric providers is necessary to ensure that each Service Member and Veteran is receiving the care she needs and that all providers are fully aware of

information relevant to the pregnant woman's health and treatment plan. More information on this is available in the section on Patient Focus Group Methods and Findings.

b. Rates of Reproduction

Between 2003 and 2014, 174,921 infants were born to Active Duty Service Members.[17] Recently, from 2012-2016, annual prevalence of pregnancy-related events has decreased from 14.2% to 13.1%. The birth rate has also decreased from 69.8 live births per 1,000 person-years in 2012 to 59.7 live births per 1,000 person-years in 2016.[18] Between 2003 and 2014, 1,043,812 infants were born to dependent spouses of Active Duty Service Members.[17]

Between fiscal years 2000 and 2010, the VA covered an estimated total of 12,000 inpatient deliveries through community providers. Over this time period, the number of deliveries covered by the VA has increased from approximately 350 per year in 2000 to more than 2,000 per year in 2010.[19] As the female, childbearing-age Veteran population increases, use of maternity and newborn care may also increase.

c. Complications

Although women Service Members and Veterans experience some of the same challenges during pregnancy as women in the general population, they also may have different challenges and pregnancy care needs than their civilian counterparts. Their service experience may have included involvement in combat or environmental/occupational exposures (e.g., fumes from burn pits, chemical toxicants). Service-related stressors such as those present in the lives of Service Members and Veterans may amplify the physical and psychological stresses of pregnancy. Although there is limited information regarding the impact of such exposures on reproductive health outcomes, the effort to assess the possible health impacts of military experience on women and their implications for obstetric healthcare is ongoing.[19]

As in the general population, in some cases, births in Veterans and Service Members are affected by complications. The following data relates to complications experienced in pregnancies of Active Duty Service Members, which appear to be similar to those of the dependent spouses of Active Duty Service Members.[17,20] Between 2012 and 2016, pre-term labor, obesity related complications, preeclampsia, and GDM affected 17.7%, 9.2%, 6.8%, and 6.3% of live births, respectively. Over the same time period, the percentage of live births affected by preeclampsia and GDM remained relatively stable, while the percentages of live births affected by preterm labor decreased and the percentage of live births affected by obesity-related complications increased.[20]

Pregnant Service Members and Veterans more commonly experience mental health issues than non-pregnant Service Members and Veterans or pregnant women in the general population. In a study of mental health concerns among women Veterans between 2008 and 2012, anxiety, depression, and PTSD were twice as likely among those receiving pregnancy care as those without a pregnancy.[21] Being removed from their support network for military service during deployments and military assignments may also affect mental health outcomes of pregnant Service Members. Nearly one in eight women in the military (compared to approximately one in nine in the general population) develop postpartum depression, possibly reflecting disrupted social support. Postpartum depression can, in turn, be

complicated by other psychosocial factors, such as poor relationship satisfaction and low self-esteem.[22-24]

Other VA/DoD CPGs provide guidance regarding care for the following conditions:

- Screening and Management of Obesity and Overweight (VA/DoD Obesity CPG)[1]
- Management of Posttraumatic Stress Disorder and Acute Stress Disorder (VA/DoD PTSD CPG)[2]
- Management of Major Depressive Disorder (VA/DoD MDD CPG)[3]

III. About this Clinical Practice Guideline

This guideline represents an important step toward improving the treatment and management of pregnant women in the VA and DoD. As with other CPGs, however, challenges remain, including evidence gaps, the need to develop effective strategies for guideline implementation, and the need to evaluate the effect of guideline adherence on clinical outcomes. This guideline is intended for VA and DoD healthcare practitioners including primary care providers, obstetricians, gynecologists, nurses, nurse practitioners, care coordinators, midwives, mental health practitioners, cardiologists, dietitians, breastfeeding/lactation specialists, physical therapists, and others involved in the care of pregnant Service Members or Veterans.

As elaborated upon in the qualifying statement on page one, this CPG is not intended to serve as a standard of care. Standards of care are determined on the basis of all clinical data available for an individual patient and are subject to change as scientific knowledge and technology advance and practice patterns evolve. This CPG is based on information available through May 2017 and is intended to provide a general guide to best practices. The guideline can assist care providers, but the use of a CPG must always be considered as a recommendation, within the context of a provider's clinical judgment and patient values and preferences, for the care of an individual patient.

A. Methods

The current document is an update to the 2009 Pregnancy CPG. The methodology used in developing the 2018 CPG follows the *Guideline for Guidelines*,[1] an internal document of the VA and DoD EBPWG. The *Guideline for Guidelines* can be downloaded from http://www.healthquality.va.gov/policy/index.asp. This document provides information regarding the process of developing guidelines, including the identification and assembly of the Guideline Champions (Champions) and other subject matter experts from within the VA and DoD, known as the Work Group and, ultimately, the development and submission of a new or updated Pregnancy CPG.

The Champions and Work Group for this CPG were charged with developing evidence-based clinical practice recommendations and writing and publishing a guideline document to be used by providers

[1] See the VA/DoD Clinical Practice Guideline for Screening and Management of Obesity and Overweight. Available at: https://www.healthquality.va.gov/guidelines/CD/obesity/

[2] See the VA/DoD Clinical Practice Guideline for the Management of Posttraumatic Stress Disorder and Acute Stress Disorder. Available at: https://www.healthquality.va.gov/guidelines/MH/ptsd/

[3] See the VA/DoD Clinical Practice Guideline for the Management of Major Depressive Disorder. Available at: https://www.healthquality.va.gov/guidelines/MH/mdd/

within the VA/DoD healthcare systems as well as those within the community who treat individuals within the VA and DoD. Specifically, the Champions and Work Group members for this guideline were responsible for identifying the key questions (KQs) of the most clinical relevance, importance, and interest for the management of pregnant women. The Champions and the Work Group also provided direction on inclusion and exclusion criteria for the evidence review and assessed the level and quality of the evidence. The amount of new scientific evidence that had accumulated since the previous version of the CPG was also taken into consideration in the identification of the KQs. In addition, the Champions assisted in:

- Identifying appropriate disciplines of individuals to be included as part of the Work Group
- Directing and coordinating the Work Group
- Participating throughout the guideline development and review processes

The VA Office of Quality, Safety and Value, in collaboration with the Office of Evidence Based Practice, U.S. Army Medical Command, the proponent for CPGs for the DoD, identified four clinical leaders, Heather Able, MSN, RNC and Alicia Christy, MD, MHSCR, FACOG from the VA and COL Lisa Foglia, MD, FACOG and Lt Col Barton Staat, MD, FACOG from the DoD, as Champions for the 2018 CPG.

The Lewin Team, including The Lewin Group, Duty First Consulting, ECRI Institute, and Sigma Health Consulting, LLC, was contracted by the VA and DoD to support the development of this CPG and conduct the evidence review. The first conference call was held in October 2016, with participation from the contracting officer's representative (COR), leaders from the VA Office of Quality, Safety and Value and the DoD Office of Evidence Based Practice, and the Champions. During this call, participants discussed the scope of the guideline initiative, the roles and responsibilities of the Champions, the project timeline, and the approach for developing and prioritizing specific research questions on which to base a systematic review (SR) about the management of pregnancy. The group also identified a list of clinical specialties and areas of expertise that are important and relevant to the management of pregnancy, from which Work Group members were recruited. The specialties and clinical areas of interest included: breastfeeding/lactation, care coordination, cardiology, clinical psychology, dietetics, family medicine, gynecology, internal medicine, mental health, midwifery, nursing, nutrition, obstetrics, psychiatry, women's health, and physical therapy.

The guideline development process for the 2018 CPG update consisted of the following steps:

1. Formulating and prioritizing KQs
2. Convening patient focus groups
3. Conducting the systematic evidence review
4. Convening a face-to-face meeting with the CPG Champions and Work Group members
5. Drafting and submitting a final CPG on the management of pregnancy to the VA/DoD EBPWG

Appendix A provides a detailed description of each of these tasks.

a. Grading Recommendations

The Champions and Work Group used the Grading of Recommendations Assessment, Development and Evaluation (GRADE) system to assess the quality of the evidence base and assign a strength for each

recommendation. The GRADE system uses the following four domains to assess the strength of each recommendation:[25]

- Balance of desirable and undesirable outcomes
- Confidence in the quality of the evidence
- Patient or provider values and preferences
- Other implications, as appropriate, e.g.,:
    - Resource use
    - Equity
    - Acceptability
    - Feasibility
    - Subgroup considerations

Using these four domains, the Work Group determined the relative strength of each recommendation ("Strong" or "Weak"). A "Strong" recommendation generally indicates a high confidence in the quality of the available scientific evidence, a clear difference in magnitude between the benefits and harms of an intervention, similar patient or provider values and preferences, and understood influence of other implications (e.g., resource use, feasibility). If the Work Group has less confidence after the assessment across these domains and believes that additional evidence may change the recommendation, it generally assigns a "Weak" recommendation. It is important to note that the GRADE terminology used to indicate the assessment across the four domains (i.e., Strong vs. Weak) should not be confused with the clinical importance of the recommendation. A weak recommendation may still be important to the clinical care of a pregnant patient.

Occasionally, instances may occur when the Work Group feels there is insufficient evidence to make a recommendation for or against a particular therapy or preventive measure. This can occur when there is an absence of studies on a particular topic that met evidence review inclusion criteria, studies included in the evidence review report conflicting results, or studies included in the evidence review report inconclusive results regarding the desirable and undesirable outcomes.

Using these elements, the grade of each recommendation is presented as part of a continuum:

- Strong for (or "We recommend offering this option …")
- Weak for (or "We suggest offering this option …")
- No recommendation for or against (or "There is insufficient evidence…")
- Weak against (or "We suggest not offering this option …")
- Strong against (or "We recommend against offering this option …")

The grade of each recommendation made in the 2018 CPG can be found in the section on Recommendations. Additional information regarding the use of the GRADE system can be found in Appendix A.

b. Reconciling 2009 Clinical Practice Guideline Recommendations

Evidence-based CPGs should be current, which typically requires revisions of previous guidelines based on new evidence, or as scheduled and subject to time-based expirations.[25] For example, the U.S. Preventive Services Task Force (USPSTF) has a process for refining or otherwise updating its recommendations pertaining to preventive services.[26] Further, the inclusion criteria for the National Guideline Clearinghouse specify that a guideline must have been developed, reviewed, or revised within the past five years.

The Pregnancy Guideline Work Group focused largely on developing new and updated recommendations based on the evidence review conducted for the priority areas addressed by the KQs. In addition to those new and updated recommendations, the Work Group considered, without complete review of the relevant evidence, the current applicability of other recommendations that were included in the previous 2009 Pregnancy CPG, subject to evolving practice in today's environment.

A set of recommendation categories was adapted from those used by the National Institute for Health and Care Excellence (NICE).[27,28] These categories, along with their corresponding definitions, were used to account for the various ways in which older recommendations could have been updated. In brief, the categories took into account whether or not the evidence that related to a recommendation was systematically reviewed, the degree to which the recommendation was modified, and the degree to which a recommendation is relevant in the current care environment and within the scope of the CPG. Additional information regarding these categories and their definitions can be found in Recommendation Categorization. The categories for the recommendations included in the 2018 version of the guideline can be found in the section on Recommendations. The categories for the recommendations carried forward from the 2009 Pregnancy CPG are noted in Appendix D.

The CPG Work Group recognized the need to accommodate the transition in evidence rating systems from the 2009 Pregnancy CPG to the current CPG. In order to report the strength of all recommendations using a consistent format (i.e., the GRADE system) the CPG Work Group converted the USPSTF strengths of the recommendation accompanying the carryover recommendations from the 2009 guideline to the GRADE system. As such, the CPG Work Group considered the strength of the evidence cited for each recommendation in the 2009 Pregnancy CPG as well as the intervention's harms and benefits, values and preferences, and other implications, where possible. The CPG Work Group referred to the available evidence as summarized in the body of the 2009 Pregnancy CPG and did not systematically re-assess the evidence. In some instances, relevant peer-reviewed literature published since the 2009 Pregnancy CPG was considered along with the original evidence base for the specific recommendation. Where such newer literature was considered when converting the strength of the recommendation from the USPSTF to the GRADE system, it is referenced in the discussion that follows the corresponding recommendation, as well as in Appendix C.

The CPG Work Group recognizes that, while there are sometimes practical reasons for incorporating findings from a previous SR, previous recommendations,[29] or recent peer-reviewed publications into an updated CPG, doing so does not involve an original, comprehensive SR and, therefore, may introduce bias.

c. Peer Review Process

The CPG was developed through an iterative process in which the Work Group produced multiple drafts of the CPG. The process for developing the initial draft is described in more detail in Drafting and Submitting the Final Clinical Practice Guideline.

Once a near-final draft of the guideline was agreed upon by the Champions and Work Group members, the draft was sent out for peer review and comment. The draft was posted on a wiki website for a period of 14 business days. The peer reviewers comprised individuals working within the VA and DoD healthcare systems as well as experts from relevant outside organizations designated by the Work Group members. Organizations designated by the Work Group to participate in the peer review and who provided feedback include the following:

- Albany Medical Center
- American College of Obstetricians and Gynecologists (ACOG)
- Tufts Medical Center

The VA and DoD Leadership reached out to both the internal and external peer reviewers to solicit their feedback on the CPG. Reviewers were provided a hyperlink to the wiki website where the draft CPG was posted. All feedback from the peer reviewers was discussed and considered by the Work Group. Modifications made throughout the CPG development process were made in accordance with the evidence.

B. Summary of Patient Focus Group Methods and Findings

When forming guideline recommendations, consideration should be given to the values of those most affected by the recommendations: patients. Patients bring perspectives, values, and preferences into their healthcare experience that can vary from those of clinicians. These differences can affect decision making in various situations, and should thus be highlighted and made explicit due to their potential to influence a recommendation's implementation.[30,31] Focus groups can be used as an efficient method to explore ideas and perspectives of a group of individuals and collect qualitative data on a thoughtfully predetermined set of questions.

Therefore, as part of the effort to update this CPG, VA and DoD Leadership, along with the Pregnancy CPG Work Group, held two patient focus groups. The first was held on December 1, 2016 at the Washington DC VA Medical Center in Washington, DC. The second was held on February 2, 2017 at Malcolm Grow Medical Clinics and Surgery Center at Joint Base Andrews, MD. The aim of the focus groups was to further understand and incorporate the perspective of pregnant women covered and/or receiving their care through the VA and/or DoD healthcare systems during their pregnancy and perinatal period, as pregnant women are those most affected by the CPG. The focus groups delved into the patients' perspectives on a set of topics related to their pregnancy care, including their priorities, challenges they have experienced, and the information they received regarding their pregnancy care, as well as the impacts of their pregnancy and their pregnancy care on their lives.

It is important to note the focus groups comprised a convenience sample and the Work Group recognizes the lack of generalizability and other limitations inherent in the small sample size. Less than 10 people in

total were included in two focus groups to be consistent with the requirements of the federal Paperwork Reduction Act, 1980. The Work Group acknowledges that the sample of pregnant women included in these focus groups is not representative of all pregnant women within the VA and DoD healthcare systems. Further, time limitations for the focus groups prevented exhaustive exploration of all topics related to pregnancy care in the VA and DoD and the women's broader experiences with their care. Thus, the Work Group made decisions regarding the priority of topics to discuss at the focus groups. These limitations, as well as others, were considered during guideline development as the information collected from the discussion was being used. Recruitment for participation in the focus groups was managed by the Champions and VA and DoD Leadership, with assistance from coordinators at the facilities at which the focus groups took place.

The following concepts are ideas and suggestions about aspects of care that are important to pregnant women and emerged as recurring themes during the discussions (Table 2). These concepts were important parts of the participants' care and added to the Work Group's understanding of patient values and perspectives. Additional details regarding the patient focus group methods and findings can be found in Appendix B.

Table 2. Pregnancy CPG Focus Group Concepts

Pregnancy CPG Focus Group Concepts
A. Recognize the importance of a support network throughout pregnancy, including as a trusted source of information specific to a patient's unique pregnancy experience (e.g., as a first-time parent or Active Duty Service Member)
B. Provide information regarding general pregnancy care to the patient in a timely manner and in a way that is responsive to the patients' goals, values, and preferences
C. Provide comprehensive, understandable information regarding covered services to the patient and help the patient navigate that information and answer questions as needed
D. Recognize the importance of the relationship between the patient and her provider and care team and the necessity for the patient to have consistency in this relationship and her access to care
E. Ensure that the family is involved in the pregnancy in accordance with patient preferences and recognize the differences among families in structure and composition
F. Ensure that patients know the options for pediatric healthcare and day care early in their pregnancy and provide information so that they can feel secure in their planning
G. Improve communication and information sharing between VA and community providers to ensure patients receive the individualized care they need without undue stress

C. Conflicts of Interest

At the start of this guideline development process and at other key points throughout, the project team was required to submit disclosure statements to reveal any areas of potential conflict of interest (COI) in the past 24 months. Verbal affirmations of no COI were used as necessary during meetings throughout the guideline development process. The project team was also subject to random web-based surveillance (e.g., Centers for Medicare and Medicaid Services open payments or ProPublica).

If a project team member reported a COI (actual or potential), then it was reported to the Office of Evidence Based Practice. It was also discussed with the Pregnancy CPG Champions in tandem with their review of the evidence and development of recommendations. The Office of Evidence Based Practice and the Pregnancy CPG Champions determined whether or not action, such as restricting participation and/or

voting on sections related to the conflict or removal from the Work Group, was necessary. If it was deemed necessary, action to mitigate the COI was taken by the Champions and Office of Evidence Based Practice, based on the level and extent of involvement. No conflicts of interest were identified for the Pregnancy CPG Work Group members or Champions. Disclosure forms are on file with the Department of Veterans Affairs Evidence Based Practice Program office and available upon request.

D. Scope of this Clinical Practice Guideline

Regardless of setting, any patient in the healthcare system should ideally have access to the interventions that are recommended in this guideline after taking into consideration the patient's specific circumstances.

Guideline recommendations are intended to be patient-centered. Thus, treatment and care should take into account a patient's needs and preferences. Good communication between healthcare professionals and the patient is essential and should be supported by evidence-based information tailored to the patient's needs. Use of an empathetic and non-judgmental approach facilitates discussions sensitive to gender, culture, ethnic, and other differences. The information that patients are given about treatment and care should be culturally appropriate and also available to people with limited literacy skills. It should also be accessible to people with additional needs such as physical, sensory, or learning disabilities. Family involvement should be considered, if appropriate.

This CPG is designed to assist providers in managing or co-managing pregnant women as well as co-occurring conditions (e.g., generalized anxiety disorder, PTSD, diabetes mellitus [DM]). Moreover, the patient population of interest for this CPG is pregnant women who are eligible for care in the VA and DoD healthcare delivery systems. It includes Veterans as well as deployed and non-deployed Active Duty Service, Guard, and Reserve Members and their dependents.

E. Highlighted Features of this Clinical Practice Guideline

The 2018 edition of the VA/DoD Pregnancy CPG is the second update to the original CPG. It provides practice recommendations for the care of women with uncomplicated pregnancies as well as guidance for specialty referral. A particular strength of this CPG is the multidisciplinary stakeholder involvement from its inception, ensuring representation from the broad spectrum of clinicians engaged in the treatment and management of pregnant women with and without co-occurring conditions.

The framework for recommendations in this CPG considered factors beyond the strength of the evidence, including balancing desired outcomes with potential harms of the intervention, equity of resource availability, the potential for variation in patient values and preferences, and other considerations (e.g., resource use, subgroup considerations) as appropriate. Applicability of the evidence to VA/DoD populations was also taken into consideration. An algorithm, in the form of a table, accompanies the guideline to provide an overview of the recommendations in the context of the flow of patient care and to assist with training providers (see the section Algorithm). The algorithm may be used to help facilitate translation of guideline recommendations into effective practice.

F. Patient-centered Care

VA/DoD CPGs encourage clinicians to use a PCC approach that is individualized based on patient needs, characteristics, experience with previous pregnancies, and preferences. Regardless of setting, all patients

in the healthcare system should be able to access evidence-based care appropriate to that patient. When properly executed, PCC may decrease patient anxiety, increase trust in clinicians,[32] and improve treatment adherence.[33] Improved patient-clinician communication and a PCC approach conveys openness and supports disclosure of current and future concerns.

As part of the PCC approach, clinicians should review the outcomes of previous healthcare experiences with the pregnant woman. They should ask each pregnant woman about any concerns she has or barriers to high quality care she might experience. Lastly, they should educate the pregnant women on the actions that need to be taken and any decisions that need to be made and should involve the woman in decision making regarding management of pregnancy.

Healthcare coverage may factor into a pregnant woman's decision making process regarding her care. However, healthcare coverage for each woman may vary. Therefore, it may be helpful for pregnant women to discuss their coverage with the appropriate VA or DoD representative. Pregnant women who obtain their healthcare coverage through the VA should talk to their Maternity Care Coordinator. Pregnant women who obtain their healthcare coverage through the DoD should talk to their TRICARE representative.

G. Shared Decision Making

Throughout this VA/DoD CPG, the authors encourage clinicians to focus on shared decision making (SDM). The SDM model was introduced in *Crossing the Quality Chasm,* an Institute of Medicine (IOM) (now called the National Academy of Medicine [NAM]) report, in 2001.[34] It is readily apparent that pregnant women, together with their clinicians, make decisions regarding their plan of care and management options. Pregnant women require sufficient information and time to be able to make informed decisions. Clinicians must be adept at presenting information to their patients regarding individual treatments, expected outcomes, and levels and/or locations of care. During pregnancy, this includes presenting the mother, and her support system as appropriate, information about maternal and fetal risks of untreated symptoms and maternal and fetal benefits and risks of proposed care. Clinicians are encouraged to use SDM to individualize treatment goals and plans based on patient capabilities, needs, goals, prior pregnancy experience, and preferences.

H. Co-occurring Conditions

Co-occurring medical and mental health conditions are important to recognize because they can modify the management of pregnancy, patient or provider treatment priorities, clinical decisions, and the provider with which pregnancy and ongoing healthcare will be provided. Providers should expect that many pregnant Veterans, Service Members, and their family will have one or more co-occurring health conditions. Because of the nature of pregnancy care, which sometimes takes place in parallel with ongoing care for co-occurring conditions, it is generally best to manage pregnancy in collaboration with the care for other health conditions that are being treated in primary or specialty care. Some co-occurring medical or mental health conditions may require early specialist consultation in order to discuss any necessary changes in treatment due to pregnancy or to establish a common understanding of how care will be coordinated and delivered.

I. Implementation

This CPG and algorithm are designed to be adapted by individual healthcare providers with consideration of local needs and resources. The algorithm serves as a tool to prompt providers to consider key decision points in the course of an episode of care.

Although this CPG represents the recommended practice on the date of its publication, medical practice is evolving and this evolution requires continuous updating based on published information. New technology and more research will improve patient care in the future. The CPG can assist in identifying priority areas for research and informing optimal allocation of resources. Future studies examining the results of CPG implementation may lead to the development of new evidence particularly relevant to clinical practice.

IV. Guideline Work Group

Guideline Work Group*	
Department of Veterans Affairs	**Heather Able, MSN, RNC (Champion)**
	Alicia Christy, MD, MHSCR, FACOG (Champion)
	Grace Chang, MD, MPH
	Megan Gerber, MD, MPH
	Barbara J. Hector, WHNP
	Carrie Kairys, DNP, FNP-BC
	Jacqueline H. Langston, BSN, RN, CNM
	Laura J. Miller, MD
	Ki Park, MD, MS, FSCAI
	Deanna Rolstead, MD, FACOG
Department of Defense	**COL Lisa Foglia, MD, FACOG (Champion)**
	Lt Col Barton Staat, MD, FACOG (Champion)
	CPT Allison M. DeLuca, CNM, RN
	Maj Minette Herrick, MS, RDN, IBCLC
	LT Karla Krasnoselsky, DPT, CSCS
	MAJ Sheila A. Medina, DNP, FNP-C
	COL Cynthia Sanchez, MSN, RN
	CDR Robert Selvester, MD
	Kristi Shearer, PhD
	Elaine P. Stuffel, BSN, RN, MHA
	CDR Christopher Tatro, MD, FACOG
Office of Quality, Safety and Value Veterans Health Administration	M. Eric Rodgers, PhD, FNP-BC
	James Sall, PhD, FNP-BC
	Rene Sutton, BS, HCA
Office of Evidence Based Practice U.S. Army Medical Command	Corinne K. B. Devlin, MSN, RN, FNP-BC
	Elaine P. Stuffel, BSN, RN, MHA
The Lewin Group	Clifford Goodman, PhD
	Christine Jones, MS, MPH, PMP
	Erika Beam, MS
	Anjali Jain, MD
	Nicolas Stettler-Davis, MD, MSCE
ECRI Institute	Kristen D'Anci, PhD
	James Reston, PhD, MPH
	Jeff Oristaglio, PhD
	Amy Tsou, MD
	Gina Giradi, MS
	Michele Datko, MLS
Sigma Health Consulting, LLC	Frances Murphy, MD, MPH
DutyFirst Consulting	Anita Ramanathan, BA
	Megan McGovern, BA

*Additional contributor contact information is available in Appendix E.

V. Algorithm

This algorithm is designed to inform providers of the recommended interventions and appropriate timing of each of the interventions for women during pregnancy and in the postpartum period. The interventions included in the algorithm are paired with the corresponding recommendation in the VA/DoD Clinical Practice Guideline for the Management of Pregnancy. Following the algorithm, narrative sections, Standard of Pregnancy Care and Routine Pregnancy Care, provide additional information.

A. Algorithm Key

Symbol	Meaning
P	Action to be carried out by provider
R	Referral needs to be made to an advanced prenatal care provider (e.g., obstetrician or maternal-fetal medicine)
L	Lab needs to be ordered
Dotted	Timing is not ideal, but it is still helpful for the pregnant woman to receive this action at this time (rather than not at all)
V1	First visit
PP	Postpartum visit

B. Actions at Every Visit

At every visit, assess:

- Blood pressure
- Body mass index (BMI)
- Weight gain
- Medication reconciliation
- Need for consultation with advanced prenatal care provider (e.g., obstetrician or maternal-fetal medicine) for women at high risk for preterm delivery (Recommendation 18)

Note:

Please see the below sections Standard of Pregnancy Care and Routine Pregnancy Care.

C. Interventions by Weeks Gestation

Intervention	Weeks Gestation: First Trimester V1	8	12	Second Trimester 16	20	24	Third Trimester 28	32	36	40	PP
■ Screen for intimate partner violence[a] ■ Screen for depression using standardized tool (e.g., EPDS, PHQ-9)[a] (Recommendation 6)	P						P				P
■ Screen for tobacco, alcohol, illicit drugs, and non-prescribed use of medication; if positive, recommend cessation and offer assistance[a] (Recommendation 5) ■ Provide prenatal education (e.g., dental health, breastfeeding [Recommendation 7], exercise [Recommendation 2], weight gain, work schedules [Recommendation 3], dietary supplementation [Recommendation 4])[b] ■ Recommend influenza vaccination (seasonal) for mother and family[b]	P										
■ Screen for infectious diseases (GC/CT, HIV, syphilis, rubella, hepatitis B, varicella [if unsure], asymptomatic bacteriuria, TB, history of HSV); treat or manage as indicated[a] ■ Screen for Rh status and anemia/hemoglobinopathies	L										
■ Evaluate for nutritional deficiencies in women who have undergone bariatric surgery with intervention as needed (Recommendation 20) ■ Consult with RDN for women who have undergone bariatric surgery and who are on a restrictive diet ■ Refer to bariatric surgeon women who have recently undergone gastric bypass surgery (Recommendation 22)	R										
■ Perform dating ultrasound[c] (Recommendation 11)	P										
■ Offer group model of prenatal care (Recommendation 1)	P										

Intervention	Weeks Gestation: First Trimester (V1, 8, 12) / Second Trimester (16, 20, 24) / Third Trimester (28, 32, 36, 40) / PP
■ Offer prenatal screening for aneuploidy and common genetic disorders (Recommendation 8 and Recommendation 9)	P
■ Offer prenatal diagnostic testing for aneuploidy (accepted alternative to screening)	L
■ Initiate low dose aspirin therapy for women at risk of preeclampsia (Recommendation 17)	P
■ Offer evaluation of MSAFP for pregnant women who did not have serum aneuploidy screening or who had non-invasive prenatal screening (Recommendation 14)	L
■ Offer antenatal progesterone therapy in consultation with an advanced prenatal care provider (e.g., obstetrician or maternal-fetal medicine) for women at high risk for recurrent preterm delivery (Recommendation 18)	P
■ Complete fetal anatomy ultrasound	P
■ Measure fundal height	P
■ Screen for GDM with one-hour GCT (for women with dumping syndrome, use fasting and two-hour post-prandial glucose value)[a] (Recommendation 10)	L
■ Perform fetal fibronectin test for women with signs/symptoms of preterm labor (Recommendation 16)	P
■ Assess and educate regarding fetal movement/kick counts and preterm labor symptoms	P
■ Recommend Tdap vaccination for mother and family	P
■ Administer Rh immune globulin to Rh negative pregnant women	P
■ Discuss family planning/contraception	P P
■ Screen for GBS	P
■ Initiate HSV prophylaxis if indicated	P
■ Assess fetal presentation	P
■ Assess and educate regarding fetal movement/kick counts and labor symptoms	P
■ Offer scheduled delivery at 38 weeks for women greater than 44 years old (Recommendation 19)	P
■ Offer scheduled delivery or initiate antepartum fetal testing (Recommendation 12)	P
■ Administer Rh immune globulin to Rh negative mothers with Rh positive babies	P
■ Postpartum visit: Educate about lifetime risk of CVD and DM for women with GDM, HTN, and/or preeclampsia (Recommendation 13); review current vaccination status in accordance with CDC guidance; screen for type 2 diabetes if the patient had GDM	P

[a] Follow-up for positive screen or based on patient need

[b] Provide education at the initial visit and throughout the pregnancy as needed

[c] This is optimally performed in the first trimester; in the absence of a first trimester ultrasound, dating can be established by ultrasound alone up to 22 6/7 weeks

Abbreviations: CDC: Centers for Disease Control and Prevention; CVD: cardiovascular disease; DM: diabetes mellitus; EPDS: Edinburgh Postnatal Depression Scale; GBS: group B streptococcus; GC/CT: Neisseria gonorrhoeae/Chlamydia trachomatis; GCT: glucose challenge test; GDM: gestational diabetes mellitus; HIV: human immunodeficiency virus; HPV: human papillomavirus; HSV: herpes simplex virus; HTN: hypertension; MSAFP: maternal serum alpha-fetoprotein; PHQ-9: Patient Health Questionnaire-9; RDN: Registered Dietician Nutritionist; Rh: rhesus; TB: tuberculosis; Tdap: tetanus-diphtheria-acellular pertussis

D. Standard of Pregnancy Care

Some aspects of pregnancy care, although clinically important and part of the generally accepted standard of pregnancy care, do not have sufficient high-quality evidence to support a stand-alone recommendation. In many cases, clinical studies assessing the efficacy of these standards of pregnancy care do not exist because they are determined to be routine actions and it would be unethical to withhold them from pregnancy women in order to conduct a clinical trial (e.g., administration of rhesus [Rh] immune globulin). This is true for actions that are to be completed at every visit (Actions at Every Visit), certain screenings, and other time-sensitive care.

a. Additional Information on Actions at Every Visit

Vital Signs

Vital signs, such as measuring blood pressure, calculating BMI, and weighing a pregnant woman at each prenatal visit, is the standard of care in VA, DoD, and in the community. High blood pressure in pregnancy may lead to life-threatening maternal and fetal outcomes. Routinely measuring blood pressure is useful in detecting and managing gestational hypertension, preeclampsia, and pre-existing hypertension in pregnant women. The USPSTF determined that the best strategy for preventing preeclampsia in pregnancy is early detection through routine blood pressure screening.[35] A pregnant woman's blood pressure should be measured at every visit.

Assessing weight and calculating BMI for pregnant women at every visit gives the provider an opportunity to offer interventions that can improve both obstetrical and neonatal outcomes. Women who are overweight or obese are at greater risk for adverse health conditions during the preconception, antepartum, and postpartum periods. Women with low BMI are also at risk for adverse maternal and neonatal outcomes. Inadequate weight gain is a risk factor for spontaneous abortion, preterm birth, fetal growth restriction, hypertensive disorders, and poor perinatal outcomes. Women with anorexia nervosa may be identified by a low initial BMI and/or inadequate antepartum weight gain.[36] This screening is particularly important in the military and Veteran population, as studies have suggested that this population may be at greater risk for BMI-associated obstetrical complications.[37] More information regarding recommended weight gain can be found in Table 3 and Table 4.

Table 3. Weight Gain Recommendations for Singletons [38]

Pre-pregnancy Weight (BMI in kg/m^2)	Recommended Weight Gain
Underweight (BMI <18.5)	28-40 lbs
Normal Weight (BMI 18.5-24.9)	25-35 lbs
Overweight (BMI 25.0-29.9)	15-25 lbs
Obese (BMI ≥30.0)	11- 20 lbs

Abbreviations: BMI: body mass index; kg: kilogram(s); lbs: pounds; m: meter(s)

Table 4. Weight Gain Recommendations for Women Pregnant With Twins [38]

Pre-pregnancy Weight (BMI in kg/m2)	Recommended Weight Gain
Underweight (BMI <18.5)	50-62 lbs
Normal Weight (BMI 18.5-24.9)	37-54 lbs
Overweight (BMI 25.0-29.9)	31-50 lbs
Obese (BMI ≥30.0)	25-42 lbs

Abbreviations: BMI: body mass index; kg: kilogram(s); lbs: pounds; m: meter(s)

Medication Reconciliation

Medication reconciliation or review at every prenatal visit to screen for potentially teratogenic medications, newly prescribed medications since the last prenatal visit, over the counter medications, and supplements is standard of care. When multiple providers are co-managing a pregnant woman, as in the case of VA and some DoD pregnant women, it is important to identify, address, and document medications. The CDC has partnered with other federal agencies and non-federal partners to improve the health of women and babies by working to identify the safest treatment options for the management of common conditions before and during pregnancy.[39] Pregnant women, in collaboration with their trusted providers and pharmacists, are highly motivated to protect developing babies from potential harms of medication use during pregnancy while maintaining optimal health.[39]

b. Screenings

Dental Care

Periodontal disease, although common during pregnancy, is both preventable and curable. While recommendations for treatment of periodontal disease cannot be endorsed specifically at this time for the purpose of decreasing adverse fetal and maternal pregnancy outcomes (e.g., preterm birth, low birth weight, pregnancy loss, preeclampsia, GDM), several studies have shown there may be an association between periodontal disease and increased risk of adverse pregnancy outcomes.[40,41] Pregnancy is not a contraindication to most dental services, though some procedures requiring general anesthesia may be deferred to the postpartum period.[42] Oral health care is not only a component of a healthy pregnancy, but evidence suggests that most infants and young children acquire caries-causing bacteria from their mothers.[43] Routine dental care, including x-rays (with proper anatomic shielding) and periodontal therapy, along with good oral hygiene, should be encouraged throughout pregnancy.[43,44]

Immunizations

It is important that all pregnant and breastfeeding women are immunized according to current CDC schedules for vaccination. Maternal immunizations decrease the risk of life- or fetus-threatening diseases during pregnancy. Pregnant women are relatively immunocompromised and can be severely affected by influenza and other infectious pathogens. Immunizations help protect the mother from infection. They also enhance passive immunity of infants to pathogens that cause life-threatening illnesses. Safe immunization options during pregnancy are available, namely: pertussis, influenza, varicella, and rubella. Some patients may have concerns about the safety of vaccination in pregnancy; therefore, providers should be well-versed in the safety and benefits of vaccine administration.

- **Pertussis:** Also known as whooping cough, pertussis is a highly contagious bacterial disease that can cause coughing and difficulty breathing. Pertussis poses a significant burden on infants and can be very serious or deadly, especially in those younger than one year. Pregnant women should receive the Tdap (tetanus toxoid, reduced tetanus, diphtheria toxoid, and acellular pertussis) vaccine during each pregnancy to provide passive immunity to infants, who would not otherwise routinely receive it until two months of age.[45] Although a pregnant woman can receive the Tdap vaccine at any time during pregnancy, the optimal time to receive the vaccine is from 27-36 weeks gestation, maximizing maternal antibody response and passive antibody transfer to the newborn. Women who do not receive Tdap during pregnancy should receive the vaccine in the immediate postpartum period. Furthermore, all caregivers, family, or others who will have direct contact with the newborn should be immunized.[45]
- **Influenza:** Women who acquire influenza during pregnancy may experience increased morbidity and even death, with a possible increased spontaneous abortion rate.[46] For this reason, all women who are pregnant during influenza season should receive the influenza vaccine (an inactivated virus). According to the CDC, influenza vaccination is safe for both the mother and the fetus, regardless of gestational age. The influenza immunization has also been proven to be protective to both the mother and her baby from influenza for several months after birth.[47]
- **Varicella:** Women with varicella infection during pregnancy have a 10-20% risk of developing pneumonia, a significant risk factor for maternal mortality, which is estimated to be as high as 40%.[48] In pregnancy, varicella may cross the placenta resulting in congenital or neonatal varicella infection. Maternal infection in the first half of pregnancy has been associated with congenital varicella syndrome.[49] Neonatal varicella zoster virus (VZV) infection is associated with a high neonatal death rate.[50] Routine screening for varicella should be conducted through obtaining the mother's history. If there is a negative/uncertain history of prior disease or vaccination status, a varicella titer should be obtained. If the mother is non-immune, a vaccination should be offered during the postpartum period. The vaccine is contraindicated during pregnancy.[51,52]
- **Rubella:** Infection in the first 16 weeks of pregnancy can cause miscarriage or congenital rubella syndrome (CRS).[53] Due to concerns about possible teratogenicity, the measles/mumps/rubella (MMR) vaccination is not recommended during pregnancy.[54,55] Women who are not immune to rubella should be vaccinated before leaving the hospital after delivery.

Infectious Diseases

Screening for infectious diseases during pregnancy per current guidance from the CDC is recommended. Appropriate follow-up treatment and/or prophylaxis treatment depending upon the history, known exposure, and symptoms of infectious disease is necessary. This includes:

- Gonorrhea
- Chlamydia
- Syphilis
- Human immunodeficiency virus (HIV)

- Hepatitis B virus
- Rubella
- Human papillomavirus virus (HPV) (if there is a history of an abnormal cervical screen)
- Herpes simplex virus (HSV)
- Group B streptococcus (GBS)

Infectious diseases during pregnancy can cause significant mortality and morbidity in both the mother and the fetus. According to the CDC, screening for infectious diseases, counseling, and treatment can improve maternal and fetal outcomes.[56]

GBS infections are the leading cause of serious neonatal infections (e.g., sepsis, meningitis, pneumonia) within the first seven days of life (early-onset infection). Universal screening at 35-37 weeks gestation with a single vaginal swab and intrapartum antibiotic prophylaxis continues to be the standard.

Because new exposures and infectious agents can emerge (such as Zika virus), it is important to refer to the most recent CDC guidance. Screening can lead to diagnosis in asymptomatic women and allow pregnant women an opportunity to be treated.

Vitamins

We suggest daily multivitamins to be taken starting one month before conception and continued throughout pregnancy and breastfeeding. Women in the U.S. commonly supplement their diet with vitamins and minerals during pregnancy. Supplementation with multivitamins and minerals have also been associated with improved outcomes. See Recommendation 4 for additional information on folate supplementation. Supplementation with multivitamins was found to lower the risk of preeclampsia and three forms of childhood cancer (pediatric brain tumors, neuroblastomas, and leukemia).[57,58] The Operation Supplement Safety website (www.opss.org) provides additional information that may be useful for patients regarding use of supplements during pregnancy and lactation, as well as information for women who may not be pregnant but who are planning to become pregnant or are of childbearing age.[59,60]

Nutrition

We suggest that pregnant women on restrictive diets (e.g., vegetarians, bariatric surgery) consult with a dietitian. Though there is no consensus on the necessary requirements for patients both pre- and post-bariatric surgery, it is a generally accepted standard of practice for surgeons and dietitians to follow up with these patients to monitor for surgical complications as well as nutritional adequacy and any potential deficiencies associated with the procedure. In addition to post-bariatric pregnant women, others with higher risk of nutritional complications include those who:

- Are vegetarian or vegan
- Avoid certain foods (e.g., due to food allergies, cultural reasons, fad diets)
- Are breastfeeding while pregnant
- Are underweight with a BMI <18.5 kg/m^2

- Are <17 years old
- Have a multiple gestation pregnancy
- Have a history of hypertension, hyperlipidemia, DM, or GDM
- Have an eating disorder
- Are identified as food insecure (food insecurity is defined by the U.S. Department of Agriculture as a household-level economic and social condition of limited or uncertain access to adequate food [61])

The Academy of Nutrition and Dietetics (AND) recommends screening for the aforementioned nutritional risks and subsequent assessment by a Registered Dietitian Nutritionist (RDN) to evaluate the pregnant woman for nutritional adequacy during this phase of life.[62] Appointments with RDNs may not be feasible at all locations but tele-medical nutrition therapy may be a cost-effective option in some instances.

Intimate Partner Violence

Intimate partner violence (IPV) is a high-prevalence and high-risk problem that may be first identified during pregnancy, therefore routine screening during pregnancy is indicated. Risks of IPV during pregnancy include preterm birth, low birth weight, and decreased gestational age. In addition, a history of IPV is associated with higher rates of chronic pain, neurologic disorders, gastrointestinal disorders, and psychiatric disorders.[63] Although there is strong evidence for the utility of screening, there is no evidence regarding optimal screening times or intervals.

The 5-item Extended - Hurt, Insult, Threaten, Scream (E-HITS) tool has been found to be an effective screening method, with high levels of sensitivity and specificity.[63,64] The items are included below.

> In the past year, how often did a current or former intimate partner (e.g., boyfriend, girlfriend, wife, husband, sexual partner):
>
> 1. Physically hurt you
> 2. Insult or talk down to you
> 3. Threaten you with harm
> 4. Scream or curse at you
> 5. Force you to have sexual activities
>
> Responses for each item are on a 5-point scale: Never (1), Rarely (2), Sometimes (3), Often (4), Frequently (5). A score of 7 or higher is considered positive for IPV, with clinician judgment recommended for a score of 6.

For women who screen positive, we recommend completing an assessment and providing information, intervention, and/or referrals as needed.

c. Time Sensitive Care

Fetal Anatomy Scan

We suggest offering a complete fetal anatomy ultrasound to all pregnant women. Optimal timing of this complete fetal anatomy ultrasound is in the second trimester between 18 and 22 weeks of gestation.[65,66] Routine screening provides a more accurate gestational age assessment (with subsequent lower incidence of induction for post-term pregnancy), earlier detection of multiple gestations, and greater detection of unsuspected fetal abnormalities (with subsequent increased terminations).[67] A complete obstetric sonographic examination should be available to all women, including those considering an invasive test.[68,69]

Fetal Presentation

Fetal presentation should be assessed at 36 weeks gestation in order to determine the need for further treatment.[70] If non-cephalic presentation is suspected, it should be confirmed with ultrasound.[71] Once confirmed, a consultation with the appropriate obstetrical provider should be made immediately to discuss external cephalic version to correct malpresentation.[72,73] Potential benefits of appropriate management of pregnancy would include improved vaginal delivery rates and decreased maternal harm from cesarean delivery.

Postpartum Visit

All women should have a postpartum visit, optimally within six weeks, and no later than eight weeks, after delivery. Postpartum follow-up is specifically encouraged for women who experienced complications during pregnancy, such as hypertensive diseases, gestational and non-gestational DM, and depression. Women with a history of GDM are at increased risk of developing type 2 DM. See the VA/DoD Clinical Practice Guideline for the Management of Type 2 Diabetes Mellitus in Primary Care (VA/DoD DM CPG) for more information on diagnostic techniques.[4] Women with hypertensive and metabolic diseases of pregnancy may have increased risk of long-term health problems, particularly lifetime risk of cardiovascular disease (CVD). Thus, more accurate diagnosis of conditions such as impaired glucose tolerance has become even more crucial. The obstetric provider should begin the implementation of an individual risk-based surveillance strategy at the postpartum visit, which can be transitioned to the woman's long-term primary care provider. Benefits to the mother may include early identification of health conditions and early initiation of appropriate management methods. During this postpartum visit the provider may also assess contraception initiation, breastfeeding, and mental health disorders.

d. Summary

These assessments and care management methods, including actions completed at every visit, screenings, and time sensitive care, have become the standard of pregnancy care. When combined, all of these factors will help providers determine the appropriate management of pregnancy, potentially including a consult to an advanced prenatal care provider (e.g., obstetrician or maternal-fetal medicine) or another referral as indicated.

[4] See the VA/DoD Clinical Practice Guideline for the Management of Type 2 Diabetes Mellitus in Primary Care. Available at: https://www.healthquality.va.gov/guidelines/cd/diabetes/

VI. Routine Pregnancy Care

The CPG does not address every aspect of routine care. The below information can be used to help guide clinicians during the routine aspects of management of pregnancy. An initial prenatal risk assessment checklist, which can be used to help guide the initial prenatal care appointment and next steps, is included in Table 5. Consideration of antepartum referrals to advanced prenatal care providers can be informed by Table 6.

Table 5. Initial Prenatal Risk Assessment Checklist

	Risk Factors	Nurse Assessment via Questionnaire	Suggested Action
Dating	Uncertain dating criteria	√	Dating ultrasound
	Late presentation	√	Dating ultrasound
Current Issues	Vaginal bleeding	√	Immediate evaluation
	Significant abdominal pain/cramping	√	Immediate evaluation
	Dental complaint	√	Refer to dental
Past Obstetrical History	Recurrent pregnancy loss	√	Refer to infertility specialist or reproductive endocrinologist
	Risk of ectopic pregnancy (prior ectopic pregnancy, prior tubal surgery, current intrauterine device, history of tubal infertility or pelvic inflammatory disease)	√	Refer for evaluation and ultrasound (immediate referral if having bleeding or pain; scheduled referral if asymptomatic)
	Prior macrosomia or prior GDM	√	Obtain early one-hour GCT
	Prior preterm delivery	√	Refer to obstetrician/gynecologist or maternal fetal medicine provider
	Prior second-trimester pregnancy loss	√	Refer to maternal fetal medicine provider
	Prior preeclampsia	√	Refer to obstetrician/gynecologist or maternal fetal medicine provider
	Prior stillbirth	√	Refer to obstetrician/gynecologist or maternal fetal medicine provider
	Prior isoimmunization affected pregnancy	√	Refer to maternal fetal medicine provider
	Cervical surgery (loop electrical excision procedure, cone biopsy) or uterine anomaly	√	Refer to obstetrician/gynecologist or maternal fetal medicine provider
	Prior uterine surgery (myomectomy, metroplasty)	√	Refer to obstetrician/gynecologist or maternal fetal medicine provider
	Bariatric surgery less than 18 months ago	√	Refer to nutrition, obstetrician/gynecologist, or maternal fetal medicine provider
	Prescription or over-the-counter medications or herbal supplements	√	Refer to maternal fetal medicine based on teratogen risk
	Drug/alcohol use	√	Refer to maternal fetal medicine provider
	Tobacco product use	√	Document, educate

	Risk Factors	Nurse Assessment via Questionnaire	Suggested Action
Medical Conditions/ History	Neurological disorder	√	Refer to maternal fetal medicine provider, neurology
	CVD, cardiac anomaly	√	Refer to maternal fetal medicine provider, cardiology
	Hypertension	√	Refer to obstetrician/gynecologist or maternal fetal medicine provider, cardiology
	Pulmonary disease	√	Refer to maternal fetal medicine provider, pulmonology
	Renal disorder (includes pyelonephritis)	√	Refer to maternal fetal medicine provider, nephrology
	DM (Type 1 or 2)	√	Refer to maternal fetal medicine provider, endocrinology Obtain HbA1c
	Family history of DM in first relative	√	Obtain early one-hour GCT
	Thyroid disorders	√	Obtain thyroid function tests
	Autoimmune disorders (lupus, rheumatoid arthritis, anti-phospholipid syndrome)	√	Refer to maternal fetal medicine provider, rheumatology
	Bleeding disorder	√	Refer to maternal fetal medicine provider, hematology
	Clotting disorder	√	Refer to maternal fetal medicine provider, hematology
	Gastrointestinal disorders on medications	√	Refer to maternal fetal medicine provider, gastroenterology
	Sickle cell anemia or carrier	√	Refer to maternal fetal medicine provider, hematology, genetic counselor Hemoglobin electrophoresis if not done for patient and partner
	Cystic fibrosis carrier status	√	Refer to maternal fetal medicine provider, genetic counselor
	History of genetic disease or family history of genetic disease	√	Refer to maternal fetal medicine provider, genetic counselor
	Prior infant with congenital birth defect	√	Refer to maternal fetal medicine provider
	Hepatitis	√	Refer to maternal fetal medicine provider, gastroenterology Pertinent hepatitis labs, liver function tests
	Positive screen for sexually transmitted infection	√	Refer to provider and take appropriate action depending on infection
	Tuberculosis or received Bacillus Calmette–Guérin vaccine	√	Chest x-ray
	HIV	√	Refer to maternal fetal medicine provider, infectious disease
	Rash or viral illness	√	Serology for suspected infection

	Risk Factors	Nurse Assessment via Questionnaire	Suggested Action
Medical Conditions/ History (cont.)	Radiation/toxic chemical exposure since becoming pregnant	√	Refer to maternal fetal medicine provider
	Cancer (current or recent)	√	Refer to maternal fetal medicine provider
	Transplant	√	Refer to maternal fetal medicine provider
	Current or prior depression	√	Refer to behavioral health if suicidal or moderate or severe MDD, unless has established care
	Other mental illness (e.g., anxiety, bipolar, schizophrenia) on or off medications	√	Refer to behavioral health unless has established care
	Deployment related PTSD and/or military sexual trauma	√	Refer to behavioral health unless established care
	Occupational hazards or exposures	√	Refer to occupational health, Refer to maternal fetal medicine provider if teratogen
	Homeless	√	Refer to social services
	Intimate partner violence	√	Refer to social services
	History of infertility	√	Perform transvaginal ultrasound, if not already done
	Diet restriction (e.g., previous bariatric surgery, vegan, vegetarian)	√	Refer to nutrition
	Eating disorder	√	Refer to behavioral health
	BMI <16.5 or >30 kg/m^2	√	Obtain early one-hour GCT if BMI >30 kg/m^2 Refer to nutrition
	Age (<16 or >35 years)	√	Refer to advanced prenatal provider
Additional Information	Currently or previously deployed or family member	√	Refer to social work if desired
	Previous deployment (self)	√	Document
	Lives with cats; educate about not changing litter box	√	Educate
	Eating undercooked meat, high-mercury fish, unpasteurized foods	√	Educate
	Seat belt usage	√	Educate
	Planned pregnancy	√	Document
	Born outside the U.S.	√	Document
	Primary language other than English	√	Document
	Religious preference	√	Document
	Highest level of education	√	Document
	Preferred method of learning	√	Document

	Risk Factors	Nurse Assessment via Questionnaire	Suggested Action
Routine Lab Tests	HIV		Lab
	Complete blood count		Lab
	ABO Rh blood typing		Lab
	Antibody screen		Lab
	Rapid plasma reagin		Lab
	Hepatitis B surface antigen test		Lab
	Rubella IgG		Lab
	Urinalysis and culture		Lab
	Varicella IgG if status unknown		Lab

Abbreviations: BMI: body mass index; CVD: cardiovascular disease; DM: diabetes mellitus; GCT: glucose challenge test; GDM: gestational diabetes mellitus; HbA1c: glycosylated hemoglobin A1c; HIV: human immunodeficiency virus; IgG: immunoglobulin G; kg: kilogram(s); m: meter(s); MDD: major depressive disorder; PTSD: posttraumatic stress disorder; Rh: rhesus; U.S.: United States

Table 6. Potential Indications for Referral to an Advanced Prenatal Care Provider

	Risk Assessed or Identified by Routine Prenatal Care Provider
Obstetric Complications	Short (<2.5 cm) cervix (<24 weeks)
	Malpresentation (>36 weeks)
	Placenta previa (symptomatic or beyond 28 weeks)
	Abnormal amniotic fluid: oligo/polyhydramnios
	Preterm premature rupture of membranes
	Fetal growth abnormality (estimated fetal weight >5,000 g)
	Known or suspected fetal anomaly
	Multiple gestation
	Isoimmunization
	Abnormal prenatal screening result (aneuploidy risk, open NTD, carrier screen)
	Intrauterine fetal demise
	Prior cesarean section
Gynecologic, Medical, and Surgical Conditions	Current need for surgery
	Hematologic disorders (except physiologic anemia)
	Abnormal pap smear
	Prior uterine surgery (myomectomy)
	Breast abnormality
	Illicit drug or alcohol
	TORCH infection

*Referral depends upon local availability of resources and comfort of individual care provider

Abbreviations: cm: centimeter(s); g: gram(s); NTD: neural tube defect; TORCH: toxoplasmosis, other (syphilis, varicella-zoster, parvovirus B19), rubella, cytomegalovirus (CMV), and herpes infections

VII. Recommendations

		#	Recommendation	Strength*	Category†
Care Throughout Pregnancy	*a. Routine Care During Pregnancy*	1.	We suggest offering a group model of prenatal care as an acceptable alternative to individual provider appointments.	Weak for	Not reviewed, Amended
		2.	We recommend that all healthy, pregnant women without known contraindications participate in regular mild to moderate exercise sessions, three or more times per week.	Strong for	Reviewed, Amended
		3.	We suggest that women with uncomplicated pregnancies continue a standard work schedule throughout their pregnancy.	Weak for	Not reviewed, Amended
	b. Nutrition	4.	We recommend folic acid (at least 400 micrograms daily) to be taken starting one month before conception and continued throughout pregnancy and breastfeeding.	Strong for	Not reviewed, Amended
	c. Screening	5.	We recommend screening for use of tobacco, alcohol, illicit drugs, and unauthorized use of prescription medication because their use is common and can result in adverse outcomes. For women who screen positive, we recommend additional evaluation and treatment (see VA/DoD Clinical Practice Guidelines for the Management of Substance Use Disorders[5] and the Management of Tobacco Use[6]).	Strong for	Reviewed, Amended
		6.	We recommend screening for depression using a standardized tool such as the Edinburgh Postnatal Depression Scale or the 9-item Patient Health Questionnaire periodically during pregnancy and postpartum.	Strong for	Reviewed, New-replaced
	d. Education	7.	We recommend breastfeeding education, assessment, and support to all pregnant women and their families at the first visit and throughout the pregnancy and postpartum period using open-ended questions such as “What do you know about breastfeeding?”	Strong for	Reviewed, New-replaced
One-time Interventions	*a. Screening and Diagnostic Testing*	8.	We suggest making prenatal diagnostic testing for aneuploidy available to all pregnant women.	Weak for	Reviewed, New-replaced
		9.	We recommend offering prenatal screening for aneuploidy and the most common clinically significant genetic disorders to all pregnant women. When aneuploidy screening is desired, cell-free fetal DNA screening should be considered; however, screening test selection should be individualized and take into account the patient’s age, baseline aneuploidy risk, and test performance for a given condition.	Strong for	Reviewed, New-replaced
		10.	We suggest the two-step process (one-hour oral glucose challenge test followed by three-hour oral glucose tolerance test) to screen for gestational diabetes mellitus at 24-28 weeks gestation for all pregnant women.	Weak for	Reviewed, New-replaced

[5] See the VA/DoD Clinical Practice Guideline for the Management of Substance Use Disorders. Available at: https://www.healthquality.va.gov/guidelines/mh/sud/

[6] See the Clinical Practice Guideline for the Management of Tobacco Use. Available at: https://www.healthquality.va.gov/CPGArchives.asp

		#	Recommendation	Strength*	Category†
One-time Interventions (cont.)	b. Imaging	11.	We recommend first-trimester ultrasound to establish or confirm the gestational age and estimated birth date, identify multiple pregnancies, and confirm the presence of cardiac activity. ▪ For pregnant women who present after the first trimester, we suggest performing a dating and anatomical ultrasound at the earliest opportunity, preferably prior to 22 weeks.	Strong for	Reviewed, New-replaced
	c. Preparing for Delivery	12.	We recommend offering scheduled delivery to women who reach 41 weeks and 0/7 days undelivered. Antepartum fetal testing should begin at 41 weeks and 0/7 days if not scheduled for delivery.	Strong for	Reviewed, Amended
	d. Postpartum Care	13.	For pregnant women who have a past or current history of gestational diabetes mellitus, hypertension, or preeclampsia, we recommend documenting the reproductive history and making women aware of the increased lifetime risks of cardiovascular disease and/or diabetes.	Strong for	Reviewed, New-added
Referral		14.	We suggest that pregnant women with an unexplained elevation of maternal serum alpha-fetoprotein be evaluated and counseled by a qualified obstetric provider due to increased risk for adverse perinatal outcomes.	Weak for	Not reviewed, Amended
		15.	We recommend against routine screening for preterm delivery using the fetal fibronectin test in asymptomatic women.	Strong against	Not reviewed, Amended
		16.	We recommend considering the use of fetal fibronectin testing as a part of the evaluation strategy in women between 24 and 34 6/7 weeks gestation with signs and symptoms of preterm labor, particularly in facilities where the result might affect management of delivery.	Strong for	Not reviewed, Amended
Subpopulations	a. High Risk for Preeclampsia	17.	In women at risk of preeclampsia, we recommend low dose (e.g., 100-150 mg daily) aspirin therapy initiated at or before 16 weeks gestation.	Strong for	Reviewed, New-added
	b. High Risk for Preterm Delivery	18.	We recommend antenatal progesterone therapy in consultation with an advanced prenatal care provider (e.g., obstetrician or maternal-fetal medicine) for women at high risk for recurrent preterm delivery and who meet the generally accepted inclusion criteria.	Strong for	Not reviewed, Amended
	c. Over 44 Years of Age	19.	We suggest offering women greater than 44 years of age planned delivery at 38 weeks gestational age to reduce the risk of stillbirth.	Weak for	Reviewed, New-added

		#	Recommendation	Strength*	Category†
Subpopulations (cont.)	*d. History of Bariatric Surgery*	20.	We suggest that women who have undergone bariatric surgery should be evaluated for nutritional deficiencies and need for nutritional supplementation where indicated (e.g., vitamin B12, folate, iron, calcium).	Weak for	Reviewed, New-replaced
		21.	For pregnant women who have undergone bariatric surgery, there is insufficient evidence to recommend for or against the routine supplementation of vitamins A, D, E, or K.	N/A	Reviewed, New-replaced
		22.	We suggest that pregnant women with a history of gastric bypass surgery be evaluated by a surgeon with bariatric expertise.	Weak for	Reviewed, Amended

*For additional information, please refer to Grading Recommendations.

†For additional information, please refer to Recommendation Categorization and Appendix D.

A. Care Throughout Pregnancy

a. Routine Care During Pregnancy

Recommendation

1. We suggest offering a group model of prenatal care as an acceptable alternative to individual provider appointments.
   (Weak for | Not reviewed, Amended)

Discussion

The 2009 CPG recommended a group model of prenatal care as an acceptable alternative to individual provider appointments based on two studies.[74,75] One study, in a university-based setting, demonstrated that women assigned to group prenatal care were less likely to experience preterm delivery than those receiving standard prenatal care.[74]

A recent meta-analysis of group prenatal care versus traditional prenatal care did not find significant benefits to group prenatal care over traditional prenatal care.[76] However, the study found a potential risk reduction of preterm delivery in African American women and did not find any evidence of harm through participation in group prenatal care. A limitation of this meta-analysis is that a variety of other important outcomes such as patient satisfaction, contraception initiation, and depression were not examined.

A group model of prenatal care may fit better with the values and preferences of some pregnant women than the individual model. Patient preferences and values, as well as competing issues such as child care, may affect a woman's choice to pursue individualized care versus care in a group setting. The presence of medical or pregnancy complications may also influence a woman's decision to pursue group prenatal care.

As this is a *Not reviewed, Amended* recommendation, the Work Group did not systematically review evidence related to this recommendation. Based on the assessment of the quality of the evidence put forth in the 2009 Pregnancy CPG,[74,75] the Work Group determined the evidence to be moderate quality for offering a group model of prenatal care as an alternative to individual provider appointments. Other support for this recommendation stemmed from the benefits outweighing the harms of offering a group model of prenatal care as an alternative to an individual model.

Recommendation

2. We recommend that all healthy, pregnant women without known contraindications participate in regular mild to moderate exercise sessions, three or more times per week.
   (Strong for | Reviewed, Amended)

Discussion

Moderate level evidence shows that healthy pregnant women benefit most from completing at least 150 minutes per week of mild to moderate intensity exercise, with limited risk to mother and baby.[77] Studies included in the evidence review overwhelmingly used three or more sessions per week.[77-82] In an SR by Harrison et al. (2016) outcomes overall seemed to improve with exercise of greater frequency and/or intensity with some form of supervision for the purposes of improving adherence.[80] In another SR, by Aune et al. (2016), the minimum exercise frequency studied was one time per week to provide sufficient

stimulus or aerobic effect with no exercise as the control.[78] Therefore, for better outcomes, providers should encourage women to exercise three or more times per week at an intensity level of mild to moderate for at least 20 minutes per day, with a goal of 150 minutes per week. Less than 20 minutes per day has not been shown to benefit mother or baby.[78]

Women with healthy pregnancies can continue their pre-pregnancy exercise routine throughout pregnancy. Previously sedentary women can slowly start a new exercise routine during pregnancy, consisting of aerobic exercise and strength training, without increase risk of preterm birth or shortening gestational age at birth.[77]

Women should be educated on how to calculate or identify mild to moderate intensity to better recognize exercises that are right for them. Estimation can include percentage of heart rate, metabolic equivalent levels, and the Borg Rate of Perceived Exertion.[83] Further information on exercise intensity can be found in the VA/DoD Obesity CPG[7] and through the CDC website[8].

The benefits of exercise during pregnancy outweigh harms for most women, as exercise can reduce excess maternal weight gain and the incidence of fetal macrosomia in newborns, as well as decrease the rate of neonatal respiratory distress, GDM, depression, and cesarean deliveries.[77-82,84,85] There is no evidence to suggest that exercise causes preterm births, underweight newborns, stillbirths, or increased incidence of shoulder dystocia or induction of labor.[77-82,84,85] Pregnant women may note an increase in uterine cramping with moderate exercise or activity; this is rarely problematic, as long as the cramping ceases with termination of activity.

Many women are concerned about risks associated with exercise during pregnancy and are unclear about what types of exercise are safe for them and their babies. Therefore, women need to be educated that moderate intensity exercise can be safely continued during pregnancy as long as symptoms of preterm labor do not arise.

Many types of exercise were included in the studies identified through the systematic review. Exercise included aerobic, strength training, or a combination of both. It was supervised, in groups, or in independently led programs. Pre-pregnancy fitness levels of participants ranged from sedentary to athletic. The type of exercise a woman chooses may vary but is best and most sustainable if worked into a woman's lifestyle.

Obstetric contraindications to aerobic exercise include incompetent cervix or cerclage, multiple gestation, at risk of preterm labor, persistent second or third trimester bleeding, placenta previa after 26 weeks gestation, preterm labor during the current pregnancy, and ruptured membranes.[85] Maternal contraindications to aerobic exercise include hemodynamically significant heart disease and restrictive lung disease.

Medical conditions that may warrant referral for a supervised exercise program include moderate or severe anemia, preeclampsia, gestational hypertension, poorly controlled chronic hypertension,

[7] See the VA/DoD Clinical Practice Guideline for Screening and Management of Obesity and Overweight. Available at: https://www.healthquality.va.gov/guidelines/cd/obesity/

[8] The Centers for Disease Control and Prevention website on physical activity is available at: https://www.cdc.gov/physicalactivity/index.html.

unevaluated maternal cardiac arrhythmia, chronic bronchitis, poorly controlled type 1 DM, extreme morbid obesity, extreme underweight (BMI <12 kg/m^2), extremely sedentary lifestyle, fetal growth restriction in current pregnancy, orthopedic limitations, poorly controlled seizure disorder, poorly controlled hyperthyroidism, and heavy smoking.[85]

Some types of exercise have other benefits. For example, there is moderate quality evidence to support the use of yoga in reducing depression scores during pregnancy in women with or without a diagnosis of prenatal depression. Integrative yoga that may or may not incorporate physical exercise, includes some type of deep breathing or controlled breathing (i.e., pranayama), and includes meditation is more effective than exercise-based yoga alone.[84]

There is moderate to low quality evidence that some activities and positions should be avoided, such as high-altitude activities (>10,000 feet), prolonged supine positions, Valsalva maneuver, scuba diving, contact sports, or activities that increase the risk for abdominal injuries such as soccer, baseball, basketball, and horseback riding.[85,86]

As noted in the 2009 Pregnancy CPG, there is no evidence that sexual intercourse increases the probability of preterm labor in women with uncomplicated pregnancy.[87] Some women may see sexual intercourse as a strenuous aerobic activity. They may experience some uterine contractions following orgasm; however, this is a normal response and women only need to seek medical attention if uterine contractions persist at four or more per hour for at least three hours or if heavy vaginal bleeding is noted.

Based on the assessment of the quality of the evidence identified in the 2017 systematic evidence review conducted for this CPG update [77-82,84,85] as well as the quality of the evidence cited in the 2009 Pregnancy CPG,[87] the Work Group determined confidence in the quality of the evidence was high in support of participation of pregnant women in regular mild to moderate exercise sessions. Other support for this recommendation stemmed from the benefits of regular aerobic exercise outweighing the harms.

Recommendation

3. We suggest that women with uncomplicated pregnancies continue a standard work schedule throughout their pregnancy.
   (Weak for | Not reviewed, Amended)

Discussion

If a pregnant woman's work is strenuous or if she spends long periods of time on her feet, she should limit her work week to 40 hours and workday to eight hours during the last trimester (beginning at 28 weeks) or earlier, if she frequently experiences symptoms of preterm labor while at work. Strenuous work is defined as work involving industrial machines or conveyor belts, significant physical exertion or load carrying, or prolonged adverse conditions such as cold temperatures, wet atmosphere, or the manipulation of chemical substances.[88] Physically demanding work and prolonged standing (more than three hours at a time with little movement) increases risk for preterm birth and hypertension or preeclampsia.[88-91] Pregnant women should attempt to limit time on their feet to three hours at a time.

Active Duty Service Members should continue to follow their service-specific profiling regulations. Before a specific recommendation can be made regarding particular work limitations, further high-quality studies

are needed to examine the association between strenuous or prolonged work activities and adverse pregnancy outcomes. No changes to the current service branch guidelines are suggested as an updated systematic review was not conducted and no new evidence was reviewed for this recommendation.

As this is a *Not reviewed, Amended* recommendation, the Work Group did not systematically review evidence related to this recommendation. Based on the assessment of the quality of the evidence put forth in the 2009 Pregnancy CPG, including peer-reviewed publications [88-91] and a publication from another organization,[92] the Work Group determined confidence in the quality of the evidence was moderate for offering a group model of prenatal care as an alternative to individual provider appointments. One publication from another organization that was included in the evidence base for the 2009 CPG [92] has been updated.[93] The Work Group determined that benefits of this recommendation slightly outweigh the harms for women with uncomplicated pregnancies. A weak recommendation was made due to the considerations that need to be made for women with occupations that require strenuous activity or prolonged periods of standing, for whom the balance of benefits and harms may be different.

b. Nutrition

Recommendation

4. We recommend folic acid (at least 400 micrograms daily) to be taken starting one month before conception and continued throughout pregnancy and breastfeeding.
   (Strong for | Not reviewed, Amended)

Discussion

The recommendation for a pregnant woman to supplement her diet with folic acid beginning one month before conception and continuing throughout pregnancy and breastfeeding is based on support cited in the 2009 Pregnancy CPG [94] as well as relevant USPSTF recommendations.[95,96] Neural tube defects (NTDs), one of the most common major congenital anomalies in the U.S., occur at a very early gestational age. Studies have found that preconception folic acid supplements, either alone or combined with other vitamins or minerals (e.g., in a multivitamin), reduces risk of NTDs and should be continued through the first trimester.[97-99] Folic acid supplementation has not been found to be associated with serious harms.[95,96] Women prescribed folate antagonists (e.g., antiepileptic, antimalarial, methotrexate) may require doses of folic acid higher than the CDC-recommended minimal daily dose of 400 micrograms. For women taking antiepileptic drugs, clinicians should defer to the manufacturer's recommended dosing for folic acid. Women who have had an NTD-affected pregnancy and who are planning on becoming pregnant should take higher levels of folate daily (i.e., 4 milligrams daily). These women should also consume 0.4 mg (400 micrograms) of folic acid every day when not planning to become pregnant.[100]

Folic acid supplements are widely available without prescription and generally over the counter. They are also safe and relatively inexpensive. Providers should educate their patients about their options regarding supplementation. In addition to folic acid supplements, women should also be educated on the benefits of eating a folate-rich diet.

As this is a *Not reviewed, Amended* recommendation, the Work Group did not review evidence related to this recommendation. Based on the assessment of the quality of the evidence put forth in the 2009 Pregnancy CPG,[57,58,94,97,98,101-103] the Work Group determined confidence in the quality of the

evidence was high in support of supplementing the diet of a pregnant woman with folate. One systematic review that was included in the evidence base for the 2009 CPG [98] has been updated.[99] Other support for this recommendation stemmed from the benefits of supplementation outweighing the harms. The benefits of folic acid supplementation, including reducing risk of NTDs which carry significant harm, are well documented, which led to a "Strong for" recommendation.

c. Screening

Recommendation

5. We recommend screening for use of tobacco, alcohol, illicit drugs, and unauthorized use of prescription medication because their use is common and can result in adverse outcomes. For women who screen positive, we recommend additional evaluation and treatment (see VA/DoD Clinical Practice Guidelines for the Management of Substance Use Disorders[9] and the Management of Tobacco Use[10]).
   (Strong for | Reviewed, Amended)

Discussion

Background on Substance Use During Pregnancy

Substance use during pregnancy can influence fetal and maternal outcomes. Tobacco, alcohol, cannabis, and illicit drugs are the most commonly used substances during pregnancy.[104] The 2013 National Survey on Drug Use and Health (NSDUH) found that among pregnant women aged 15-44 in 2012-2013, 9.4% reported current alcohol use, 2.3% reported binge drinking, and 0.4% reported heavy drinking. More than 15% (15.4%) of pregnant women smoked cigarettes and 5.4% of pregnant women used illicit drugs.[105] A report developed based on combined data from a series of Substance Abuse and Mental Health Services Administration (SAMHSA) data sets stated that pregnant women (ages 15-44) reported less frequent non-medical use of opioids in the previous month than non-pregnant women (0.9% versus 2.6%).[106] Substance use among Veterans may be higher than in the general population. Among women Veterans of child-bearing age, it was estimated that 27-43% have had heavy episodic drinking (defined as four or more standard drinks on at least one occasion), 24-26% have had daily cigarette use, 12-29% have reported illicit drug use in the past year, and 6-14% have reported misuse of prescription drugs.[107]

Consequences of Prenatal Exposure to Substances

Prenatal exposure to substances may increase the risk of congenital anomalies and long-term adverse effects. However, other risky behaviors (e.g., use of multiple substances, lack of prenatal care, and other stressors in the antepartum) confound attempts to assign causality.[108]

- Best available evidence indicates that prenatal smoking may impact pregnancy outcomes by limiting fetal growth as manifest by low birth weight, reduced birth length, or reduced head circumference. A modest increase in the rate of fetal anomalies has also been described.[108] Maternal smoking is associated with cardiovascular/heart defects, musculoskeletal defects, limb

[9] See the VA/DoD Clinical Practice Guideline for the Management of Substance Use Disorders. Available at: https://www.healthquality.va.gov/guidelines/mh/sud/

[10] See the Clinical Practice Guideline for the Management of Tobacco Use. Available at: https://www.healthquality.va.gov/CPGArchives.asp

reduction defects, craniosynostosis, facial defects, eye defects, orofacial clefts, gastrointestinal defects, gastroschisis, anal atresia, hernia, and undescended testes in exposed infants.[109]

- Alcohol is a known teratogen. The effects of prenatal alcohol exposure are wide-ranging and reflect extent of exposure and susceptibility. Prenatal alcohol exposure causes several abnormalities with the heart, kidney, liver, gastrointestinal tract, endocrine system, and the brain.[110] The term fetal alcohol spectrum disorder (FASD) describes the broad range of adverse sequellae of fetal alcohol exposure, with fetal alcohol syndrome (FAS) and its characteristic triad of problems with facial features, growth, and central nervous system as its most severe expression.
- The risks of prenatal cannabis exposure are unknown. To date, cannabis has not been definitively associated with human teratogenicity nor specific enduring effects in childhood or adolescence.[108]
- Opioids in general have not been considered teratogenic, although a higher incidence of congenital anomalies in infants born to mothers exposed to codeine, methadone, or heroin has been reported.[108] In utero exposure to opioids is associated with neonatal abstinence syndrome (NAS), defined as a constellation of symptoms in newborns including central nervous system irritability, gastrointestinal dysfunction, and temperature instability.[111] The incidence of NAS has increased almost 300% from 1999 to 2013, reflecting increases in use of opioid prescription medications and heroin among women of reproductive age.[112,113]

Challenges in Identification

The DoD screens Active Duty Service Members for drug use. The VA conducts universal screening for alcohol and tobacco use but not for other substances. The standard threshold for the Alcohol Use Disorders Identification Test- Consumption (AUDIT-C) screening tool is not adjusted for gender.[107] Moreover, there is no safe drinking limit during pregnancy.[114] The reference standard for the detection of prenatal alcohol exposure is maternal self-reporting.[115] Women may be less likely than men to disclose alcohol use to a primary care provider, resulting in women being less likely to receive effective intervention.[116] There is no reliable laboratory test to screen for alcohol use in pregnancy.[115,117] Because there are potential legal and other consequences when positive biological tests are found, informed consent must be obtained prior to their utilization, except in the case of a medical emergency when the pregnant woman is unconscious and unable to consent.

Summary

Antepartum use of alcohol, cigarettes, illicit drugs, or unauthorized use of prescription medication in this period is not uncommon, and may be associated with adverse effects. Hence, we recommend screening for tobacco, alcohol, illicit drugs, and non-prescribed use of medication, followed by additional evaluation and treatment based on screening results. See the VA/DoD Clinical Practice Guideline for the Management

of Substance Use Disorders (VA/DoD SUD CPG)[11] and the Management of Tobacco Use (VA/DoD Tobacco Use CPG)[12].

As this is a *Reviewed, Amended* recommendation, the Work Group systematically reviewed the evidence identified in the evidence review conducted for this CPG update [118] and considered the assessment of the evidence put forth in the 2009 CPG.[119-128] The Work Group determined confidence in the quality of the evidence was moderate in support of screening pregnant women for use of alcohol, tobacco, or illicit drugs or unauthorized use of prescription drugs. One systematic review that was included in the evidence base for the 2009 CPG [120] has been updated.[129] The Work Group determined that benefits of this recommendation outweigh the harms for pregnant women and their newborns.

Recommendation

6. We recommend screening for depression using a standardized tool such as the Edinburgh Postnatal Depression Scale or the 9-item Patient Health Questionnaire periodically during pregnancy and postpartum.
   (Strong for | Reviewed, New-replaced)

Discussion

Moderate quality evidence suggests that screening pregnant and postpartum women for depression using a validated screening tool is more effective than usual clinical assessment in detecting depression and in reducing depressive symptoms, particularly when done with access to interventions such as treatment protocols, care management, and trained clinicians.[130] Providers should screen patients periodically, such as at first presentation, week 28, and at the postpartum visit. Potential harms of screening include time spent on screening and discomfort with screening questions. Benefits of screening for depression outweigh harms, given the high prevalence of perinatal depression, adverse maternal and offspring effects of untreated perinatal depressive symptoms, and low rates of detection and treatment entry in the absence of screening. VA/DoD patient focus group findings suggest that pregnant women want to discuss mental health concerns with their clinicians and do not object to depression screening (see Patient Focus Group Methods and Findings). This is congruent with research findings that perinatal depression screening is acceptable to most women.[131] Screening tools and mental health treatment resources are available in the VA and DoD.

The Edinburgh Postnatal Depression Scale (EPDS) and the 9-item Patient Health Questionnaire (PHQ-9) are among the screening tools which have been validated for perinatal use. The PHQ-9 is readily available in all VA and DoD clinical settings; the EPDS is more commonly used in perinatal care settings. In a randomized controlled trial (RCT) comparing these two screening tools, moderate quality evidence suggests 83% concordance between the two scales when scores are dichotomized between "normal" and "increased risk of depression."[132] Concordance is greatest at the highest score levels, and concordance for suicidal thoughts is very high. More research is needed to determine the optimal screening tool. Evidence to date suggests that screening produces better outcomes than no screening, regardless of which screening tool is

[11] See the VA/DoD Clinical Practice Guideline for the Management of Substance Use Disorders. Available at: https://www.healthquality.va.gov/guidelines/mh/sud/

[12] See the Clinical Practice Guideline for the Management of Tobacco Use. Available at: https://www.healthquality.va.gov/CPGArchives.asp

used. If used alone, the PHQ-2 (first two items of the PHQ-9) has less specificity; following up with the full PHQ-9 improves specificity with no loss of sensitivity.

Using depression screens may not detect other perinatal psychiatric disorders, such as bipolar disorder, anxiety disorders, or PTSD. It is important to have other methods in place to detect these disorders. Screening is not necessary for pregnant women who have already been diagnosed with a psychiatric disorder and are engaged in mental health treatment. More information can be found in the VA/DoD PTSD CPG[13] and the VA/DoD MDD CPG[14]. Additionally, Massachusetts Child Psychiatry Access Project (MCPAP) for Moms offers information and tools providers can use in the prevention, identification, and treatment of depression and other mental health conditions.[15]

As this is a *Reviewed, New-replaced* recommendation, the Work Group systematically reviewed evidence related to this recommendation in the evidence review conducted as part of this guideline update.[132] The Work Group determined confidence in the quality of the evidence was moderate in support of screening for depression. Other support for this recommendation stemmed from the benefits of this recommendation outweighing the harms, as the perinatal period is a higher risk time for developing depression, and untreated perinatal depression poses risks to offspring as well as risks to the mother.

d. Education

Recommendation

7. We recommend breastfeeding education, assessment, and support to all pregnant women and their families at the first visit and throughout the pregnancy and postpartum period using open-ended questions such as "What do you know about breastfeeding?"
   (Strong for | Reviewed, New-replaced)

Discussion

The World Health Organization (WHO) recommends initiation of breastfeeding within the first hour of life and exclusive breastfeeding for at least six months.[133] The health benefits of breastfeeding for both the mother and the newborn have been well-documented. Breastfeeding has been shown to lower the risk of type 2 DM, certain types of breast cancer, and ovarian cancer in mothers and asthma, childhood leukemia, and type 2 DM in children.[134,135] However, the various ways in which clinicians instruct their patients about breastfeeding differs immensely across clinical settings. What seems to be clear is that the education should start prenatally (ideally at the first visit), be continued throughout the pregnancy, and include the pregnant woman's family or chosen support people. Breastfeeding education can be provided in individual appointments or through a group model of prenatal care (see Recommendation 1).

Breastfeeding education should be tailored to the needs and resources of the community. A provider should approach the topic with sensitivity and foster a supportive environment. A breastfeeding education program which used open-ended questions focusing on the woman's beliefs about breastfeeding was

[13] See the VA/DoD Clinical Practice Guideline for the Management of Posttraumatic Stress Disorder and Acute Stress Disorder. Available at: https://www.healthquality.va.gov/guidelines/MH/ptsd/

[14] See the VA/DoD Clinical Practice Guideline for the Management of Major Depressive Disorder. Available at: https://www.healthquality.va.gov/guidelines/MH/mdd/

[15] See the Massachusetts Child Psychiatry Access Project (MCPAP) for Moms website. Available at: https://www.mcpapformoms.org/

effective in increasing breastfeeding.[136] Breastfeeding assessment in the prenatal period should include breast examination to screen for potential breastfeeding challenges, such as those related to inverted or "flat" nipples, history of breast augmentation or reduction, suspected breast hypoplasia or insufficient glandular tissue, past breastfeeding experience/perceptions, use of medications known to interfere with milk production, and basic education pertaining to the benefits of breastfeeding and local resources and support programs available. As indicated, pregnant women should be referred to a certified lactation consultant (as available) for additional lactation support and education.

According to cohort studies by Fairlie et al. (2009) and Wouk et al. (2016), women who experience anxiety and depression during pregnancy are just as likely to initiate breastfeeding as women who do not, while those who experience anxiety or depression in the postpartum period are far less likely to continue exclusive breastfeeding.[137,138] By providing additional support, providers may be able to identify and address potential breastfeeding challenges for women over the course of their pregnancy and thus increase the number of women who are exclusively breastfeeding.

As this is a *Reviewed, New-replaced* recommendation, the Work Group systematically reviewed evidence related to this recommendation in the evidence review conducted as part of this guideline update.[137,138] The Work Group determined confidence in the quality of the evidence was moderate in support of breastfeeding education, assessment, and support. Other support for this recommendation stemmed from the benefits of breastfeeding support outweighing the harms.

B. One-time Interventions

a. Screening and Diagnostic Testing

Recommendation

8. We suggest making prenatal diagnostic testing for aneuploidy available to all pregnant women. **(Weak for | Reviewed, New-replaced)**

Discussion

There are no RCTs or SRs evaluating the overall benefits of offering prenatal diagnostic testing to all pregnant women. The Work Group's confidence in the quality of the evidence is low, except regarding risk of pregnancy loss with procedures for which the confidence in the quality of the evidence is high. The Pregnancy CPG Work Group acknowledges that this recommendation is based, in part, on consensus and expert opinion from ACOG and the Society for Maternal-Fetal Medicine (SMFM);[139,140] therefore it is the accepted standard of care, and the Work Group determined this recommendation was appropriate for inclusion in the CPG.

The benefits of invasive prenatal diagnostic testing include improving the ability to plan and to make more informed pregnancy and birth management decisions. Some women may choose to electively terminate their pregnancies based on these results. For women who choose to continue their pregnancies, early diagnostic testing affords the opportunity to learn about the diagnosis and prepare for the birth and the neonatal period. It also facilitates earlier consultation with other pediatric subspecialists (e.g., developmental pediatricians). Offering prenatal diagnostic testing, regardless of maternal age or risk factors, respects the values and preferences of women who make this choice. The potential harms include the small, but known, risk of pregnancy loss, which is about 1/455 (0.22%) for chorionic villus sampling

(CVS) and about 1/900 (0.1%) for amniocentesis.[141] Pregnant women considering invasive prenatal diagnostic testing should be counseled about the risks, benefits, limitations, and alternatives to invasive testing by a provider qualified to conduct this counseling.[142]

There may be increased costs associated with prenatal diagnostic testing. Because some facilities do not offer CVS and/or amniocentesis, pregnant women may be referred to outside facilities to obtain testing. This will likely increase out-of-pocket and/or travel costs.

Based on the assessment of the quality of the evidence identified in the 2017 evidence review as well as on the assessment of the quality of the evidence put forth in the 2009 Pregnancy CPG, which included peer-reviewed publications [143-148] and a publication from another organization,[139] the Work Group determined overall confidence in the quality of the evidence was low in support of making prenatal diagnostic testing available. ACOG and SMFM published an updated version [140] of the publication included as evidence in the 2009 CPG.[139] The recommendation is, in part, based on consensus and expert opinion from ACOG and SMFM, rather than prospective studies. The 2017 evidence review did not identify any new studies that showed a direct benefit of invasive testing; however, the availability of prenatal diagnostic testing for all patients, regardless of age, supports patient autonomy and may be beneficial to patients in making pregnancy and birth management decisions.

Future research should examine the characteristics of pregnant women most likely to choose invasive diagnostic testing, especially those who do not have a known increased risk for fetal genetic disorders. The optimal method to educate pregnant women about the growing list of prenatal testing options should be continuously re-evaluated, as the information and testing options continue to increase in complexity. Finally, the optimal test (e.g., karyotype, targeted micro-array, genome-wide array) in the low-risk patient is not known.

Recommendation

9. We recommend offering prenatal screening for aneuploidy and the most common clinically significant genetic disorders to all pregnant women. When aneuploidy screening is desired, cell-free fetal DNA screening should be considered; however, screening test selection should be individualized and take into account the patient's age, baseline aneuploidy risk, and test performance for a given condition.
   (Strong for | Reviewed, New-replaced)

Discussion

Some women strongly desire prenatal screening for aneuploidy and other genetic disorders to guide management of their pregnancy. Others do not desire this screening. The benefits of testing are that, if the testing is positive, women have time to become educated about having a child with a genetic disorder. They also have an opportunity to consult with providers who may be involved in the care of their child, such as developmental pediatricians. Benefits may be greatest for women who are at high risk of aneuploidy (e.g., greater maternal age). Risks of aneuploidy screening include false positive and negative results, potential pregnancy loss if patients subsequently pursue invasive diagnostic testing, and maternal anxiety from testing. The benefits and harms of aneuploidy screening should be discussed with all patients with the ultimate decision taking into account patient's individual preferences and personal values.

There are multiple aneuploidy screening tests available. Some screening tests assess analytes in the maternal serum independently (e.g., quad screen, serum integrated screen) or in conjunction with assessment of nuchal translucency (e.g., integrated screen, first trimester screen, sequential screen). Some assess placental DNA in the maternal circulation (e.g., cell-free fetal deoxyribonucleic acid [cffDNA] screen). Each test's performance has different sensitivity, specificity, and positive and negative predictive values, which are affected by the a priori risk of a given aneuploidy based on maternal age. Resource use also varies between tests.

cffDNA screening has the highest sensitivity and specificity of the available screening tests for Down syndrome in high-risk women.[149-154] The test also screens for trisomy 18 and trisomy 13, but has lower detection rates for these conditions. Though cffDNA has a lower false positive rate than traditional serum screening, the positive predictive value (chance that a positive test is a true positive) depends on the patient's a priori risk of having the condition. The positive predictive value should be calculated and provided as part of pre- and post-test counseling. Another potential risk of cffDNA is receiving a non-diagnostic test result. This may be due to low fetal fraction or the presence of other chromosomal conditions. Women with non-diagnostic test results will require further evaluation and counseling, which can potentially increase costs and use of services, and maternal anxiety. cffDNA screening carries a risk of identifying undiagnosed genetic disorders or carcinomas in the mother and identifying non-paternity or consanguinity in tests using single nucleotide polymorphism technology. This test can also identify fetal gender, which some pregnant women may not wish to know prior to birth. Women who have undergone in-vitro fertilization with donor eggs may be candidates for this test; providers should understand test recommendations and limitations prior to ordering.

Adequate pre-test counseling is required for all aneuploidy screening tests. The ability to provide post-test counseling for pregnant women who screen negative, as well as the availability of timely post-test counseling and diagnostic prenatal testing for pregnant women who screen positive, is necessary. The field of prenatal screening is rapidly evolving, and gaps in both patient and provider understanding are anticipated. There will also be emerging technologies that outpace CPG updates. The Work Group acknowledges that serum screening has the ability to identify a broader scope of conditions than cffDNA screening, including for example Smith-Lemli-Opitz symdrome and unexplained elevated alpha-fetoprotein, for which younger women may be at greater risk than aneuploidy. This limitation should be addressed as part of pre-test counseling and included as part of a woman's decision on which screening test they choose. Finally, the predictive value of cffDNA testing is dependent upon maternal age, with greater predictive values for aneuploidy as maternal age increases, due to the greater prevalence of aneuploidy with advancing age. Its utility in younger patients, who have a lower prevalence of aneuploidy, may not be cost-effective and patient's individual desires and values should be factored into the decision on which screening test to complete.

The optimal provider type to counsel women about prenatal screening options is unknown; however, there are not enough genetic counselors available to conduct pre-test counseling for all pregnant women. Due to the rapid expansion and availability of genetic testing, there is a significant need for increased provider education to provide adequate patient counseling. The Work Group acknowledges that the field of prenatal genetic screening is rapidly evolving; patient and provider understanding, test availability, and cost considerations may vary widely and are likely to change. The Work Group acknowledges that there

are additional recommendations from professional societies to offer carrier screening to all pregnant women for specific genetic conditions (e.g., cystic fibrosis, spinal muscular atrophy, hemoglobinopathies). Such tests if performed, do not need to be repeated in each pregnancy. Counseling should include residual risk estimates of having an affected child.

The rate of uptake of prenatal screening based on place of care and provider type (e.g., academic military treatment facilities versus community-based military treatment facilities versus purchased care) should be examined to improve understanding of current prenatal screening strategies. This may, in turn, help improve screening services. Limitations of non-invasive prenatal screening should also be examined. Evaluation of provider proficiency in counseling and understanding of rapidly evolving technologies as related to prenatal screening is critical. Determining the effectiveness of individual versus group-based counseling versus other modalities such as web-based counseling will also guide approaches to counseling moving forward.

As this is a *Reviewed, New-replaced* recommendation, the Work Group systematically reviewed evidence related to this recommendation in the evidence review conducted as part of this guideline update.[149-154] The Work Group determined confidence in the quality of the evidence was moderate in support of using cffDNA screening if aneuploidy screening is desired. As women have varying preferences regarding aneuploidy screening, the Work Group recommends offering the screening and, if desired, selecting the test with the best performance based on maternal age, risk factors, and test performance for a specific condition.

Recommendation

10. We suggest the two-step process (one-hour oral glucose challenge test followed by three-hour oral glucose tolerance test) to screen for gestational diabetes mellitus at 24-28 weeks gestation for all pregnant women.
    (Weak for | Reviewed, New-replaced)

Discussion

Background

GDM is defined as marked impairment of glucose metabolism initially identified during pregnancy. Pregnant women with GDM are at increased risk for developing fetal macrosomia and requiring operative delivery. Uncontrolled or poorly controlled GDM may also lead to neonatal morbidity, such as hypoglycemia, polycythemia, and hyperbilirubinemia. Treatment aimed at normalizing glucose metabolism has been shown to reduce these risks. Therefore, any pregnant woman with GDM should have additional surveillance and management beyond the scope of this guideline.

Testing

For most women, screening for GDM should be undertaken at 24-28 weeks gestation. It is typically diagnosed using a two-step process.[155-157] The first step is the administration of a one-hour 50-gram non-fasting oral glucose challenge test (GCT) (which includes a blood draw). The typically accepted upper limit for this one-hour screen ranges between 130 and 140 mg/dL. Women who are outside this acceptable range will require the second step.

The second step (for women who screen positive in the first step) is the diagnostic fasting three-hour 100-gram glucose tolerance test (GTT). There are two acceptable sets of threshold values for this three-hour screen that can be used to diagnose GDM. The older criteria defined by the National Diabetes Data Group (NDDG) (1979) considers the test positive and the pregnant woman to have GDM if at least two of the four values are equal to or exceed 105 mg/dL, 190 mg/dL, 165 mg/dL, and 145 mg/dL for the fasting, one-hour, two-hour, and three-hour specimens, respectively.[158] The Expert Committee on the Diagnosis and Classification of Diabetes Mellitus has proposed alternate values, which are believed to more closely approximate the original Carpenter and Coustan (1982) criteria of 95 mg/dL, 180 mg/dL, 155 mg/dL, and 140 mg/dL for the fasting, one-hour, two-hour, and three-hour specimens, respectively.[159,160] There is currently insufficient evidence-based comparison data to recommend one set of criteria over the other. There is a growing body of evidence, albeit insufficient at this time, to suggest a simplified testing schema in the future.

Rationale

Moderate quality evidence suggests that the benefits of screening slightly outweigh the harms/burden of screening, but universal consensus has not been reached on that point. Benefits of screening include early, appropriate diagnosis and treatment for those pregnant women requiring insulin and the resultant avoidance of DM-related complications. Specifically, early, appropriate treatment may lead to a reduction in hypertensive disorders in pregnancy, a decrease in cesarean deliveries, and a decrease in macrosomia.[161] Harms associated with testing include treatment with insulin for those who would not necessarily develop these complications, as well as the time and expense of both counseling and treatment.

There is modest variation in patient preference regarding screening, as some patients may wish to avoid blood draws or may not want to wait for a three-hour GTT. However, the majority of patients value GDM screening and will return for testing if educated by their providers about the benefits of testing. Those who are informed of an abnormal value and do not return for the three-hour test may lack the proper education about testing, may be unable to invest the time for a three-hour GTT, or may want to avoid multiple blood draws. In a pilot study by Scifres et al. (2015), which also examined patient and provider preferences on GDM, 94% of the providers surveyed believed screening women for GDM was important and 92% of those providers recommended the current two-step strategy.[162] In contrast, patients preferred the two-hour, 75-gram oral GTT, in the absence of a provider recommendation to the contrary. Glycosylated hemoglobin (HbA1c) lacks both sensitivity and specificity to serve as an adequate screening tool.[163]

The Work Group further acknowledges that the need for resources varies directly with the number of women tested. With an increase in diagnoses of GDM, referral to RDNs will be appropriate. Depending on the degree of blood sugar control in a particular woman, additional prenatal visits and maternal and fetal surveillance and other services may also be indicated.

Women with Risk Factors for Gestational Diabetes Mellitus

Women with risk factors for GDM (e.g., history of GDM in prior pregnancy, previous delivery of a macrosomic infant [>4,000 g], pre-pregnancy BMI >30 kg/m^2, first degree relative with DM, and certain high-risk ethnic groups [e.g., Native Americans, Hispanics, Pacific Islanders]) [164] may benefit from earlier

screening and treatment, but should be re-screened at 24-28 weeks if initial testing is normal. Women with a one-hour GCT value >200 mg/dL may be treated presumptively for GDM without a confirmatory test. Women with, or at high risk of, dumping syndrome following gastric bypass surgery may benefit from screening for GDM with a fasting and two-hour postprandial glucose values rather than an oral glucose load.

Summary and Future Research

As this is a *Reviewed, New-replaced* recommendation, the Work Group systematically reviewed evidence related to this recommendation in the evidence review conducted as part of this guideline update.[161,162] The Work Group determined confidence in the quality of the evidence was moderate in support of the two-step process to screen pregnant women for GDM. Other support for this recommendation stemmed from benefits of screening slightly outweighing harms and patient values and preferences. Future research is needed to definitively demonstrate whether a single two-hour oral GTT would be sufficient to diagnose GDM and adequate to replace the two-step process.

b. Imaging

Recommendation

11. We recommend first-trimester ultrasound to establish or confirm the gestational age and estimated birth date, identify multiple pregnancies, and confirm the presence of cardiac activity.
    - For pregnant women who present after the first trimester, we suggest performing a dating and anatomical ultrasound at the earliest opportunity, preferably prior to 22 weeks.

    (Strong for | Reviewed, New-replaced)

Discussion

Reliable gestational age is crucial for assessment of fetal size and growth since this may influence management decisions that could, in turn, influence outcomes at peri-viable gestational ages. Self-report of last menstrual period (LMP) is often used to estimate gestational age but may be unreliable.[165] Ultrasonography before 20 weeks gestation is generally viewed as a more accurate method of estimating gestational age than menstrual dating. Ultrasound assessment is limited by the implicit assumption that below a certain gestational age all fetal size variability is due to gestational age, which can lead to systematic under-estimation of gestational age among pregnancies exhibiting early growth restriction measured in later scans. However, this is less of a concern for very early ultrasound scans given that variation in fetal size is minimal during the first trimester of pregnancy.

A large prospective study by Hoffman et al. (2008) followed 1,867 participants who were required to report the month and day of LMP and undergo first-trimester transvaginal ultrasounds.[165] This study suggests that early reporting of LMP results in similar gestational age dating as that obtained from early ultrasound. However, when discrepant, the LMP estimate of gestational age tended to be greater than ultrasound-based gestational age and resulted in a higher proportion of births being classified as post-term. Inaccurate determination of gestational age may lead to suboptimal planning of care throughout the pregnancy.

Another large prospective study (3,760 participants) by Verburg et al. (2008) compared gestational age at birth using estimates from LMP versus ultrasound imaging.[166] The study provided charts for ultrasound

dating of pregnancy based on crown-rump length and biparietal diameter and concluded that first trimester ultrasounds, preferably between 10 and 12 weeks, are better for the prediction of gestational age.

As this is a *Reviewed, New-replaced* recommendation, the Work Group systematically reviewed evidence related to this recommendation in the evidence review conducted as part of this guideline update.[165,166] The Work Group determined confidence in the quality of the evidence was moderate in support of first-trimester ultrasound to establish or confirm the gestational age and estimated birth date. Other support for this recommendation stemmed from benefits of this recommendation outweighing the harms. Benefits include improved timing of planned births and avoidance of post-term birth complications. There is some variation in patient and provider preferences regarding first-trimester ultrasound. Access issues may make it difficult for some patients to get an ultrasound, particularly in rural or resource-poor settings. Future research priorities include how the quality and accuracy of the dating ultrasound are affected by provider level or characteristics (e.g., practitioner and specialty type, training, qualifications).

c. Preparing for Delivery

Recommendation

12. We recommend offering scheduled delivery to women who reach 41 weeks and 0/7 days undelivered. Antepartum fetal testing should begin at 41 weeks and 0/7 days if not scheduled for delivery.
    (Strong for | Reviewed, Amended)

Discussion

Gestational age beyond 40 weeks is associated with increasing risk of perinatal death and perinatal complication. A Cochrane review by Gulmezoglu et al. (2012) identified that a policy of labor induction at 42 weeks gestational age compared to expectant management is associated with fewer perinatal deaths and fewer cesarean births.[167] Perinatal complications after 41 weeks gestational age have also been documented to include asphyxia, fetal distress, sepsis, and meconium aspiration.[167,168] In addition, there has been a documented increased risk of intrauterine death after 37 and 0/7 weeks gestation in pregnancies complicated by high maternal age (≥35 years) and in women with high BMI.[169]

Consistent with these findings, the Work Group recommends that women who reach 41 and 0/7 weeks be offered planned delivery. There is moderate confidence in the quality of the current evidence that women of all ages reduce the negative neonatal outcomes by delivering before 41 and 0/7.[170] Studies have also shown an equal or lower rate of cesarean delivery in women for whom pregnancy is induced at 41 weeks compared to women for whom expectant management is used.[171,172]

Counseling women in order to make an informed decision about scheduled inductions or antepartum fetal monitoring without induction will help prioritize pregnant women's values. Some women may value immediate delivery, while others may prefer to wait. The costs associated with induction include increased length of hospital stay and increased nursing contact time versus costs incurred by outpatient monitoring followed by induction if spontaneous labor does not occur. However, medical costs and resource allocation associated with perinatal complications are also high, making this approach valuable in reducing negative outcomes and costs. Some patient variability in values will be noted in this approach as some

women highly value deliveries without intervention and have limited time for antenatal monitoring. These women may find this approach less acceptable than those that highly value the reduction of risk. As noted above, women with complicated pregnancies comprise a higher risk subgroup that may have more negative outcomes at an earlier gestational age and should be treated separately.

As this is a *Reviewed, Amended* recommendation, the Work Group systematically reviewed the evidence identified in the evidence review conducted for this CPG update [170] and considered the assessment of the evidence put forth in the 2009 CPG.[171-174] The Work Group determined confidence in the quality of the evidence was moderate in support of a strong recommendation to offer scheduled delivery for women who reach 41 weeks and 0/7 days undelivered. Other support for this recommendation stemmed from the benefits of this recommendation, which include improved delivery outcomes, outweighing the harms.

d. Postpartum Care

Recommendation

13. For pregnant women who have a past or current history of gestational diabetes mellitus, hypertension, or preeclampsia, we recommend documenting the reproductive history and making women aware of the increased lifetime risks of cardiovascular disease and/or diabetes. **(Strong for | Reviewed, New-added)**

Discussion

Pregnancy is often referred to as a "stress test" as it relates to the cardiovascular and metabolic systems of the mother. There are dramatic shifts in blood volume, hemodynamics, and lipid/glucose metabolism to accommodate the growing needs of the fetus. However, these adaptive mechanisms may become dysregulated and lead to adverse clinical outcomes in both the mother and fetus. Over the past few decades, it has become increasingly apparent that these adverse conditions that occur during pregnancy can serve as a marker of future maternal cardiovascular, metabolic, and possible rheumatologic risk. Such adverse conditions include hypertensive conditions of pregnancy, including gestational hypertension and preeclampsia, as well as GDM. Evidence reviewed in development of this recommendation included analyses of three SRs [175-177] and 12 individual cohort or case-control studies [178-189] that evaluated the potential association between pregnancy complications (preeclampsia, gestational hypertension, and GDM) and adverse lifetime health outcomes (CVD, DM, and rheumatoid arthritis). The overall quality of evidence supporting an association between hypertensive conditions of pregnancy, preeclampsia and GDM was determined to be moderate.

Although these conditions may become quiescent during the postpartum period, there is a breadth of epidemiologic evidence that long-term increase in cardiovascular and metabolic risk exists that clinically manifest many years later. Recognition of these adverse pregnancy risk factors as markers for future health risk is important, as women in their childbearing years are often otherwise healthy and it may not be obvious to most providers to consider screening for hypertension and DM in such women. There are no studies assessing the effect of specific interventions to modify this risk. There may be potential benefit to periodic screening (e.g., yearly screening for DM and hypertension) and lifestyle modifications; however, future research is needed. Studies have shown that many providers in primary care and obstetrics under-recognize these adverse pregnancy conditions.[190] Initiatives to increase awareness amongst those

working in various specialties as well as a broad range of providers including nursing, physicians, and women's health providers are in progress.

Primary care providers should obtain a reproductive history yearly in women of childbearing age; a one-time assessment in women who are postmenopausal without prior history of CVD is sufficient. Specifically, inquiry should be focused on a history of gestational hypertension/preeclampsia (previously known as toxemia) and GDM. Benefits of awareness of lifetime risk and regular cardiovascular screening in these women outweigh harms.

It is recommended that women with a history of acute pulmonary edema, often associated with other conditions such as preeclampsia or magnesium sulfate toxicity, be encouraged to have a follow-up visit in primary care. Documentation of an episode of acute pulmonary edema should be added to the patient's problem list and be readily accessible. The importance of follow-up and discussion of such acute pulmonary edema conditions with a general follow-up provider should be stressed, as most pregnant women would be receptive to prevention of CVD and DM.

As this is a *Reviewed, New-added* recommendation, the Work Group systematically reviewed evidence related to this recommendation in the evidence review conducted as part of this guideline update.[175-189] The Work Group determined confidence in the quality of the evidence was moderate in support of documenting pregnancy history and making pregnant women aware about the lifetime risk of these conditions. Other support for this recommendation stemmed from the benefits of this recommendation, which include the potential to improve care, outweighing the harms.

Several areas of future research would be helpful in this area in regards to timing of screening and specific interventions for these women. Additionally, there is increasing evidence for association between other adverse pregnancy conditions, such as premature births and recurrent miscarriage, and long-term cardiovascular risk. There is also some suggestion that adverse pregnancy conditions may also increase rheumatologic risk, specifically rheumatoid arthritis; however, definitive evidence to support this is lacking. This, along with specific use of intervention therapies such as anti-hypertensives, should be considered as a focus for future prevention trials.

C. Referral

Recommendation

14. We suggest that pregnant women with an unexplained elevation of maternal serum alpha-fetoprotein be evaluated and counseled by a qualified obstetric provider due to increased risk for adverse perinatal outcomes.
    (Weak for | Not reviewed, Amended)

Discussion

This recommendation was carried forward from the 2009 Pregnancy CPG and is based on publications that indicated an increased risk of adverse outcomes, such as preterm birth, preterm rupture of membranes, preeclampsia, fetal growth restriction, and intrauterine fetal death with unexplained elevated alpha-fetoprotein.[139,191,192] Counseling about these findings should be conducted by an obstetric provider

who is able to discuss the meaning of an unexplained elevated maternal serum alpha-fetoprotein (MSAFP) and arrange for appropriate follow-up.

An SR and meta-analysis published since the completion of the evidence review conducted for the 2009 Pregnancy CPG concludes that elevated MSAFP is a risk factor for the pregnancy complications of preeclampsia and low birth weight.[193] This study did not examine other outcomes of importance to patients and providers, such as spontaneous preterm labor, stillbirth, or preterm premature rupture of the membranes.

The benefits of this recommendation slightly outweigh the harms and burdens. The benefit is that pregnant women with elevated MSAFP would undergo heightened surveillance and possible earlier detection of preeclampsia or fetal growth restriction. This may also identify a specific subgroup of pregnant women who may receive better protection from the use of prophylactic aspirin for prevention of preeclampsia. One potential harm is that the subgroup of women who will experience complications cannot be predicted. Further, knowledge of the test results and increased surveillance may heighten anxiety, and place the pregnant woman at risk for increased, and potentially unnecessary, interventions.

There are limitations to consider with this recommendation. The definition and diagnostic criteria for preeclampsia have changed over time, and the cited review is not based on the current diagnostic criteria for preeclampsia.[193] It would be clinically useful to examine the predictive value of analytes for fetal growth restriction, which may necessitate early birth. This study did not review other complications associated with elevated MSAFP, such as stillbirth or premature labor.[193]

As this is a *Not reviewed, Amended* recommendation, the Work Group did not systematically review evidence related to this recommendation. Based on the assessment of the quality of the evidence put forth in the 2009 Pregnancy CPG, including a peer-reviewed publication of a scientific study [191] and publications from other organizations,[139,192] the Work Group determined the confidence in the quality of the evidence was moderate in support of a qualified obstetric provider evaluating and counseling pregnant women with persistent unexplained elevations of MSAFP. The publications from other organizations that were included in the evidence base for the 2009 CPG [139,192] have been updated.[140,194,195] Other support for this recommendation stemmed from the benefits slightly outweighing the harms.

More research is needed to identify the role of serum analytes in a time when non-invasive prenatal screening is replacing serum analyte use for aneuploidy screening. Whether serum analytes have a role in risk prediction with respect to pregnancy complications, rather than being used for aneuploidy screening, needs to be determined. Finally, the specific combination and appropriate gestational age to examine serum analytes in not known.

Recommendations

15. We recommend against routine screening for preterm delivery using the fetal fibronectin test in asymptomatic women.
    (Strong against | Not reviewed, Amended)

16. We recommend considering the use of fetal fibronectin testing as a part of the evaluation strategy in women between 24 and 34 6/7 weeks gestation with signs and symptoms of preterm labor, particularly in facilities where the result might affect management of delivery.
    (Strong for | Not reviewed, Amended)

Discussion

Fetal fibronectin testing has a narrowly defined role in obstetric evaluation, and therefore should only be used when it has the potential to alter care. Several prospective cohort studies have shown no improvement in outcomes for either mother or baby.[196,197] The potential value of fetal fibronectin testing in the setting of evaluation or triage of preterm labor is to more precisely discriminate between the subset of women who have true preterm labor versus false labor.[198] In a woman at low risk for preterm delivery presenting with preterm contractions, a negative test may inform the decision to use or avoid tocolytics and corticosteroids.[197] Alternatively, a positive test may allow providers at some facilities to arrange transfer of women identified as at higher risk of preterm delivery to facilities better suited to manage the complications of a preterm birth. In asymptomatic women, the low positive and negative predictive values limit the test's value in medical decision making.

Other methods of screening for preterm delivery addressed in the 2009 VA/DoD Pregnancy CPG included cervical length. One large RCT examined the difference in rates of low birth weight, delivery at less than 37 weeks gestation, and premature rupture of membranes between women who received routine cervical examinations and women who did not. It found no statistically significant difference between groups.[199] Recent research, identified outside of the systematic evidence review, also found that routine cervical length screening for the general population was not effective in predicting preterm birth.[200]

As these are *Not reviewed, Amended* recommendations, the Work Group did not systematically review evidence related to these recommendations. Based on the assessment of the quality of the evidence put forth in the 2009 Pregnancy CPG, including peer-reviewed publications [196-198,201-203] and one publication from another organization,[204] the Work Group determined confidence in the quality of the evidence for both recommendations was moderate. One publication from another organization that was included in the evidence base for the 2009 CPG [204] has been updated and is consistent with the current recommendations.[205]. Recent research, identified outside of the systematic evidence review, has found that fetal fibronectin testing in asymptomatic women provided no benefit.[200,206] While testing was not found to be clinically harmful, it was associated with increased resource use.[206] The Work Group developed the strong recommendation against testing in asymptomatic women due to the absence of benefit coupled with the non-negligible cost of widespread testing. In the symptomatic sub-population, acknowledging that there is very limited potential benefit for women treated in a large cross-section of treatment facilities, the Work Group valued the modest benefit in terms of treatment and transfer decision-making over the costs of the test for women treated at those select smaller facilities who might benefit. When testing is judiciously applied to those circumstances, the result may

likely alter management. The timeframe of 24 to 34 6/7 weeks gestation was chosen because it represents the period between viability and the point at which particular inventions (e.g., steroid treatment, tocolytics) would be considered. The lower limit of the gestational age testing, which may prompt intervention, should be individualized at each treatment facility, based on the threshold of viability established jointly by the neonatal intensive care unit and obstetric service.

D. Special Considerations

a. High Risk for Preeclampsia

Recommendation

17. For women at risk of preeclampsia, we recommend low dose (e.g., 100-150 mg daily) aspirin therapy initiated at or before 16 weeks gestation.
    (Strong for | Reviewed, New-added)

Discussion

Roberge et al. (2016), through an SR and meta-analysis of RCTs, compared the effect of daily aspirin or placebo during pregnancy.[207] The study, which included 45 RCTs totaling 20,909 pregnant women taking 60-150 mg of aspirin daily, found that low-dose aspirin therapy initiated at or before 16 weeks gestation resulted in a significant reduction in preeclampsia, severe preeclampsia, and fetal growth restriction. A dose response effect was observed with higher dosages of aspirin being associated with greater risk reduction of the three outcomes. In a comparison between 60 mg and 100 mg aspirin daily, there was no significant impact of 60 mg/day of aspirin on the prevalence of preeclampsia, severe preeclampsia, or fetal growth restriction. Initiating 100 mg/day of aspirin before 16 weeks gestation proved to be the most beneficial.

The Block-Abraham et al. (2014) prospective cohort study found that, for some of the women at an increased risk of developing preeclampsia, the risk may not be significant after a stepwise logistic regression, partially due to confounding issues (e.g., DM, hypertension, prior preeclampsia and obesity).[208] Some populations respond better. According to Gan et al. (2016), taking low dose aspirin decreased risk of preeclampsia in both subgroups studied, East Asians and non-East Asians; however, this study did not provide clinically significant information regarding other subpopulations.[209] The Work Group notes the USPSTF recommends low dose aspirin for prevention of preeclampsia in women with risk factors such as history of preeclampsia, multiple gestation, chronic hypertension, or DM.[210]

As this is a *Reviewed, New-added* recommendation, the Work Group systematically reviewed evidence related to this recommendation in the evidence review conducted as part of this guideline update.[208,209] The Work Group determined the confidence in the quality of the evidence was high in support of low dose aspirin therapy for prevention of preeclampsia in women at risk. Other support for this recommendation stemmed from the benefits of this recommendation outweighing the harms. The benefits of taking low dose aspirin outweigh the harms of potential placental abruption, postpartum hemorrhage, or fetal harms such as intracranial bleeding and congenital anomalies. Aspirin in 81 mg strength is widely available in the U.S. over-the-counter or on the VA and DoD formularies. While the dosage and timing of initiation of low-dose aspirin varied across studies, the benefits of taking low dose aspirin outweighed the harms consistently across dosages and timing of initiation. Further research is

indicated for populations with the highest risk of developing preeclampsia. Additional studies examining any long-term effects of fetal exposure to low dose aspirin therapy are needed.

b. High Risk for Preterm Delivery

Recommendation

18. We recommend antenatal progesterone therapy in consultation with an advanced prenatal care provider (e.g., obstetrician or maternal-fetal medicine) for women at high risk for recurrent preterm delivery and who meet the generally accepted inclusion criteria.
(Strong for | Not reviewed, Amended)

Discussion

Studies show that the administration of progesterone intramuscularly or intravaginally beginning early in pregnancy in women at high risk for preterm birth significantly reduces the rate of preterm delivery.[211-213] Specifically, women with a prior spontaneous birth at less than 37 weeks gestation benefit from the administration of progesterone. Progesterone therapy is typically started early in the second trimester and continued until approximately 36 weeks. Both intramuscular 17 alpha-hydroxyprogesterone caproate (250 mg, administered weekly) and vaginal progesterone suppositories (100-200 mg, administered once daily) have been found to be effective.

One RCT (Deeks et al., 2011) found that using a U.S. Food and Drug Administration (FDA) approved formulation of 17 alpha-hydroxyprogesterone caproate intramuscularly (the formulation used in the study was Makena™) significantly reduced preterm delivery at 37, 35, and 32 weeks gestation in singleton pregnancies (not studied in women with multiple gestations). Preterm delivery rates were lower with treatment than with placebo. The benefit of the treatment in reducing the risk of preterm birth was observed in spontaneous deliveries regardless of maternal race. Furthermore, this study indicated a significantly lower rate of adverse neonatal outcomes such as necrotizing enterocolitis, need for supplemental oxygen, birth weight of <2500 g, and intraventricular hemorrhage among infants of women who received 17 alpha-hydroxyprogesterone caproate than among infants of placebo recipients.[214] 17 alpha-hydroxyprogesterone caproate-exposed neonates showed no evidence of detrimental effect in a two to five year follow-up. 17 alpha-hydroxyprogesterone caproate is, at the time of publication, available on VA and DoD formularies. Further research may concentrate on following 17 alpha-hydroxyprogesterone caproate-exposed neonates beyond five years for evidence of detrimental effects.

As this is a *Not reviewed, Amended* recommendation, the Work Group did not systematically review evidence related to this recommendation. Based on the assessment of the quality of the evidence put forth in the 2009 Pregnancy CPG, including peer-reviewed publications [211-213] and a publication from another organization,[204] the Work Group determined confidence in the quality of the evidence was moderate in support of antenatal progesterone therapy for women with a history of preterm delivery who are at risk for subsequent preterm delivery. One publication from another organization that was included in the evidence base for the 2009 CPG [204] has been updated.[205] The support for the strength of this recommendation is based on the significant benefits related to reducing morbidity and mortality that this treatment has for the developing fetus which clearly outweigh any potential harm. No evidence of detrimental effects between birth and five years of age has been found when the fetus was exposed to prenatal progesterone.

c. Over 44 Years of Age

Recommendation

19. We suggest offering women greater than 44 years of age planned delivery at 38 weeks gestational age to reduce the risk of stillbirth.
    (Weak for | Reviewed, New-added)

Discussion

The number of women over the age of 35 having children has increased significantly in the past few decades.[215] Advanced maternal age has been associated with higher rates of late-term stillbirths.[216] Compared with women under 35 years of age, women of advanced maternal age appear to reach late-term stillbirth rates at an earlier gestational age.[217] In addition to the adverse psychological consequences associated with stillbirth, women of advanced maternal age are also less likely to become pregnant again. Alternative methods of management of pregnancy in women ages >35 has often been suggested.[218]

Chaudhary and Contag (2017) found that only mothers over the age of 44 had reduced prenatal mortality risk with immediate delivery at 38 weeks gestation.[219] This moderate quality evidence formed the basis for this recommendation. This retrospective cohort study of over 16 million pregnancies found that the relative risk of stillbirth was decreased in women over the age of 44 (relative risk: 0.35, 95% confidence interval: 0.14-0.90) with planned delivery at 38 weeks compared to expectant management. Authors note that there was a low relative risk of death or complication from immediate delivery at 38 for all mothers. However, the reduction in stillbirth rates only occur in mothers over 44 years. Given the great benefit of avoiding stillbirth, the Work Group decided that a recommendation for immediate delivery at 38 weeks was warranted for women over 44 years.

A second study only examined women between 35 and 44 years of age. Walker et al. (2016) completed an RCT of primigravid mothers 35 to 44 years of age.[220] The primary aim of the study was to determine if planned birth or induction of labor at 39 weeks reduced the risk of neonatal death. This study provided high quality evidence that induction at 39 weeks did not reduce cesarean deliveries rates in primigravid women ages 35-44, and moderate quality evidence that it did not reduce maternal complications or neonatal outcomes.[220] Given that outcomes are similar in this group, patient preference and values should be considered when developing delivery plans for primigravid women aged 35-44 with uncomplicated pregnancies. Patient involvement in decisions about the method of delivery is considered best practice for all pregnancies and was a theme that emerged during the patient focus group (see Patient Focus Group Methods and Findings).

Increased financial costs for monitoring and medical interventions associated with planned induction are outweighed by reducing the highly negative impact of stillbirth. There may be an increase in late-term respiratory complications, although this was not demonstrated in an identified study.[220] Induction needs to be weighed against patient preferences, healthcare costs, and maternal outcomes. Counseling women of advanced maternal age on their risk of stillbirth is important as the trend of advancing age for first and subsequent pregnancies continues.[221]

As this is a *Reviewed, New-added* recommendation, the Work Group systematically reviewed evidence related to this recommendation in the evidence review conducted as part of this guideline update.[219,220] The Work Group determined the confidence in the quality of the evidence was moderate in support of planned delivery in women over the age of 44. There is moderate evidence available to support delivering women greater than 44 years of age at 38 weeks. One retrospective study of moderate quality (Chaudhary and Contag, 2017) found a clear benefit for women over 44 to be delivered at 38 weeks.[219] Our selection criteria also identified one RCT, rated as "Good" per USPSTF criteria, that evaluated women between ages 35-44 planned induction.[220] Findings did not support early induction between the ages of 35-44. The Work Group acknowledges that additional evidence that both supports and contradicts planned induction at advanced maternal ages exists, but was not included in this evidence review. These mixed results did not meet the inclusion criteria for the systematic review conducted for this CPG update. Thus, the Work Group decided upon a "Weak for" recommendation for planned deliveries for women greater than 44 years at 38 weeks.

Further research is recommended to understand the mechanism behind unexplained fetal death in women of advanced maternal age, and to determine the maternal age cut-off that optimizes neonatal outcomes while minimizing maternal risk.

d. History of Bariatric Surgery

Recommendations

20. We suggest that women who have undergone bariatric surgery should be evaluated for nutritional deficiencies and need for nutritional supplementation where indicated (e.g., vitamin B12, folate, iron, calcium).
    (Weak for | Reviewed, New-replaced)

21. For pregnant women who have undergone bariatric surgery, there is insufficient evidence to recommend for or against the routine supplementation of vitamins A, D, E, or K.
    (N/A | Reviewed, New-replaced)

Discussion

The prevalence of obesity has doubled from 1980 to 2008 and some women are becoming pregnant after bariatric surgery.[222] As noted in the VA/DoD Obesity CPG,[16] many non-surgical treatments for obesity are available; however, obese patients are often unable to achieve substantial weight loss. Bariatric surgery has been proven to be an effective treatment for obesity. However, the impact of bariatric surgery on pregnancy has not been well studied. Pregnancies in women after bariatric surgery may need additional care other than routine prenatal care, as unique risks may be present. Bariatric surgeries may create a risk for nutritional deficiencies during pregnancy. Thus, patients may be advised to defer pregnancy for at least 18 months after surgery.

Although obesity is common and utilization of bariatric surgery has been increasing, there is very little high quality evidence to support best practices during pregnancy. In the systematic evidence review conducted for this guideline update, interventions considered for women who have undergone bariatric surgery

[16] See the VA/DoD Clinical Practice Guideline for Screening and Management of Obesity and Overweight. Available at: https://www.healthquality.va.gov/guidelines/CD/obesity/

included nutritional screening, nutritional medicine referrals, nutritional management, and additional micronutrient supplementation.

We suggest that women who have undergone bariatric surgery should be evaluated for nutritional deficiencies, most commonly vitamin B12, folate, iron, and calcium, and need for nutritional supplementation where indicated. The evidence supporting this recommendation was determined to be of low quality due to small sample sizes.[223,224] In addition to size limitations, there was also significant non-compliance with prescribed supplement regimens and heterogeneous bariatric surgery types with some having restrictive versus malabsorptive procedures.[223] There are minimal risks and potential benefits to evaluation and supplementation for vitamin B12, folate, iron, and calcium. Additional limitations to the studies reviewed include vague description of supplementation regimens used.[223]

According to the VA/DoD Obesity CPG, the risk for nutritional deficiencies may vary depending on type of surgery performed. [17] The VA/DoD Obesity CPG states, "Specifically after Roux-en-Y gastric bypass, several nutritional deficiencies are common and supplementation at higher than the usual recommended daily dose may be required. Typical doses of elemental calcium are 1200-1200 mg daily, preferably as calcium citrate which is better absorbed in the absence of gastric acid. The optimal dose of vitamin B12 is not known. While all forms of delivery have been shown to be effective, poor absorption is common and sublingual or intramuscular injection may be required. Iron deficiency is common and typically all patients receive prophylactic therapy in conjunction with vitamin C to enhance absorption."

In studies reviewed, there were no serious adverse events related to evaluation and supplementation. There may be potential benefits that are greater for neonatal outcomes, but study sample sizes did not provide power to demonstrate.

As these are *Reviewed, New-replaced* recommendations, the Work Group systematically reviewed evidence related to these recommendation in the evidence review conducted as part of this guideline update.[223,224] The Work Group determined confidence in the quality of the evidence was low (due to small sample sizes and vague reporting regarding supplementation regimens used) in support of evaluation for nutritional deficiencies and nutritional supplementation where indicated for women who have had bariatric surgery (Recommendation 20). The potential for improvement in neonatal outcomes with evaluation outweighed the potential harm of evaluation, as no serious adverse events were shown in the studies.

For pregnant women who have had prior bariatric surgery, the Work Group determined that there was insufficient evidence identified in the systematic review conducted for this CPG update to recommend for or against the routine supplementation of vitamins A, D, E, or K (Recommendation 21). The quality of evidence was very low.[223,224] When considering whether to monitor or supplement with vitamins A, D, E, or K, there is no evidence to support the ideal amount or route of supplementation or frequency. According to the National Institutes of Health, women who might be pregnant should not take high doses of vitamin A supplements due to risks of potential birth defects.[225]

[17] See the VA/DoD Clinical Practice Guideline for Screening and Management of Obesity and Overweight. Available at: https://www.healthquality.va.gov/guidelines/CD/obesity/

Recommendations

22. We suggest that pregnant women with a history of gastric bypass surgery be evaluated by a surgeon with bariatric expertise.
    (Weak for | Reviewed, Amended)

Discussion

There is limited research related to the nutritional management of the post-operative bariatric patient and of the patient with nutritional risk factors who is pregnant. The systematic evidence review conducted for the update of this CPG identified no evidence-based standardized practices. The VA/DoD Obesity CPG[18] suggests that an "…integrated lifestyle program for the patient should be in place, both prior to and after the surgical procedure, to provide ongoing guidance and support." Additionally, the VA/DoD Obesity CPG goes on to state that lifelong medical surveillance should be established for these patients to evaluate behavioral and nutritional status changes. One prospective study found that laparoscopic adjustable gastric banding prior to pregnancy was safe for both mother and newborn.[226] Another prospective study compared the pregnancy outcomes of women who underwent laparoscopic adjustable gastric banding prior to pregnancy to the pregnancy outcomes of women in the general community and obese women. The outcomes of pregnant women who underweight laparoscopic adjustable gastric banding were similar to women in the general community, rather than to obese women.[227]

Pregnant women who have undergone bariatric surgery should be evaluated by a surgeon with bariatric expertise as early as possible during the pregnancy period. Pregnant women may require evaluation for needed adjustment of the gastric band if appropriate weight gain is not developing or if there is potential band slippage. Pregnancies after laparoscopic gastric banding can result in appropriate maternal and fetal weight gain.[226] Pregnant women may require assessment for weight management complications, such as inadequate weight gain or excessive weight loss, behavioral evaluation, and/or nutritional deficiencies. Appointments with general/bariatric surgeons may not be feasible at all locations and, even when available, limitations include that pregnant women may have to travel for multiple appointments, or see a different provider than the surgeon who performed the surgery. In these cases, the risk must be assessed against the benefit of this consultation.

Pregnant women who have undergone bariatric surgery should establish (or re-establish) care with an RDN to evaluate for adequate nutritional intake and potential nutritional deficiencies. Post-bariatric surgery nutritional deficiencies can be avoided with adequate dietary intake but can be readily addressed and treated when appropriately identified.[228] It is important to note that the VA/DoD Obesity CPG[18] states: "While evidence to support absolute contraindications for bariatric surgery is lacking, expert consensus states that women who are pregnant or who are considering pregnancy in the next 18-24 months should not be considered candidates for bariatric surgery."[229]

As this is a *Reviewed, Amended* recommendation, the Work Group systematically reviewed the evidence identified in the evidence review conducted for this CPG update and considered the assessment of the evidence put forth in the 2009 CPG, which included one publication from another organization.[230] They determined the evidence was of very low quality due to limited evidence and small sample size. However,

[18] See the VA/DoD Clinical Practice Guideline for Screening and Management of Obesity and Overweight. Available at: https://www.healthquality.va.gov/guidelines/CD/obesity/

the potential benefits of avoiding complications outweigh the little potential harm and burden to the patient and provider of being screened. Thus, the strength of this recommendation was determined to be "Weak for."

Appendix A: Evidence Review Methodology

A. Developing the Scope and Key Questions

The CPG Champions, along with the Work Group, were tasked with identifying KQs to guide the SR of the literature on pregnancy. These questions, which were developed in consultation with the Lewin team, addressed clinical topics of the highest priority for the VA and DoD populations. The KQs follow the population, intervention, comparison, outcome, timing and setting (PICOTS) framework for evidence questions, as established by the Agency for Healthcare Research and Quality (AHRQ). Table A-1 provides a brief overview of the PICOTS typology.

Table A-1. PICOTS [231]

P	**Patients, Population, or Problem**	A description of the patients of interest. It includes the condition(s), populations or sub-populations, disease severity or stage, co-occurring conditions, and other patient characteristics or demographics.
I	**Intervention or Exposure**	Refers to the specific treatments or approaches used with the patient or population. It includes doses, frequency, methods of administering treatments, etc.
C	**Comparison**	Describes the interventions or care that is being compared with the intervention(s) of interest described above. It includes alternatives such as placebo, drugs, surgery, lifestyle changes, standard of care, etc.
O	**Outcome**	Describes the specific results of interest. Outcomes can include short, intermediate, and long-term outcomes, or specific results such as quality of life, complications, mortality, morbidity, etc.
(T)	**Timing, if applicable**	Describes the duration of time that is of interest for the particular patient intervention and outcome, benefit, or harm to occur (or not occur).
(S)	**Setting, if applicable**	Describes the setting or context of interest. Setting can be a location (such as primary, specialty, or inpatient care).

The Champions, Work Group, and evidence review team carried out several iterations of this process, each time narrowing the scope of the CPG and the literature review by prioritizing the topics of interest. Due to resource constraints, all developed KQs were not able to be included in the systematic evidence review. Thus, the Champions and Work Group determined which questions were of highest priority, and those were included in the review. Table A-2 contains the final set of KQs used to guide the SR for this CPG.

a. Population(s)

- Pregnant women 18 years or older treated in any VA/DoD primary care setting

b. Interventions

- Key Question 1
  - One-hour GTT
  - Two-hour GTT
  - Three-hour GTT
  - Hemoglobin A1c
  - Fasting blood sugar

- Key Question 2
  - Characteristics present
- Key Question 3

  In women with a history of bariatric surgery:
  - Nutritional screening
  - Nutritional medicine referral
  - Nutritional management
  - Additional micronutrient supplementation
- Key Question 4

  Aneuploidy screening in women presenting for initial prenatal care:
  - Maternal serum screening
  - Non-invasive prenatal screening/testing
  - Ultrasound
  - Amniocentesis (gold standard)
- Key Question 5

  Routine VA/DoD screening methods:
  - Depression: PHQ-9
  - Alcohol Use Disorder: AUDIT-C
  - Biological (e.g., toxicological screens)
- Key Question 6
  - First trimester ultrasound
- Key Question 7
  - Breastfeeding education delivered by provider
  - Prior history of breastfeeding success or failure
  - Breast examination
  - Prior history of breast surgery or augmentation
  - Nipple protrusion
  - Tagged nipples
  - Other physiological characteristics of the breast
  - Presence of depressive symptoms
  - Return to work

- Key Question 8
  - Exercise programs (e.g., aerobic exercise, yoga)
- Key Question 9

  Presence of:
  - Preeclampsia
  - Eclampsia
  - GDM
  - Gestational hypertension
- Key Question 10
  - Antepartum surveillance
  - Planned delivery

c. Comparators

- Key Question 1
  - One-hour GTT followed by a three-hour GTT
- Key Question 2
  - Characteristics absent
- Key Question 3
  - Standard patient management
- Key Question 4
  - Interventions (listed in above section b. Interventions) compared to each other
- Key Question 5

  In pregnant and early (≤6 weeks) postpartum women: Perinatal-specific validated "Gold-standard" screens:
  - Depression
    - EPDS, EPDS-7, and the EPDS-2
    - Postpartum Depression Screening Scale (PDSS)
  - Substance use disorders:
    - T-ACE (Tolerance, Annoyed, Cut down, Eye-opener)
    - TWEAK (Tolerance, Worried, Eye-opener, Amnesia,[K] Cut-down)
    - NET (Normal drinker, Eye-opener, Tolerance)
  - 4P's Plus©

- Key Question 6
  - Date of LMP
- Key Question 7
  - Usual care (e.g., no education, no history obtained, no breast examination, not returning to work)
- Key Question 8
  - Different programs
  - No exercise
- Key Question 9
  - No presence of complications
- Key Question 10
  - Expectant management (watchful waiting)

d. Outcomes

- Key Question 1
  - Diagnosis of GDM
  - Sensitivity, specificity, clinical utility, positive predictive value, negative predictive value
- Key Question 2
  - Preeclampsia
  - Preeclampsia necessitating preterm delivery
  - Recurrence of preeclampsia in woman with history of preeclampsia
- Key Question 3
  - Fetal growth
  - Term delivery versus medically indicated preterm delivery
  - Mode of delivery
  - Maternal nutrition status
  - Hyperemesis gravidarum
  - Neonatal hypoglycemia
  - GDM
  - Macrosomia
  - Shoulder dystocia
- Key Question 4
  - Sensitivity and specificity

  - Positive and negative predictive value
  - Cost
  - Rates of uptake of amniocentesis
  - Impact on patient decision making (including toxic knowledge, decision to continue or terminate pregnancy, decision regarding delivery method)
  - Counseling
  - Other clinical impact
- Key Question 5

  Identification of:
  - Depression
  - Use of alcohol
  - Anxiety
  - Other psychiatric disorders
- Key Question 6
  - Accuracy
  - Avoidance of obstetrical complications (e.g., neonatal intensive care unit admission, induced labor, giving prenatal steroids)
  - Reduction in unnecessary obstetrical interventions
- Key Question 7

  Breastfeeding outcomes:
  - Breastfeeding initiation and exclusive breastfeeding for four months
  - Continuation of breastfeeding for 12 months
  - Number of postnatal consultations for breastfeeding
- Key Question 8
  - Maternal outcomes (e.g., overall health, excess weight gain, weight retention/failure to lose weight as expected after delivery, postpartum recovery, depression, anxiety, measures of general sense of well-being, GDM, mode of delivery)
  - Fetal outcomes (e.g., large or small for gestational age)
- Key Question 9

  Adverse lifetime health outcomes:
  - PTSD
  - DM
  - CVD and/or CVD markers including laboratory markers: cardiac calcium score (Agatston score), C-reactive protein, endothelial intimal thickness

    - Autoimmune disorders (rheumatoid arthritis, lupus, fibromyalgia)
- Key Question 10
    - Stillbirth
    - Maternal complication
        - Gestational hypertension
        - Preeclampsia
        - Mode of delivery
        - Macrosomia
    - Fetal outcomes
        - Fetal growth restrictions
        - Neonatal intensive care unit admission

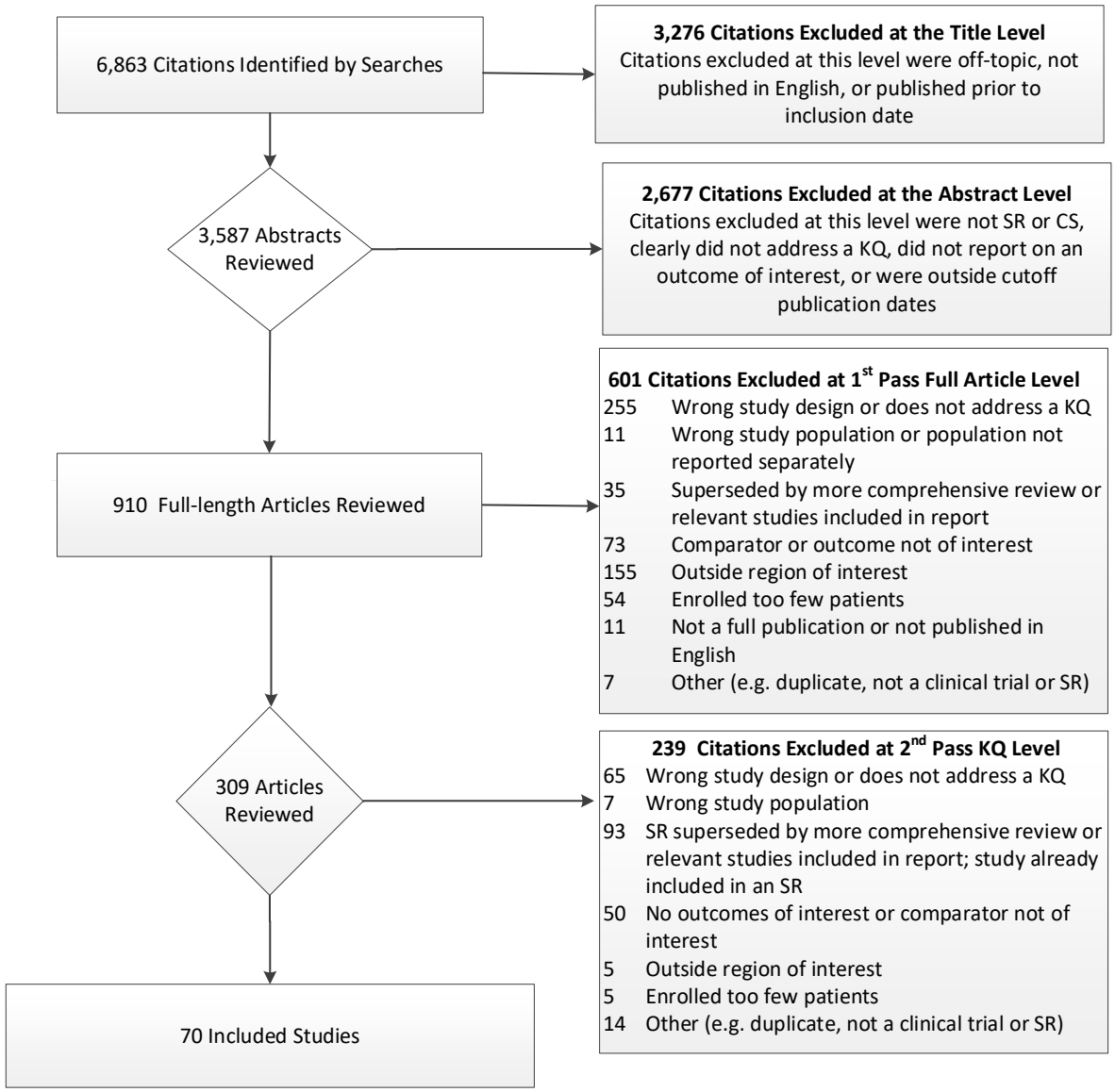
B. Conducting the Systematic Review

Based on the decisions made by the Champions and Work Group members regarding the scope, the KQs, and the PICOTS statements, the Lewin Team produced a systematic review protocol prior to conducting the review. The protocol was reviewed and approved by the Champions and Work Group members. It described in detail the final set of KQs, the methodology to be used during the systematic review process, and the inclusion/exclusion criteria to be applied to each potential study, including, but not limited to, study type, sample size, and PICOTS criteria.

Extensive literature searches identified 6,863 citations potentially addressing the KQs of interest to this evidence review. Of those, 3,276 were excluded upon title review for clearly not meeting inclusion criteria (e.g., not pertinent to the topic, not published in English, published prior to study inclusion publication date, or not a full-length article). Overall, 3,554 abstracts were reviewed with 2,677 of those being excluded for the following reasons: not an SR or an accepted study design (see the General Criteria for Inclusion in Systematic Review and Key Question Specific Criteria), did not address a KQ of interest to this review, did not report on an outcome of interest, or published outside cut-off publication dates. A total of 910 full-length articles were reviewed. Of those, 601 were excluded at a first pass review for the following: not addressing a KQ of interest, not enrolling the population of interest, not meeting inclusion criteria for study design, not meeting inclusion criteria for any KQ, or being a duplicate. A total of 309 full-length articles were thought to address one or more KQs and were further reviewed. Of these, 239 were ultimately excluded. Reasons for their exclusion are presented in Figure A-1 below.

Overall, 70 studies addressed one or more of the KQs and were considered as evidence in this review. Table A-2 indicates the number of studies that addressed each of the questions.

Figure A-1. Study Flow Diagram



Abbreviations: CS: clinical study; KQ: key question; SR: systematic review

Table A-2. Evidence Base for KQs

Question Number	Question	Number of Studies & Type of Studies
1	What is the optimal way to screen for and diagnose GDM in pregnant women a) with or b) without preexisting risk factors?	1 RCT 2 prospective cohort studies
2	What are the characteristics of patients who are more likely to respond to aspirin for prevention of preeclampsia?	2 SRs 2 secondary analyses of RCT data 1 nested case-control study
3	What nutritional interventions improve outcomes for pregnant women who have had bariatric surgery?	2 prospective cohort studies
4	What are the comparative accuracy, clinical utility, and cost of methods of aneuploidy screening?	6 SRs 11 diagnostic accuracy 1 non-RCT
5	In pregnant and early postpartum women, are perinatal survey screens for psychiatric and substance use disorders as effective or more effective as routine screening methods or toxicological screens?	1 RCT 1 cohort study
6	Does first trimester ultrasound to confirm gestational age improve obstetrical outcomes?	3 prospective cohort studies 2 retrospective cohort studies
7	In pregnant women, what factors or interventions impact probability of initiating and continuing breastfeeding?	4 SRs 1 non-RCT 2 cohort studies
8	In pregnant women, what is the impact of exercise frequency, type, and intensity on maternal and fetal outcomes?	8 SRs 2 RCTs
9	In women following childbirth, does presence of pregnancy-related complications predict the risk of adverse lifetime health outcomes?	3 SRs 10 cohort studies 2 case-control studies
10	In pregnant women, at what maternal age and what gestational age should antepartum surveillance and planned delivery be considered?	1 RCT 2 retrospective cohort studies
	Total Evidence Base	**70 studies**

Abbreviations: GDM: gestational diabetes mellitus; RCT: randomized controlled trial; SR: systematic review

a. General Criteria for Inclusion in Systematic Review

- Studies or SRs published on or after January 1, 2008 to February 4, 2017, except as noted below. If multiple SRs addressed a KQ, the most recent and/or comprehensive review was included. SRs were supplemented with clinical studies published subsequent to the SR.
    - An updated search for KQ 9 was done on March 1, 2017, in which pregnancy and synonyms were not included in the search, as it was determined that the original search parameters were too restrictive. We identified one additional systematic review that addressed KQ 9, which was published later than the original date cut-off, and was added to the evidence base for that question.
    - At the face-to-face meeting it was determined that retrospective studies potentially were needed to more fully address KQ 10. Updated searches were conducted up to May 18,

2017. We identified two additional studies that addressed KQ 10 that were added to the evidence base for that question.

- English language publication.
- Publication must have been a full study or SR; abstracts alone were not included. Similarly, letters, editorials, and other publications that were not full-length clinical studies were not accepted as evidence.
- Intervention studies needed to have a treatment or management style and have been a prospective, RCT with an independent control group, unless otherwise noted (see Key Question Specific Criteria below). Crossover trials were not included. The ideal diagnostic study compares clinical outcomes after diagnostic technology evaluation versus clinical evaluation, or compares clinical outcomes linked to different diagnostic technologies. However, non-comparative diagnostic studies that reported a change in management strategy or patient outcomes (e.g., evidence of organic based disease patterns) were included.
- Study must have enrolled at least 20 patients (10 per study group) unless otherwise noted (see Key Question Specific Criteria below).
- Study must have reported on an outcome of interest. Studies must have enrolled a patient population in which at least 80% of patients were pregnant at the time of enrollment. If the percentage was less than 80%, then data must have been reported separately for the patient subgroup.

b. Key Question Specific Criteria

- For KQs 1, 4, and 6, acceptable study designs included SRs of acceptable study designs, RCTs, and diagnostic cohort studies.
- For KQ 4, studies examining cost effectiveness must have been prospective comparisons or cohort studies looking at diagnostic performance of one or more tests and a cost effectiveness analysis. Modeling studies using previously published or retrospectively analyzed data (e.g., from patient registries and/or Medicare payer reports) or studies using published diagnostic performance data to simulate the cost effectiveness of testing in a hypothetical cohort (i.e., no actual patient data incorporated into the model) were excluded.
- For KQs 2, 7, and 9, acceptable study designs included SRs of acceptable study designs, RCTs (if available), large prospective (100 patients per arm) and retrospective (200 patients per arm) cohort studies. Cohort studies must have performed multivariate analyses of the prognostic factors of interest on patient outcomes.
- For KQ2, studies looking at incidental use of aspirin were not included.
- For KQs 3, 8, and 10 acceptable study designs included SRs of RCTs and/or individual RCTs.
- For KQ 5, SRs of acceptable study designs and RCTs were prioritized. If insufficient evidence was available to address the KQ, then large prospective (100 patients per arm) and retrospective (200 patients per arm) cohort studies were considered. Cohort studies must have performed multivariate analyses of the prognostic factors of interest on patient outcomes.

- If insufficient evidence was available to address a KQ, then large prospective (100 patients per arm) non-RCTs were considered. Retrospective analyses were not included.

c. Literature Search Strategy

Information regarding the bibliographic databases, date limits, and platform/provider can be found in

Table A-3, below. Additional information on the search strategies, including topic-specific search terms and search strategies can be found in Appendix F.

Table A-3. Bibliographic Database Information

Name	Date Limits*	Platform/Provider
Cochrane Database of Systematic Reviews (Cochrane Reviews)	January 1, 2008 to February 4, 2017	Wiley
Cochrane Central Register of Controlled Trials	January 1, 2008 to February 4, 2017	Wiley
Database of Abstracts of Reviews of Effects	January 1, 2008 to February 4, 2017	Wiley
EMBASE (Excerpta Medica)	January 1, 2008 to February 4, 2017	Elsevier
Health Technology Assessment Database (HTA)	January 1, 2008 to February 4, 2017	Wiley
MEDLINE/PreMEDLINE	January 1, 2008 to February 4, 2017	Elsevier
PsycINFO	January 1, 2008 to February 4, 2017	OvidSP
PubMed (In-process and Publisher records)	January 1, 2008 to February 4, 2017	National Library of Medicine

*Bibliographic searches were initiated on December 27, 2016 and continued through February 4, 2017.

C. Convening the Face-to-face Meeting

In consultation with the COR, the Champions, and the Work Group, the Lewin Team convened a three and one half day face-to-face meeting of the CPG Champions and Work Group members on May 16 – 19, 2017. These experts were gathered to develop and draft the clinical recommendations for an update to the 2009 Pregnancy CPG. Lewin presented findings from the evidence review in order to facilitate and inform the process.

Under the direction of the Champions, the Work Group members were charged with interpreting the results of the evidence review and were asked to categorize and carry forward recommendations from the 2009 Pregnancy CPG, modifying the recommendations as necessary. The members also developed new clinical practice recommendations not presented in the 2009 Pregnancy CPG based on the 2017 evidence review. The subject matter experts were divided into two smaller subgroups at this meeting.

As the Work Group members drafted clinical practice recommendations, they also assigned a grade for each recommendation based on a modified GRADE and USPSTF methodology. Each recommendation was graded by assessing the quality of the overall evidence base, the associated benefits and harms, the variation in values and preferences, and other implications of the recommendation.

In addition to developing recommendations during the face-to-face meeting, the Work Group members also revised the 2009 Pregnancy CPG algorithms to reflect the new and amended recommendations. They discussed the available evidence as well as changes in clinical practice since 2009, as necessary, to update the algorithms.

D. Grading Recommendations

This CPG uses the GRADE methodology to assess the quality of the evidence base and assign a strength for each recommendation. The GRADE system uses the following four domains to assess the strength of each recommendation: [232]

- Balance of desirable and undesirable outcomes
- Confidence in the quality of the evidence
- Values and preferences
- Other implications, as appropriate, e.g.,:
    - Resource use
    - Equity
    - Acceptability
    - Feasibility
    - Subgroup considerations

The following sections further describe each domain.

Balance of desirable and undesirable outcomes refers to the size of anticipated benefits (e.g., increased longevity, reduction in morbid event, resolution of symptoms, improved quality of life, decreased resource use) and harms (e.g., decreased longevity, immediate serious complications, adverse event, impaired quality of life, increased resource use, inconvenience/hassle) relative to each other. This domain is based on the understanding that the majority of clinicians will offer patients therapeutic or preventive measures as long as the advantages of the intervention exceed the risks and adverse effects. The certainty or uncertainty of the clinician about the risk-benefit balance will greatly influence the strength of the recommendation.

Some of the discussion questions that fall under this domain include:

- Given the best estimate of typical values and preferences, are you confident that the benefits outweigh the harms and burden or vice versa?
- Are the desirable anticipated effects large?
- Are the undesirable anticipated effects small?
- Are the desirable effects large relative to undesirable effects?

Confidence in the quality of the evidence reflects the quality of the evidence base and the certainty in that evidence. This second domain reflects the methodological quality of the studies for each outcome variable. In general, the strength of recommendation follows the level of evidence, but not always, as other domains may increase or decrease the strength. The evidence review used for the development of recommendations, conducted by ECRI, assessed the confidence in the quality of the evidence base using GRADE methodology and assigned a rating of “High,” “Moderate,” “Low,” or “Very Low.”

The elements that go into the confidence in the quality of the evidence include:

- Is there high or moderate quality evidence that answers this question?
- What is the overall certainty of this evidence?

Values and preferences is an overarching term that includes patients' perspectives, beliefs, expectations, and goals for health and life. More precisely, it refers to the processes that individuals use in considering the potential benefits, harms, costs, limitations, and inconvenience of the therapeutic or preventive measures in relation to one another. For some, the term "values" has the closest connotation to these processes. For others, the connotation of "preferences" best captures the notion of choice. In general, values and preferences increase the strength of the recommendation when there is high concordance and decrease it when there is great variability. In a situation in which the balance of benefits and risks are uncertain, eliciting the values and preferences of patients and empowering them and their surrogates to make decisions consistent with their goals of care becomes even more important. A recommendation can be described as having "similar values," "some variation," or "large variation" in typical values and preferences between patients and the larger populations of interest.

Some of the discussion questions that fall under the purview of values and preferences include:

- Are you confident about the typical values and preferences and are they similar across the target population?
- What are the patient's values and preferences?
- Are the assumed or identified relative values similar across the target population?

Other implications consider the practicality of the recommendation, including resource use, equity, acceptability, feasibility and subgroup considerations. Resource use is related to the uncertainty around the cost-effectiveness of a therapeutic or preventive measure. For example statin use in the frail elderly and others with multiple co-occurring conditions may not be effective and, depending on the societal benchmark for willingness to pay, may not be a good use of resources. Equity, acceptability, feasibility, and subgroup considerations require similar judgments around the practically of the recommendation.

The framework below (Table A-4) was used by the Work Group to guide discussions on each domain.

Table A-4. GRADE Evidence to Recommendation Framework

Decision Domain	Questions to Consider	Judgment
Balance of desirable and undesirable outcomes	▪ Given the best estimate of typical values and preferences, are you confident that the benefits outweigh the harms and burden or vice versa? ▪ Are the desirable anticipated effects large? ▪ Are the undesirable anticipated effects small? ▪ Are the desirable effects large relative to undesirable effects?	▪ Benefits outweigh harms/burden ▪ Benefits slightly outweigh harms/ burden ▪ Benefits and harms/burden are balanced ▪ Harms/burden slightly outweigh benefits ▪ Harms/burden outweigh benefits
Confidence in the quality of the evidence	▪ Is there high or moderate quality evidence that answers this question? ▪ What is the overall certainty of this evidence?	▪ High ▪ Moderate ▪ Low ▪ Very low
Values and preferences	▪ Are you confident about the typical values and preferences and are they similar across the target population? ▪ What are the patient's values and preferences? ▪ Are the assumed or identified relative values similar across the target population?	▪ Similar values ▪ Some variation ▪ Large variation
Other implications (e.g., resource use, equity, acceptability, feasibility, subgroup considerations)	▪ Are the resources worth the expected net benefit from the recommendation? ▪ What are the costs per resource unit? ▪ Is this intervention generally available? ▪ Is this intervention and its effects worth withdrawing or not allocating resources from other interventions? ▪ Is there lots of variability in resource requirements across settings?	▪ Various considerations

The strength of a recommendation is defined as the extent to which one can be confident that the desirable effects of an intervention outweigh its undesirable effects and is based on the framework above, which combines the four domains.[233] GRADE methodology does not allow for recommendations to be made based on expert opinion alone. While strong recommendations are usually based on high or moderate confidence in the estimates of effect (quality of the evidence) there may be instances where strong recommendations are warranted even when the quality of evidence is low.[232] In these types of instances where the balance of desirable and undesirable outcomes and values and preferences played large roles in determining the strength of a recommendation, this is explained in the discussion section for the recommendation.

The GRADE of a recommendation is based on the following elements:

- Four decision domains used to determine the strength and direction (described above)
- Relative strength (Strong or Weak)
- Direction (For or Against)

The relative strength of the recommendation is based on a binary scale, "Strong" or "Weak." A strong recommendation indicates that the Work Group is highly confident that desirable outcomes outweigh undesirable outcomes. If the Work Group is less confident of the balance between desirable and undesirable outcomes, they present a weak recommendation.

Similarly, a recommendation for a therapy or preventive measure indicates that the desirable consequences outweigh the undesirable consequences. A recommendation against a therapy or preventive measure indicates that the undesirable consequences outweigh the desirable consequences.

Occasionally, instances may occur when the Work Group feels there is insufficient evidence to make a recommendation for or against a particular therapy or preventive measure. This can occur when there is an absence of studies on a particular topic that met evidence review inclusion criteria, studies included in the evidence review report conflicting results, or studies included in the evidence review report inconclusive results regarding the desirable and undesirable outcomes.

Using these elements, the grade of each recommendation is presented as part of a continuum:

- Strong For (or "We recommend offering this option …")
- Weak For (or "We suggest offering this option …")
- No recommendation for or against (or "There is insufficient evidence…")
- Weak Against (or "We suggest not offering this option …")
- Strong Against (or "We recommend against offering this option …")

Note that weak (For or Against) recommendations may also be termed "Conditional," "Discretionary," or "Qualified." Recommendations may be conditional based upon patient values and preferences, the resources available, or the setting in which the intervention will be implemented. Recommendations may be at the discretion of the patient and clinician or they may be qualified with an explanation about the issues that would lead decisions to vary.

E. Recommendation Categorization

a. Recommendation Categories and Definitions

A set of recommendation categories was adapted from those used by NICE.[27,28] These categories, along with their corresponding definitions, were used to account for the various ways in which recommendations could have been updated from the 2009 Pregnancy CPG. The categories and definitions can be found in Table A-5.

Table A-5. Recommendation Categories and Definitions

Evidence Reviewed*	Recommendation Category*	Definition*
Reviewed	New-added	New recommendation following review of the evidence
	New-replaced	Recommendation from previous CPG that has been carried over to the updated CPG that has been changed following review of the evidence
	Not changed	Recommendation from previous CPG that has been carried forward to the updated CPG where the evidence has been reviewed but the recommendation is not changed
	Amended	Recommendation from the previous CPG that has been carried forward to the updated CPG where the evidence has been reviewed and a minor amendment has been made
	Deleted	Recommendation from the previous CPG that has been removed based on review of the evidence
Not reviewed	Not changed	Recommendation from previous CPG that has been carried forward to the updated CPG, but for which the evidence has not been reviewed
	Amended	Recommendation from the previous CPG that has been carried forward to the updated CPG where the evidence has not been reviewed and a minor amendment has been made
	Deleted	Recommendation from the previous CPG that has been removed because it was deemed out of scope for the updated CPG

*Adapted from the NICE guideline manual (2012) [27] and Garcia et al. (2014) [28]
Abbreviation: CPG: clinical practice guideline

b. Categorizing Recommendations with an Updated Review of the Evidence

Recommendations were first categorized by whether or not they were based on an updated review of the evidence. If evidence had been reviewed, recommendations were categorized as "New-added," "New-replaced," "Not changed," "Amended," or "Deleted."

"Reviewed, New-added" recommendations were original, new recommendations that were not in the 2009 Pregnancy CPG. "Reviewed, New-replaced" recommendations were in the previous version of the guideline, but were modified to align with the updated review of the evidence. These recommendations could have also included clinically significant changes to the previous version. Recommendations categorized as "Reviewed, Not changed" were carried forward from the previous version of the CPG unchanged.

To maintain consistency between 2009 recommendations, which were developed using the USPSTF methodology, and 2018 recommendations, which were developed using the GRADE methodology, it was necessary to modify the 2009 recommendations to include verbiage to signify the strength of the recommendation (e.g., "We recommend," "We suggest"). Because the 2009 recommendations inherently needed to be modified at least slightly to include this language, the "Not changed" category was not used. For recommendations carried forward to the updated CPG with review of the evidence and slightly modified wording, the "Reviewed, Amended" recommendation category was used. This allowed for the wording of the recommendation to reflect GRADE methodology as well as for any other non-substantive (i.e., not clinically meaningful) language changes deemed necessary. The evidence used to support these

recommendations was carried forward from the previous version of the CPG and/or was identified in the evidence review for the update.

Recommendations could have also been designated "Reviewed, Deleted." These were recommendations from the previous version of the CPG that were not brought forward to the updated guideline after review of the evidence. This occurred if the evidence supporting the recommendations was out of date, to the extent that there was no longer any basis to recommend a particular course of care and/or new evidence suggests a shift in care, rendering recommendations in the previous version of the guideline obsolete.

c. Categorizing Recommendations without an Updated Review of the Evidence

There were also cases in which it was necessary to carry forward recommendations from the previous version of the CPG without an updated SR of the evidence. Due to time and budget constraints, the update of the Pregnancy CPG could not review all available evidence on management of pregnancy, but instead focused its KQs on areas of new or updated scientific research or areas that were not previously covered in the CPG.

For areas of research that have not changed, and for which recommendations made in the previous version of the guideline were still relevant, recommendations could have been carried forward to the updated guideline without an updated SR of the evidence. The support for these recommendations in the updated CPG was thus also carried forward from the previous version of the CPG. These recommendations were categorized as "Not reviewed." If evidence had not been reviewed, recommendations could have been categorized as "Not changed," "Amended," or "Deleted."

"Not reviewed, Not changed" recommendations refer to recommendations from the previous version of the Pregnancy CPG that were carried forward unchanged to the updated version. The category of "Not reviewed, Amended" was used to designate recommendations which were modified from the 2009 Pregnancy with the updated GRADE language, as explained above.

Recommendations could also have been categorized as "Not reviewed, Deleted" if they were determined to be out of scope. A recommendation was out of scope if it pertained to a topic (e.g., population, care setting, treatment, and condition) outside of the scope for the updated CPG as defined by the Work Group.

The categories for the recommendations included in the 2018 version of the guideline are noted in the Recommendations. The categories for the recommendations from the 2009 Pregnancy CPG are noted in Appendix D.

F. Drafting and Submitting the Final Clinical Practice Guideline

Following the face-to-face meeting, the Champions and Work Group members were given writing assignments to craft discussion sections to support each of the new recommendations and/or to update discussion sections from the 2009 Pregnancy CPG to support the amended "carried forward" recommendations. The Work Group also considered tables, appendices, and other sections from the 2009 Pregnancy CPG for inclusion in the update. During this time, the Champions and Work Group also made additional revisions to the algorithms, as necessary.

After developing the initial draft of the updated CPG, an iterative review process was used to solicit feedback on and make revisions to the CPG. Once they were developed, the first two drafts of the CPG were posted on a wiki website for a period of 14-20 business days for internal review and comment by the Work Group. All feedback submitted during each review period was reviewed and discussed by the Work Group and appropriate revisions were made to the CPG.

Draft 3 of the CPG was made available for peer review and comment. This process is described in the section titled Peer Review Process. After revisions were made based on the feedback received during the peer review and comment period, the Champions presented the CPG to the EBPWG for their approval. Changes were made based on feedback from the EBPWG and the guideline was finalized.

The Work Group also produced a set of guideline toolkit materials which included a provider summary, pocket card, and patient summary. The final 2018 Pregnancy CPG was submitted to the EBPWG in March 2018.

Appendix B: Patient Focus Group Methods and Findings

A. Methods

As part of the effort to update this CPG, the VA and DoD Leadership held two patient focus groups. The first was held on December 1, 2016 at the Washington DC VA Medical Center in Washington, DC. The second was held on February 2, 2017 at Malcolm Grow Medical Clinics and Surgery Center at Joint Base Andrews, MD. The aim of the focus groups was to further understand and incorporate the perspective of patients covered and/or receiving their care through the VA and/or DoD healthcare systems during their pregnancy and perinatal period, as patients are most affected by the recommendations put forth in the CPG. The focus groups delved into the patients' perspectives on a set of topics related to their pregnancy care, including their priorities, challenges they have experienced, and the information they received regarding their pregnancy care, as well as the impacts of their pregnancy and their pregnancy care on their lives.

Participants for the focus group were recruited by VA and DoD Leadership as well as by the Pregnancy CPG Champions. Patient focus group participants were not designed to be a representative sample of VA and DoD pregnant patients. However, recruitment focused on eliciting a range of perspectives likely to be relevant and informative in the guideline development process. Patients were not incentivized for their participation or reimbursed for travel expenses.

The Pregnancy CPG Champions and Work Group, with support from Lewin, developed a set of questions to help guide the focus group. The focus group facilitator led the discussion using the previously prepared questions as a general guide to elicit the most important information from the patients regarding their experiences and views about their treatment and overall care. Given the limited time and the range of interests of the focus group participants, not all of the listed questions were addressed.

Four patients participated in the focus groups with two patients participating in each session. Two participants had received care through the DoD healthcare system and two received care from community providers through the VA.

B. Patient Focus Group Findings

a. Recognize the importance of a support network throughout pregnancy, including as a trusted source of information specific to a patient's unique pregnancy experience (e.g., as a first-time parent or Active Duty Service Member)

- Patients, particularly those receiving care through the DoD, seemed to lack a network that they could trust and rely upon for support, leaving them with a sense of isolation. They indicated that support groups organized through the VA and DoD could be helpful in providing this network.
- Patients desired more information about their unique experience of being pregnant, e.g., as a first-time parent or an Active Duty Service Member of the military, that could help them feel prepared throughout their pregnancy and when their baby arrived.
- Patients valued the support they received from their families, friends, and colleagues during their pregnancy, and advised offering more formal support groups to enhance the patients' networks and share information.

b. Provide information regarding general pregnancy care to the patient in a timely manner and in a way that is responsive to the patients' goals, values, and preferences

- Patients desired reliable sources of information related to pregnancy, including information regarding their health and the health of their babies during pregnancy.
- Patients appreciated variation in the comprehensiveness, portability, and connectivity of multiple sources of information that could be useful in different circumstances (e.g., handbook, mobile application, and pamphlet).
- Patients appreciated the information they received regarding general pregnancy care, but noted that more information was needed regarding their specific situations (e.g., as a Veteran, Active Duty Service Member, or beneficiary of a Service Member).

c. Provide comprehensive, understandable information regarding covered services to the patient and help the patient navigate that information and answer questions as needed

- Patients desired formal, reliable and easy to navigate sources of information related to pregnancy, including comprehensive information regarding their covered services.
- Patients noted limitations and inconsistency in VA/DoD coverage of pregnancy-related services and supplies based on the information available to them and encouraged considering expansions in this coverage.

d. Recognize the importance of the relationship between the patient and her provider and care team and the necessity for the patient to have consistency in this relationship and her access to care

- Patients valued open and trusting relationships with familiar pregnancy healthcare providers and care teams.
- Patients valued the consistency in their relationships with their providers throughout their pregnancies and deliveries.
- Patients recognized the importance of a discussion regarding contingency plans in the event of a sudden or precipitous delivery necessitating an unfamiliar provider and wanted reassurance that their care would still be carried out smoothly.

e. Ensure that the family is involved in the pregnancy in accordance with patient preferences and recognize the differences among families in structure and composition

- Patients expressed the desire for their family to be involved in their pregnancy and for their providers and care teams to support their preferences regarding involving family members in their care.
- Patients noted differences in structure and composition across families and the need for VA and DoD healthcare services to recognize and appreciate these differences as they deliver care for pregnant women and their families.

f. Ensure that patients know the options for pediatric healthcare and day care early in their pregnancy and provide information so that they can feel secure in their planning

- Patients did not receive adequate formal information regarding pediatric care for their newborns or how to identify healthcare providers for their children.
- Patients were not aware of the day care options available and advised that this topic be broached early in a patient's pregnancy to allow adequate time to plan.

g. Improve communication and information sharing between VA and community providers to ensure patients receive the individualized care they need without undue stress

- Patients stressed the need for improved communication and information sharing (e.g., billing information, medical records) between the VA and the community providers under the Choice Program.
- Patients valued their care from the community providers, but indicated that community providers need to be better educated regarding military culture and potential exposures that could impact the health of Veterans and military personnel.
- Patients recognized the importance of their geographic location in receiving their care as planned during their delivery and valued the planning and communication needed to adjust the birth plan as needed during their deliveries.

Appendix C: Evidence Table

Recommendation	2009 Grade[1]	Evidence[2]	Strength of Recommendation[3]	Recommendation Category[4]
1. We suggest offering a group model of prenatal care as an acceptable alternative to individual provider appointments.	A	[74,75] **Additional References:** [76]	Weak for	Not reviewed, Amended
2. We recommend that all healthy, pregnant women without known contraindications participate in regular mild to moderate exercise sessions, three or more times per week.	A	[77-82,84,85,87] **Additional References:** [83,86]	Strong for	Reviewed, Amended
3. We suggest that women with uncomplicated pregnancies continue a standard work schedule throughout their pregnancy.	B	[88-92] **Additional References:** [93]	Weak for	Not reviewed, Amended
4. We recommend folic acid (at least 400 micrograms daily) to be taken starting one month before conception and continued throughout pregnancy and breastfeeding.	A, A	[57,58,94,97,98,101-103] **Additional References:** [59,60,95,96,99,100]	Strong for	Not reviewed, Amended

[1] The 2009 VA/DoD Pregnancy CPG used the USPSTF evidence grading system (http://www.uspreventiveservicestaskforce.org). Inclusion of more than one 2009 Grade indicates that more than one 2009 CPG recommendation is covered under the 2018 recommendation. The strength of recommendations were rated as follows: A- a strong recommendation that the clinicians provide the intervention to eligible patients; B- a recommendation that clinicians provide (the service) to eligible patients; C- no recommendation for or against the routine provision of the intervention is made; D- recommendation is made against routinely providing the intervention; I- the conclusion is that the evidence is insufficient to recommend for or against routinely providing the intervention. "Not applicable" indicates that the 2018 Pregnancy CPG recommendation was a new recommendation, and therefore does not have an associated 2009 Grade.

[2] The first set of references listed in each row in the evidence column constitutes the evidence base for the recommendation. To be included in the evidence base for a recommendation, a reference needed to be identified through the 2017 evidence review or included in the evidence base for the 2009 VA/DoD Pregnancy CPG. The second set of references in the evidence column (called "Additional References") includes references that provide additional information related to the recommendation, but which were not systematically identified through a literature review. These references were not included in the evidence base for the recommendation and therefore did not influence the strength and direction of the recommendation.

[3] Refer to the Grading Recommendations section for more information on how the strength of the recommendation was determined using GRADE methodology.

[4] Refer to the Recommendation Categorization section for more information on the description of the categorization process and the definition of each category.

Recommendation	2009 Grade[1]	Evidence[2]	Strength of Recommendation[3]	Recommendation Category[4]
5. We recommend screening for use of tobacco, alcohol, illicit drugs, and unauthorized use of prescription medication because their use is common and can result in adverse outcomes. For women who screen positive, we recommend additional evaluation and treatment (see VA/DoD Clinical Practice Guidelines for the Management of Substance Use Disorders[1] and the Management of Tobacco Use[2]).	A, A, B, B, C, C	[118-128] **Additional References:** [104-117,129]	Strong for	Reviewed, Amended
6. We recommend screening for depression using a standardized tool such as the Edinburgh Postnatal Depression Scale or the 9-item Patient Health Questionnaire periodically during pregnancy and postpartum.	B, B	[132] **Additional References:** [130,131]	Strong for	Reviewed, New-replaced
7. We recommend breastfeeding education, assessment, and support to all pregnant women and their families at the first visit and throughout the pregnancy and postpartum period using open-ended questions such as "What do you know about breastfeeding?"	B, B, C, B, B	[136-138] **Additional References:** [133-135]	Strong for	Reviewed, New-replaced
8. We suggest making prenatal diagnostic testing for aneuploidy available to all pregnant women.	B, B, I	[139,143-148] **Additional References:** [140-142]	Weak for	Reviewed, New-replaced
9. We recommend offering prenatal screening for aneuploidy and the most common clinically significant genetic disorders to all pregnant women. When aneuploidy screening is desired, cell-free fetal DNA screening should be considered; however, screening test selection should be individualized and take into account the patient's age, baseline aneuploidy risk, and test performance for a given condition.	I, B	[149-154]	Strong for	Reviewed, New-replaced
10. We suggest the two-step process (one-hour oral glucose challenge test followed by three-hour oral glucose tolerance test) to screen for gestational diabetes mellitus at 24-28 weeks gestation for all pregnant women.	B, B, C, B, C, C	[155-157,160-162,234-237] **Additional References:** [158,159,163,164]	Weak for	Reviewed, New-replaced

[1] See the VA/DoD Clinical Practice Guideline for the Management of Substance Use Disorders. Available at: https://www.healthquality.va.gov/guidelines/mh/sud/

[2] See the Clinical Practice Guideline for the Management of Tobacco Use. Available at: https://www.healthquality.va.gov/CPGArchives.asp

Recommendation	2009 Grade[1]	Evidence[2]	Strength of Recommendation[3]	Recommendation Category[4]
11. We recommend first-trimester ultrasound to establish or confirm the gestational age and estimated birth date, identify multiple pregnancies, and confirm the presence of cardiac activity. – For pregnant women who present after the first trimester, we suggest performing a dating and anatomical ultrasound at the earliest opportunity, preferably prior to 22 weeks.	B, B, B, B	[165,166]	Strong for	Reviewed, New-replaced
12. We recommend offering scheduled delivery to women who reach 41 weeks and 0/7 days undelivered. Antepartum fetal testing should begin at 41 weeks and 0/7 days if not scheduled for delivery.	A, C	[171-174] **Additional References:** [167-170]	Strong for	Reviewed, Amended
13. For pregnant women who have a past or current history of gestational diabetes mellitus, hypertension, or preeclampsia, we recommend documenting the reproductive history and making women aware of the increased lifetime risks of cardiovascular disease and/or diabetes.	Not applicable	[175-189] **Additional References:** [190]	Strong for	Reviewed, New-added
14. We suggest that pregnant women with an unexplained elevation of maternal serum alpha-fetoprotein be evaluated and counseled by a qualified obstetric provider due to increased risk for adverse perinatal outcomes.	B	[139,191,192] **Additional References:** [140,193-195]	Weak for	Not reviewed, Amended
15. We recommend against routine screening for preterm delivery using the fetal fibronectin test in asymptomatic women.	D	[196-198,201-204] **Additional References:** [199,200,205,206]	Strong against	Not reviewed, Amended
16. We recommend considering the use of fetal fibronectin testing as a part of the evaluation strategy in women between 24 and 34 6/7 weeks gestation with signs and symptoms of preterm labor, particularly in facilities where the result might affect management of delivery.	B	[196-198,201-204] **Additional References:** [199,200,205,206]	Strong for	Not reviewed, Amended
17. For women at risk of preeclampsia, we recommend low dose (e.g., 100-150 mg daily) aspirin therapy initiated at or before 16 weeks gestation.	Not applicable	[207-209] **Additional References:** [210]	Strong for	Reviewed, New-added

Recommendation	2009 Grade[1]	Evidence[2]	Strength of Recommendation[3]	Recommendation Category[4]
18. We recommend antenatal progesterone therapy in consultation with an advanced prenatal care provider (e.g., obstetrician or maternal-fetal medicine) for women at high risk for recurrent preterm delivery and who meet the generally accepted inclusion criteria.	B, B, C	[204,211-213] **Additional References:** [205,214]	Strong for	Not reviewed, Amended
19. We suggest offering women greater than 44 years of age planned delivery at 38 weeks gestational age to reduce the risk of stillbirth.	Not applicable	[219,220] **Additional References:** [215-218,221]	Weak for	Reviewed, New-added
20. We suggest that women who have undergone bariatric surgery should be evaluated for nutritional deficiencies and need for nutritional supplementation where indicated (e.g., vitamin B12, folate, iron, calcium).	C	[223,224] **Additional References:** [222,225]	Weak for	Reviewed, New-replaced
21. For pregnant women who have undergone bariatric surgery, there is insufficient evidence to recommend for or against the routine supplementation of vitamins A, D, E, or K.	C	[223,224] **Additional References:** [222,225]	N/A	Reviewed, New-replaced
22. We suggest that pregnant women with a history of gastric bypass surgery be evaluated by a surgeon with bariatric expertise.	C	[230] **Additional References:** [61,226-229]	Weak for	Reviewed, Amended

Appendix D: 2009 Recommendation Categorization Table

2009 Location[1]			2009 Recommendation Text[2]	2009 Grade[3]	Recommendation Category[4]	2018 Recommendation[5]
Section	Number	Page				
A-0	1	12	Goal-oriented prenatal care system can be delivered to all pregnant women.	B	Not reviewed, Deleted	
A-0	2	12	Education should be a central component of prenatal care for all pregnant women.	B	Not reviewed, Deleted	
A-0	3	12	Group model of prenatal care, such as the Centering Pregnancy® model, is an acceptable alternative to individual provider appointments.	A	Not reviewed, Amended	Recommendation 1
A-2	1	14	Initial assessment by nurse may include the following actions: a. Assure the patient completes the Self-Questionnaire (see Appendix B - Screening Items for Self-Administered Questionnaire – First Visit) b. Review the patient's completed Self-Questionnaire for issues requiring immediate evaluation or intervention (see Appendix B - Screening Items for Self-Administered Questionnaire – First Visit) c. Obtain initial prenatal lab tests to be reviewed and documented at the following visit d. Consult with an advanced prenatal care provider regarding advice or instruction to the patient if there are immediate needs (see Table-1) e. Arrange immediate referral to advanced prenatal care for follow-up in cases needing short-term assessment or intervention (see Table-1) f. Provide brief information about options for screening for fetal chromosomal abnormalities and arrange for counseling (See I-36) g. Arrange follow-up with the appropriate provider at 10-12 weeks.	None	Not reviewed, Deleted	
A-3	1	16	At the first provider visit, a complete medical history and physical examination (including thyroid, breast and pelvic examination) should be obtained. Information from the previous visit(s) and laboratory studies should be reviewed and significant problems/risks should be assessed.	None	Not reviewed, Deleted	

[1] The first three columns indicate the location of each recommendation within the 2009 VA/DoD Pregnancy CPG.
[2] The 2009 Recommendation Text column contains the wording of each recommendation from the 2009 VA/DoD Pregnancy CPG.
[3] The 2009 VA/DoD Pregnancy CPG used the U.S. Preventive Services Task Force (USPSTF) evidence grading system: http://www.uspreventiveservicestaskforce.org. The strength of recommendations were rated as follows: A- a strong recommendation that the clinicians provide the intervention to eligible patients; B- a recommendation that clinicians provide (the service) to eligible patients; C- no recommendation for or against the routine provision of the intervention is made; D- recommendation is made against routinely providing the intervention; I- the conclusion is that the evidence is insufficient to recommend for or against routinely providing the intervention. "None" indicates there was no grade assigned to the recommendation in the 2009 Pregnancy CPG.
[4] The Recommendation Category column indicates the way in which each 2009 Pregnancy CPG recommendation was updated.
[5] For recommendations that were carried forward to the 2018 VA/DoD Pregnancy CPG, this column indicates the new recommendation(s) to which they correspond.

2009 Location[1]			2009 Recommendation Text[2]	2009 Grade[3]	Recommendation Category[4]	2018 Recommendation[5]
Section	Number	Page				
A-3	2	16	At the first provider visit, the provider should outline an individualized plan of prenatal care that includes guideline-based routine prenatal care and consultation with advanced prenatal care providers or other medical specialty care services if needed.	None	Not reviewed, Deleted	
A-3	3	16	The following are conditions not addressed by this guideline that will require supplemental care that might be best provided by routine or advanced obstetric care providers and/or behavioral health providers depending on the individual circumstances and local conditions: – Current mental illness requiring medical therapy – Substance use disorders – Eating disorders.	None	Not reviewed, Deleted	
A-3	4	16	The following are among conditions that require supplemental prenatal care or consultation with or referral to an advanced prenatal care provider (Table 2): a. General – Body mass index (BMI) <16.5 or >30 – Age (<16 or > 34 years at delivery) – At risk for diabetes b. Infections: – Hepatitis B or C (see I-11) – Human Immunodeficiency virus (HIV) – Syphilis (positive RPR) – Cytomegalovirus (CMV) – Toxoplasmosis – Primary Herpes – Rubella – Parvovirus – Positive gonorrhea (see I-29) – Positive Chlamydia (see I-30) – Genital herpes (see I-32) – Recurrent urinary tract infections/stones	None	Reviewed, Deleted	

2009 Location[1]			2009 Recommendation Text[2]	2009 Grade[3]	Recommendation Category[4]	2018 Recommendation[5]
Section	Number	Page				
A-3 cont.	4	16	c. Pre-existing medical conditions: – Abnormal pap smear (see I-31) – Controlled hypothyroidism – Previous gastric bypass/bariatric surgery (see I-28) – Mild depression (I- 21 & 34) – Cardiovascular disease – High blood pressure – Familial hyperlipidemia – Pregestational diabetes – Kidney disease (including pyelonephritis) – Inflammatory bowel disease – Bronchio pulmonary disease including asthma – Autoimmune diseases including Anticardiolipin Antibody Syndrome, and Systemic Lupus Erythematosis – Thromboembolic disease, current or historical – Cancer – Seizure disorders – Hematologic disorders (including anemia, thrombocytopenia) – Genetic disease with known effect on pregnancy d. Obstetric conditions: – Vaginal bleeding – Isoimmunization – Placenta previa—symptomatic or present beyond 28 weeks – Placental abruption – At risk for preterm birth (see A-4) – Prior cesarean section (see I-39) – Previous uterine or cervical surgery – Intrauterine fetal demise – Preterm labor – Preterm ruptured membranes – Recurrent pregnancy loss – Suspected or documented fetal growth abnormalities (intrauterine growth restriction [IUGR] or macrosomia) – Abnormalities of amniotic fluid including oligohydramnios, polyhydramnios – Fetal anomaly(s) – Multiple gestation – Surgical condition during pregnancy (e.g., appendectomy, ovarian cystectomy, cerclage)			

2009 Location[1]			2009 Recommendation Text[2]	2009 Grade[3]	Recommendation Category[4]	2018 Recommendation[5]
Section	Number	Page				
A-4	1	21	Women should be assessed for preterm birth risk as early as possible in the pregnancy in order to optimize maternal and newborn outcomes.	None	Not reviewed, Deleted	
A-4	2	21	Screening for preterm birth risk factors should continue up to 37 weeks estimated gestational age.	None	Not reviewed, Deleted	
A-4	3	21	Women at increased risk but meeting the criteria for normal surveillance should have the risk factor(s) documented in the medical record to increase awareness of the risk but may continue to be followed in accordance with the routine management of the pregnancy guideline.	None	Not reviewed, Deleted	
A-4	4	21	Routine care providers should consult with an advanced prenatal care provider whenever a woman meets the criteria for increased surveillance for preterm birth.	None	Not reviewed, Deleted	
A-4	5	21	Women requiring increased surveillance should be considered for ancillary studies and other additional intervention. Progesterone supplementation should be considered in these women (see A-4).	None	Not reviewed, Deleted	
A-4	6	21	Routine screening of fetal fibronectin (fFN) in asymptomatic or low-risk women is not recommended (see I-52). fFN testing in symptomatic or high-risk women between 24 and 34 6/7 weeks' gestation may be useful in guiding management.	None	Not reviewed, Deleted	
A-4	7	21	The measurement of cervical length by transvaginal ultrasound may be useful in some patients requiring increased surveillance for preterm labor. Sonographic cervical length measurement is not recommended as a routine screening or prediction tool in women only requiring normal surveillance.	None	Not reviewed, Deleted	
A-4	8	21	The determination of salivary estriol levels, bacterial vaginosis screening and home uterine activity monitoring are not recommended as a means to predict preterm birth.	None	Not reviewed, Deleted	
A-4	9	21	It is reasonable to offer antenatal progesterone therapy to women at high-risk for preterm delivery and who meet the generally accepted inclusion criteria.	B	Not reviewed, Amended	Recommendation 18
A-4	10	21	Progesterone may be administered intramuscularly on a weekly basis or intravaginally on a daily basis.	B	Not reviewed, Amended	Recommendation 18
A-4	11	21	Progesterone therapy should only be initiated after consultation with an advanced prenatal care provider (obstetrician or maternal-fetal medicine specialist).	C	Not reviewed, Amended	Recommendation 18

2009 Location[1]			2009 Recommendation Text[2]	2009 Grade[3]	Recommendation Category[4]	2018 Recommendation[5]
Section	Number	Page				
A-7	1	24	The following should be included in the postpartum visit: – Pelvic and breast examinations. [B] – Cervical smear should be completed as indicated by cervical cancer screening guidelines (see I-31). [A] – Initiate or continue the HPV vaccine series for women age < 26 years (see I-50). [C] – Screening for postpartum depression (see I-21). [B] – Screening for domestic violence (see I-20). [B] – Diabetes testing for patients with pregnancies complicated by gestational diabetes. The two-hour 75g oral glucose tolerance test (GTT) is recommended but a fasting glucose can also be done. [B] – Education about contraception, infant feeding method, sexual activity, weight, exercise and the woman's assessment of her adaptation to motherhood. Pre-existing or chronic medical conditions should be addressed with referral for appropriate follow-up as indicated. [I]	B, A, C, B, B, B, I	Not reviewed, Deleted	
I-1	1	29	Recommend measuring blood pressure of all pregnant women at each prenatal visit, following the guidelines of the National High Blood Pressure Education Program and the VA/DoD Clinical Practice Guidelines for Hypertension.	B	Not reviewed, Deleted	
I-1	2	29	Women diagnosed with hypertension during pregnancy should be managed by, or in consultation with, an advanced prenatal care provider.	C	Not reviewed, Deleted	
I-1	3	29	Korotkoff 5 sound (disappearance of sound) will be used to determine the diastolic pressure.	C	Not reviewed, Deleted	
I-2	1	30	Recommend offering breastfeeding education to all pregnant women during the first visit with the provider.	B	Reviewed, New-replaced	Recommendation 7
I-2	2	30	Recommend asking pregnant women, "What do you know about breastfeeding?" rather than, "Do you plan on breast or bottle feeding?" to provide an open opportunity for education.	B	Reviewed, New-replaced	Recommendation 7
I-2	3	30	Recommend continuing education throughout pregnancy for those pregnant women who express a desire to breastfeed or for those who are still undecided on feeding method.	C	Reviewed, New-replaced	Recommendation 7
I-2	4	30	Recommend including family/significant others in breastfeeding education.	B	Reviewed, New-replaced	Recommendation 7
I-3	1	31	Strongly recommend all healthy, pregnant women perform regular mild to moderate exercise sessions, three or more times per week.	A	Reviewed, Amended	Recommendation 2
I-3	2	31	Recommend individualized exercise programs for all pregnant women, based on their pre-pregnancy activity level.	I	Reviewed, Deleted	
I-3	3	31	Recommend against high-altitude (>10,000 feet) activities, scuba diving, and contact sports during pregnancy.	I	Reviewed, Deleted	
I-4	1	33	Recommend immunizing all pregnant women for influenza during the epidemic season.	B	Not reviewed, Deleted	

2009 Location[1]			2009 Recommendation Text[2]	2009 Grade[3]	Recommendation Category[4]	2018 Recommendation[5]
Section	Number	Page				
I-5	1	33	Strongly recommend routine screening for tobacco use in pregnancy at the initial prenatal visit. For patients who smoke, recommend assessment of smoking status at each subsequent prenatal visit.	A	Not reviewed, Amended	Recommendation 5
I-5	2	33	If the screening is positive, cessation should be strongly recommended.	A	Not reviewed, Amended	Recommendation 5
I-5	3	33	There is insufficient data to recommend for or against pharmacologic therapy for tobacco cessation in pregnancy.	I	Not reviewed, Deleted	
I-6	1	34	Recommend routine screening for alcohol consumption using a standardized tool (refer to the VA/DoD Clinical Practice Guideline for the Management of Substance Use Disorders).	B	Not reviewed, Amended	Recommendation 5
I-6	2	34	If the screening is positive, cessation should be strongly recommended.	B	Not reviewed, Amended	Recommendation 5
I-6	3	34	There is insufficient evidence regarding which cessation intervention tool is the most effective.	I	Not reviewed, Deleted	
I-7	1	35	Recommend routine screening for illicit drug use using a self-report method.	C	Not reviewed, Amended	Recommendation 5
I-7	2	35	Recommend pregnant women identified as abusing drugs be offered treatment and receive care in consultation with or referral to an advanced prenatal care provider. (See also VA/DoD Clinical Practice Guideline for the Management of Substance Use Disorders.)	C	Not reviewed, Amended	Recommendation 5
I-8	1	36	Recommend evaluation of maternal ABO and Rh blood type and blood antibody status at the initial prenatal visit.	B	Not reviewed, Deleted	
I-8	2	36	Pregnant women with positive antibody screens should be referred for consultation to assist with further management.	C	Not reviewed, Deleted	
I-8	3	36	There is insufficient evidence to recommend for or against routine repeat testing at 28 weeks' gestation.	I	Not reviewed, Deleted	
I-9	1	36	Recommend all pregnant women have a serum screen for rubella status at the initial prenatal visit.	B	Not reviewed, Deleted	
I-9	2	36	Recommend seronegative pregnant women be counseled to avoid exposure.	B	Not reviewed, Deleted	
I-9	3	36	Recommend seronegative pregnant women be vaccinated in the immediate postpartum period.	B	Not reviewed, Deleted	
I-10	1	37	Recommend routine screening for varicella through history.	B	Not reviewed, Deleted	
I-10	2	37	If negative/unsure history, obtain a varicella titer.	B	Not reviewed, Deleted	
I-10	3	37	Recommend offering vaccination postpartum, if varicella is non-immune.	B	Not reviewed, Deleted	
I-11	1	38	Recommend routine laboratory screening for hepatitis B surface antigen at the initial prenatal visit.	A	Not reviewed, Deleted	

2009 Location[1]			2009 Recommendation Text[2]	2009 Grade[3]	Recommendation Category[4]	2018 Recommendation[5]
Section	Number	Page				
I-11	2	38	Repeat laboratory screening of pregnant women with identification of hepatitis risk factors during the pregnancy (e.g., healthcare worker, intravenous (IV) drug use, exposure to hepatitis, visit for evaluation or therapy for sexually transmitted infections, and new tattoos and blood transfusions).	C	Not reviewed, Deleted	
I-11	3	38	Vaccinate pregnant women with hepatitis risk factors who have not been previously vaccinated.	B	Not reviewed, Deleted	
I-11	4	38	Women at risk for HBV infection in pregnancy should be counseled concerning additional methods to prevent HBV infection.	C	Not reviewed, Deleted	
I-12	1	39	Treat all infants born to hepatitis B positive mothers with Hepatitis B immunoglobulin and initiate hepatitis B vaccination within 12 hours of birth.	A	Not reviewed, Deleted	
I-12	2	39	Strongly consider treating infants born to women at high risk for hepatitis B who have not been vaccinated or whose infectious status is unknown.	B	Not reviewed, Deleted	
I-12	3	39	Consider treating women who have high copy numbers of HBV-DNA with lamivudine during the last month of pregnancy.	B	Not reviewed, Deleted	
I-12	4	39	Women with HBV infection should be taught, and encouraged to implement, strategies to decrease transmission to non-infected intimate contacts.	B	Not reviewed, Deleted	
I-13	1	40	Recommend routine screening for syphilis using serologic testing (i.e., RPR or Venereal Disease Research Laboratory [VDRL]) at the initial prenatal visit.	B	Not reviewed, Deleted	
I-13	2	40	Recommend a confirmatory test using a more specific treponemal assay (FTA-ABS, MHA-TP, HATTS) for pregnant women who test positive.	B	Not reviewed, Deleted	
I-13	3	41	Strongly recommend therapy with penicillin G antibiotic for pregnant women who have confirmed syphilis, as recommended by other sexually transmitted disease (STD) guidelines.	A	Not reviewed, Deleted	
I-13	4	41	Recommend appropriate medical and legal mandates follow-up and state/service branch reporting requirements for pregnant women screening positive.	I	Not reviewed, Deleted	
I-14	1	41	Strongly recommend screening for ASB at initial obstetrical visit via urine culture and sensitivity.	A	Not reviewed, Deleted	
I-14	2	41	There is insufficient evidence to recommend for or against repeat screening throughout the remainder of pregnancy.	I	Not reviewed, Deleted	
I-14	3	41	Strongly recommend a three to seven-day course of appropriate antibiotics based on positive culture and sensitivity, and woman's history of medication allergies.	A	Not reviewed, Deleted	
I-14	4	41	There is insufficient evidence to recommend for or against a test of cure (TOC) after completion of antibiotic therapy, except in pregnant women with ASB-Group B Strep.	I	Not reviewed, Deleted	
I-15	1	43	All pregnant women from one or more high-risk groups should be screened for tuberculosis with a Mantoux test with purified protein derivative (PPD) soon after the pregnancy is diagnosed.	C	Not reviewed, Deleted	

2009 Location[1]			2009 Recommendation Text[2]	2009 Grade[3]	Recommendation Category[4]	2018 Recommendation[5]
Section	Number	Page				
I-15	2	43	Pregnant women with a positive PPD with known conversion in the last two years and no clinical or X-ray evidence of disease should be treated with isoniazid (300 mg per day) starting after the first trimester and continuing for nine months.	C	Not reviewed, Deleted	
I-15	3	43	For pregnant women with a positive PPD whose time of conversion is unknown and who have no clinical or X-ray evidence of disease present, consider delaying therapy until after the pregnancy.	C	Not reviewed, Deleted	
I-15	4	43	Pregnant women with active tuberculosis should be treated with multi-drug therapy including isoniazid and rifampin, supplemented by ethambutol if isoniazid drug resistance is suspected.	C	Not reviewed, Deleted	
I-16	1	44	Strongly recommend routine testing for HIV infection at the initial prenatal visit.	A	Not reviewed, Deleted	
I-16	2	44	Pregnant women who test positive for HIV should be referred for treatment and counseling.	I	Not reviewed, Deleted	
I-16	3	44	Recommend retesting all high-risk pregnant women during the early third trimester and offer repeat testing for patients who refused the first test.	B	Not reviewed, Deleted	
I-17	1	44	Strongly recommend routine screening for Tdap booster status at the initial prenatal visit.	A	Not reviewed, Deleted	
I-17	2	44	If there is no documentation of Td booster within the last 10 years: a. Provide Tdap in the immediate postpartum period before discharge from the hospital or birthing center b. May provide Tdap at an interval as short as two years since the most recent Td vaccine c. Provide Td during pregnancy for tetanus and diphtheria protection when indicated, or defer the Td vaccine indicated during pregnancy to substitute Tdap vaccine in the immediate postpartum period if the woman is likely to have sufficient protection against tetanus and diphtheria.	A	Not reviewed, Deleted	
I-17	3	45	Td booster should be provided if indicated. There are no contraindications other than a previous severe reaction to Td vaccination, such as anaphylaxis, generalized uriticaria, or angioedema.	A	Not reviewed, Deleted	
I-17	4	45	If the pregnant woman is an immigrant and it is unclear that she ever received the primary vaccination series, she should be given a primary series with an initial dose, a second dose a month later, and a third dose 12 months later.	I	Not reviewed, Deleted	
I-18	1	46	All pregnant women should be screened for anemia during pregnancy with a hematocrit or hemoglobin measurement during the first visit.	C	Not reviewed, Deleted	
I-18	2	46	Pregnant women with anemia should be further evaluated to define the cause of the anemia and given nutrient supplementation if deficient (e.g. iron, B12 or Folate).	C	Not reviewed, Deleted	
I-18	3	46	Red blood cell transfusion should be considered for pregnant women with severe anemia.	C	Not reviewed, Deleted	
I-18	4	46	Iron sucrose transfusion should be considered for pregnant women with iron deficiency anemia who fail to respond to oral iron supplementation after eliminating modifiable causes of malabsorption.	C	Not reviewed, Deleted	

2009 Location[1]			2009 Recommendation Text[2]	2009 Grade[3]	Recommendation Category[4]	2018 Recommendation[5]
Section	Number	Page				
I-19	1	46	Carrier screening should be offered to individuals of African, Southeast Asian, and Mediterranean descent.	A	Not reviewed, Deleted	
I-19	2	46	A complete blood count and hemoglobin electrophoresis are the recommended tests to screen for hemoglobinopathies.	B	Not reviewed, Deleted	
I-20	1	47	Recommend routine screening for domestic abuse at the first visit, week 28, and the post-partum visit, using the following three simple/direct questions: – Within the last year, have you been hit, slapped, kicked, or otherwise physically hurt by someone? – Since you've been pregnant, have you been hit, slapped, kicked, or otherwise physically hurt by someone? – Within the last year, has anyone forced you to engage in sexual activities?	B	Not reviewed, Deleted	
I-20	2	47	There is insufficient evidence to recommend for or against specific interventions for identified domestic abuse in pregnancy.	I	Not reviewed, Deleted	
I-20	3	47	If the screening is positive, follow appropriate medical/legal mandates for reporting requirements for state/branch of service.	C	Not reviewed, Deleted	
I-21	1	49	Women should be screened for depression during their first contact with obstetric healthcare services, at week 28 and at the postpartum visit.	B	Not reviewed, Amended	Recommendation 6
I-21	2	49	Depression screening should be performed using a standardized screening tool such as the Edinburgh Postnatal Depression Scale (EDPS) or the PHQ-2.	B	Not reviewed, Amended	Recommendation 6
I-21	3	49	Women should be asked early in pregnancy if they have had any previous psychiatric illnesses, and if they had a past history of serious psychiatric disorder they should be referred for a psychiatric assessment during the antenatal period.	B	Not reviewed, Deleted	
I-22	1	51	Establish the gestational age-based estimated delivery date (EDD) prior to 20 weeks' gestational age.	B	Reviewed, New-replaced	Recommendation 11
I-22	2	51	Various information and methods for dating a pregnancy may be available for consideration. EDD should be based on the most accurate information/method available for the individual pregnancy (see Table 4. Accuracy of Pregnancy Dating Information/Modalities (Prioritized List).	B	Reviewed, New-replaced	Recommendation 11
I-22	3	51	Gestational age permitting, first-trimester ultrasound should be used to establish the gestational age and EDD if there is any uncertainty regarding the EDD due to: a pelvic examination discrepancy (> +/- two weeks), an unknown or uncertain last menstrual period (LMP), or irregular menstrual cycles.	B	Reviewed, New-replaced	Recommendation 11
I-22	4	52	When a first-trimester dating ultrasound has not been previously performed a dating ultrasound at 16 to 22 weeks should be obtained. This examination can be combined with a basic screening anatomy ultrasound.	B	Reviewed, New-replaced	Recommendation 11

2009 Location[1]			2009 Recommendation Text[2]	2009 Grade[3]	Recommendation Category[4]	2018 Recommendation[5]
Section	Number	Page				
I-22	5	52	Situations with abnormal fetal biometric ratios (e.g., head / abdominal circumference [HC/AC], biparietal diameter / femur length [BPD/FL]) limit the accuracy of biometric measurements for pregnancy dating and may signal fetal anomalies or karyotype abnormalities. Such circumstances require individualized assessment by an advanced prenatal care provider to establish dating and recommend ongoing assessment(s) and management.	C	Not reviewed, Deleted	
I-22	6	52	When clinical decisions late in pregnancy necessitate gestational age information and the dates have not been established prior to the 29th week, fetal maturity may be assumed when one of the following criteria are met: a. 20 weeks of audible fetal heart tones by a non-electronic method b. 30 weeks of audible fetal heart tones by an electronic method c. 36 weeks from a positive pregnancy test in a reliable laboratory.	C	Not reviewed, Deleted	
I-23	1	53	Recommend assessing fetal heart tones at each prenatal visit, starting at 10 to 12 weeks.	C	Not reviewed, Deleted	
I-24	1	54	Recommend measuring fundal height in all pregnant women at each visit during the second and third trimesters.	B	Not reviewed, Deleted	
I-24	2	54	There is insufficient evidence to recommend for or against measuring fundal height after 36 weeks' gestation.	I	Not reviewed, Deleted	
I-25	1	55	Recommend assessing and documenting body mass index (BMI) of all pregnant women at the initial visit.	B	Not reviewed, Deleted	
I-25	2	55	Pregnant women found to have a BMI <20 kg/m2 should be referred for nutrition counseling and considered at increased risk for fetal growth restriction.	B	Not reviewed, Deleted	
I-25	3	55	Recommend screening for inappropriate weight gain for all women at every visit during pregnancy.	C	Not reviewed, Deleted	
I-25	4	55	Pregnant women with inadequate weight gain at 28 weeks who are unresponsive to nutritional treatment need additional surveillance. Consider consultation /referral to advanced prenatal care provider.	C	Not reviewed, Deleted	
I-26	1	56	Multivitamin supplements should be taken one month preconceptually and should be continued through the first trimester.	C	Not reviewed, Amended	Recommendation 4
I-26	2	56	Pregnant women taking nutritional supplements for a medical condition should continue that supplementation throughout pregnancy (e.g., B-12 with pernicious anemia and folate with seizure disorders).	I	Not reviewed, Deleted	
I-26	3	56	Pregnant women on restrictive diets (vegetarians, bariatric surgery) should have nutrition consultation to customize vitamin supplementation regimen.	I	Not reviewed, Deleted	
I-26	4	56	Folate supplements (400 mcg daily) should be taken one month preconceptually, continued through the first trimester and should be administered as part of the multivitamin supplementation.	A	Not reviewed, Amended	Recommendation 4

2009 Location[1]			2009 Recommendation Text[2]	2009 Grade[3]	Recommendation Category[4]	2018 Recommendation[5]
Section	Number	Page				
I-26	5	56	Women who have delivered a child with an open neural tube defect (NTD) should supplement their diets with 4 mg folate daily for at least one month prior to conception and through the first trimester to reduce the risk of recurrence.	A	Not reviewed, Amended	Recommendation 4
I-26	6	56	Calcium supplementation may be considered to reduce the risk of preeclampsia in high-risk women and those with low baseline calcium intake.	A	Not reviewed, Deleted	
I-26	7	57	There is insufficient evidence to support the use of Omega 3 supplements in the prevention of preterm birth, preeclampsia, and low birth weight.	I	Not reviewed, Deleted	
I-26	8	57	Other dietary supplements should be used with caution and only after discussion with provider.	I	Not reviewed, Deleted	
I-27	1	58	Recommend the following for obese pregnant women: a. Provision of specific information concerning maternal and fetal risks of obesity b. Consideration of screening for gestational diabetes mellitus (GDM) on presentation or in the first trimester and repeated screening later in pregnancy if results are initially negative c. Assessment and possible supplementation of vitamin B12, folate, iron, and calcium for women who have undergone bariatric surgery d. Anesthesia consultation before labor e. Possible use of graduated compression stockings, hydration, and early mobilization during and after cesarean section f. Continuation of nutrition counseling and exercise program after delivery, and consultation with weight loss specialists before attempting another pregnancy.	I	Reviewed, Deleted	
I-28	1	59	Women with a gastric band should be monitored by their general surgeons during pregnancy because adjustment of the band may be necessary.	C	Reviewed, Amended	Recommendation 22
I-28	2	59	Women who have undergone bariatric surgery should be evaluated for nutritional deficiencies and need for nutritional supplementation where indicated (e.g., Vitamin B12, folate, iron, and calcium).	C	Reviewed, New-replaced	Recommendation 20 Recommendation 21
I-28	3	59	Women who experience dumping syndrome should NOT be screened for gestational diabetes with a glucose load but rather with fasting and two-hour postprandial glucose values.	C	Not reviewed, Amended	Recommendation 33
I-29	1	60	Recommend screening for gonorrhea in all pregnant women.	B	Not reviewed, Deleted	
I-29	2	60	Pregnant women with positive cultures should be treated with ceftriaxone, per the CDC guidelines.	B	Not reviewed, Deleted	
I-29	3	60	Pregnant women with positive screens for gonorrhea should be screened for other sexually transmitted diseases (STDs) and follow local mandatory reporting requirements.	I	Not reviewed, Deleted	
I-29	4	60	Recommend performing a test of cure (TOC) during pregnancy after completing antibiotic therapy. TOC in pregnant women, unlike non-pregnant women, is recommended due to risk of complications resulting from persistent or recurrent infections.	I	Not reviewed, Deleted	
I-29	5	60	Recommend counseling to decrease rate of reinfection.	C	Not reviewed, Deleted	

2009 Location[1]			2009 Recommendation Text[2]	Grade[3]	Category[4]	Recommendation[5]
Section	Number	Page				
I-29	6	60	Recommend referring the partner for testing and treatment, as appropriate.	C	Not reviewed, Deleted	
I-29	7	60	Infected pregnant women must abstain from intercourse pending TOC.	C	Not reviewed, Deleted	
I-30	1	61	Recommend screening all pregnant women for Chlamydia trachomatis at the initial physical examination.	B	Not reviewed, Deleted	
I-30	2	61	Pregnant women with positive cultures should be treated with azithromycin or erythromycin, per the CDC guidelines.	A	Not reviewed, Deleted	
I-30	3	61	Pregnant women with positive screens for Chlamydia should be screened for other sexually transmitted diseases (STDs).	I	Not reviewed, Deleted	
I-30	4	61	Recommend performing a test of cure (TOC) during pregnancy after completing antibiotic therapy. TOC in pregnant women, unlike nonpregnant women, is recommended due to risk of complications resulting from persistent or recurrent infections.	C	Not reviewed, Deleted	
I-30	5	61	Recommend counseling to decrease rate of re-infection.	C	Not reviewed, Deleted	
I-30	6	61	Recommend referring partner for testing and treatment, as appropriate.	C	Not reviewed, Deleted	
I-30	7	61	Infected pregnant women must abstain from intercourse pending TOC.	C	Not reviewed, Deleted	
I-31	1	62	Women current with routine screening for cervical cancer do not need to undergo additional testing. If the woman will come due for routine screening before the eight week postpartum visit, a screening test should be performed at the first prenatal visit.	B	Not reviewed, Deleted	
I-31	2	62	For women who do not receive cervical cancer screening antenatally, screening should be considered at the eight-week postpartum visit to ensure compliance with routine cervical cancer screening guidelines.	B	Not reviewed, Deleted	
I-31	3	62	Recommend performing cervical screening in pregnancy with a brush sampler and spatula.	A	Not reviewed, Deleted	
I-31	4	62	Recommend women with abnormal cervical cytology during pregnancy be managed based on local algorithms, which may include repeat testing, observation, or colposcopy.	C	Not reviewed, Deleted	
I-32	1	63	Routine HSV culture-based screening of pregnant patients is not recommended.	I	Not reviewed, Deleted	
I-32	2	63	Symptomatic patients, those who are seropositive, or seronegative patients who have infected partners require further testing and counseling.	B	Not reviewed, Deleted	
I-33	1	64	Information about cystic fibrosis (CF) should be provided to all couples.	I	Not reviewed, Deleted	
I-33	2	64	For couples who desire screening at <18 weeks' gestation, only one partner should initially be screened; if the screening is positive then the other partner should be screened.	I	Not reviewed, Deleted	
I-33	3	64	Cystic fibrosis carrier screening should be offered to all couples who desire it. Informed consent should be obtained prior to testing.	I	Not reviewed, Amended	Recommendation 9

2009 Location[1]			2009 Recommendation Text[2]	2009 Grade[3]	Recommendation Category[4]	2018 Recommendation[5]
Section	Number	Page				
I-33	4	64	Either sequential (testing one partner first) or concurrent (testing both partners simultaneously) carrier screening for cystic fibrosis is appropriate. The latter option may be preferred if there are time constraints for decisions regarding prenatal diagnostic testing or termination of the affected pregnancy.	I	Not reviewed, Deleted	
I-33	5	64	Recommend genetic counseling for individuals with a family history of cystic fibrosis, or for individuals found to be carriers of two cystic fibrosis mutations who have not previously received a diagnosis of cystic fibrosis.	I	Not reviewed, Deleted	
I-34	1	65	When antenatal depression symptoms are mild to moderate, consider referring patients for non-pharmacological treatment, such as Interpersonal Therapy (IPT).	A	Not reviewed, Deleted	
I-34	2	65	When pharmacological treatment of depression is necessary during pregnancy, the potential risks of SSRI exposure during pregnancy should be balanced with the potential risks of untreated depression on the mother and fetus.	B	Not reviewed, Deleted	
I-34	3	65	Avoid paroxetine use during pregnancy when possible. Consider fetal echocardiography for women exposed to paroxetine during early pregnancy.	B	Not reviewed, Deleted	
I-34	4	65	Choice of medications should be based on the well-characterized reproductive safety profiles of the medication, while also considering the severity of the depressive disorder and the wishes of the pregnant patient.	C	Not reviewed, Deleted	
I-34	5	65	Multidisciplinary management of the pregnant patient with depression is recommended to the extent that it is possible. This may involve the patient's obstetrician, behavioral healthcare provider, primary care physician, and pediatrician.	C	Not reviewed, Deleted	
I-35	1	67	Assessment of oral health and instruction on maintaining a high level of oral hygiene should be offered to all pregnant women during their initial prenatal assessment to promote oral health and the general health of the woman.	C	Not reviewed, Deleted	
I-35	2	67	Preventative dental treatment is safe and should be provided as early in pregnancy as possible.	B	Not reviewed, Deleted	
I-35	3	67	Routine dental care, including x-rays and periodontal therapy, are effective and safe during pregnancy, and should be recommended.	B	Not reviewed, Deleted	
I-35	4	67	There is insufficient evidence to recommend the routine treatment of periodontal disease in order to alter the rates of preterm delivery (PTD), low birth weight (LBW) or fetal growth restriction.	I	Not reviewed, Deleted	
I-36	1	69	All pregnant women, regardless of age, should be offered a prenatal screening test for the most common clinically significant fetal anomalies as a routine part of prenatal care.	B	Reviewed, New-replaced	Recommendation 9
I-36	2	69	Women presenting for care at appropriate gestational ages should have aneuploidy screening and diagnostic options available to them that provide first-trimester results as well as strategies that provide second-trimester results. The specific first-trimester screening strategy made available by or in the institution must be decided prior to embarking upon that strategy.	B	Reviewed, New-replaced	Recommendation 8 Recommendation 9

2009 Location[1]			2009 Recommendation Text[2]	2009 Grade[3]	Recommendation Category[4]	2018 Recommendation[5]
Section	Number	Page				
I-36	3	69	Initial limited and comprehensive prescreen/pretest counseling methods may include written or multimedia communication, one-on-one, or group counseling formats. Posttest and late entry counseling should be provided in an individualized one-on-one format.	B	Not reviewed, Deleted	
I-36	4	69	Screening programs should show respect for the needs and quality of life of the woman and her family. Counseling should be nondirective and should respect a woman's choice to accept or to refuse any or all of the testing or options offered at any point in the process.	I	Not reviewed, Deleted	
I-36	5	69	The following modes of prenatal screening/diagnostic testing should be available for women receiving prenatal care in the DoD/VA: a. No test at all b. Screening with results in first trimester c. Screening with results in second trimester d. Diagnostic/invasive test in first and second trimester.	B	Reviewed, New-replaced	Recommendation 8 Recommendation 9
I-36	6	69	In order to make these screening and diagnostic options available, each institution providing prenatal care should provide locally or arrange for access to: genetic counseling, first- and second-trimester serum marker assessment, first-trimester nuchal translucency (NT) measurement, basic and comprehensive second-trimester ultrasound assessment, first-trimester chorionic villus sampling and second-trimester amniocentesis.	I	Not reviewed, Deleted	
I-36	7	69	All women considered high-risk, due to maternal age, personal or family history, or the result of a previous test, should be offered the choice of a first- or second-trimester screening strategy and the choice of first- or second trimester diagnostic testing including appropriate comprehensive pre- and post-test genetic counseling.	I	Reviewed, New-replaced	Recommendation 8 Recommendation 9
I-36	8	69	A comprehensive ultrasound may be offered as a primary or follow-on screening test.	B	Not reviewed, Deleted	
I-36	9	70	First-trimester NT should be interpreted for risk assessment only when performed by a trained sonographer who is accredited to provide this service [B] and when offered together with biochemical markers.	A	Not reviewed, Deleted	
I-36	10	70	For women who undertake first-trimester screening (FTS), second-trimester serum alpha fetoprotein (AFP) screening and/or ultrasound examination should be offered to screen for open neural tube defects (ONTD).	B	Not reviewed, Deleted	
I-36	11	70	Pregnant women with persistent unexplained elevations of maternal serum alphafetoprotein (MSAFP) are at increased risk for adverse perinatal outcome and should receive specialized prenatal care.	B	Not reviewed, Amended	Recommendation 14
I-36	12	70	The Quad Marker Screen should be used rather than the Triple Marker Screen when second-trimester serum screening is undertaken.	B	Not reviewed, Deleted	

2009 Location[1]			2009 Recommendation Text[2]	2009 Grade[3]	Recommendation Category[4]	2018 Recommendation[5]
Section	Number	Page				
I-37	1	76	Recommend counseling and educating all pregnant women prior to scheduling sonographic studies about the potential benefits, limitations, and safety of prenatal ultrasound. Documentation of education and counseling is recommended; however, written informed consent is not deemed necessary.	C	Not reviewed, Deleted	
I-37	2	76	A complete obstetric sonographic examination should be recommended and available to women considering an invasive test on the basis of age, or other risk factors, when a more accurate gestational age is required for decision-making regarding medical or antenatal routine care interventions, or for predicting actual date of birth.	A	Not reviewed, Deleted	
I-37	3	76	A complete obstetric sonographic examination should be recommended and available to women or who are at increased risk for a songraphically detectable maternal or fetal abnormality where an intervention may improve the outcome (See table for list of indications).	A	Not reviewed, Deleted	
I-37	4	76	There is insufficient evidence to recommend for or against complete obstetric sonographic examination in the second trimester to all low-risk asymptomatic consenting pregnant women.	I	Not reviewed, Deleted	
I-37	5	76	All complete obstetric sonographic studies should be performed and interpreted by qualified healthcare providers.	A	Not reviewed, Deleted	
I-38	1	80	Pregnant women should be educated about the most common symptoms of preterm labor: a. Low, dull backache b. Four or more uterine contractions per hour. Uterine contractions may be perceived by the patient as: – Menstrual-like cramps – Sensation of the “baby rolling up in a ball” – Increased uterine activity compared to previous patterns – Abdominal cramping (may be associated with diarrhea) c. Increased pelvic pressure (may be associated with thigh cramps) d. Change in vaginal discharge such as change in color of mucus, leaking of clear fluid, spotting or bleeding or discharge associated with itching or fish-like odor immediately after intercourse. e. Sensation that “something feels different” (e.g., agitation, flu-like syndrome, and sensation that baby has “dropped”).	None	Not reviewed, Deleted	
I-38	2	80	A pregnant woman who experiences any of the above symptoms or is unsure about the presence of any of the above, should lie down on her side with one of her hands on her lower abdomen to palpate for uterine contractions for an additional hour. If symptoms persist and/or she palpates four or more uterine contractions in the hour, she should seek immediate medical care. The exception to this is the pregnant woman who notes the presence of vaginal bleeding, leaking of clear fluid from the vagina, or a vaginal discharge with a fish-like odor immediately after intercourse, all of which should prompt immediate medical attention.	I	Not reviewed, Deleted	

2009 Location[1]			2009 Recommendation Text[2]	2009 Grade[3]	Recommendation Category[4]	2018 Recommendation[5]
Section	Number	Page				
I-38	3	80	Re-emphasize to the pregnant woman that she is the most important link in the early diagnosis of preterm labor, and that early diagnosis and treatment of preterm labor increases the chances for a healthy infant.	None	Not reviewed, Deleted	
I-38	4	80	Educate the pregnant woman that she can safely continue moderate exercise and activity during her pregnancy so long as she does not notice any of the symptoms of preterm labor. The exception to this is that she may notice some increase in uterine cramping with moderate exercise or activity. This is of no consequence so long as the cramping ceases when she stops her activity. She should limit her activity to no more than two hours per session.	B	Reviewed, Amended	Recommendation 13
I-38	5	80	Women with uncomplicated pregnancies may continue a standard work schedule throughout their pregnancy. If their work is strenuous or they spend long periods of time on their feet they should limit their work week to 40 hours and workday to eight hours during the last trimester (beginning at 28 weeks) or sooner if they frequently experience symptoms of preterm labor while at work. Pregnant women should attempt to limit periods of time on their feet to three hours.	B	Not reviewed, Amended	Recommendation 3
I-38	6	80	There is no evidence that sexual intercourse increases the probability of preterm labor in women with uncomplicated pregnancy. They may experience some uterine contractions following orgasm; however, this is a normal response and she only needs to seek medical attention if they persist at four or more per hour for at least three hours, or if vaginal bleeding or spotting is noted.	None	Reviewed, Deleted	
I-39	1	81	Appropriate candidates for a trial of labor include women with one prior low transverse cesarean and no other contraindications to labor or vaginal delivery. Women with two prior low transverse cesareans are candidates provided they have undergone a previous vaginal delivery.	B	Not reviewed, Deleted	
I-39	2	81	Women who meet the criteria for a possible trial of labor should be counseled regarding the risks and benefits of VBAC versus repeat low transverse cesarean delivery. Ideally, informed consent should be documented in the antepartum period after 24 weeks, and again at the time of admission for delivery.	None	Not reviewed, Deleted	
I-39	3	82	There is insufficient evidence to recommend for or against cesarean delivery on maternal request.	I	Not reviewed, Deleted	
I-40	1	83	Recommend screening all pregnant women for GDM at 24 to 28 weeks' gestation.	B	Reviewed, New-replaced	Recommendation 10
I-40	2	83	Screening for GDM should be performed by randomly administering a 50 gram oral glucose tolerance test (GTT) followed by a blood draw one hour later. Generally accepted threshold values of the 1-hour screen are between 130 mg/dL and 140 mg/dL. Pregnant women who are positive require the diagnostic three-hour GTT.	B	Reviewed, New-replaced	Recommendation 10
I-40	3	83	In the three-hour GTT a 100-gram glucose load is administered to a woman who has fasted overnight (minimum eight hours). Blood draws are performed fasting and at one, two and three hours after the oral glucose load. No special diet is required before this test.	C	Reviewed, New-replaced	Recommendation 10

2009 Location[1]			2009 Recommendation Text[2]	2009 Grade[3]	Recommendation Category[4]	2018 Recommendation[5]
Section	Number	Page				
I-40	4	83	Two acceptable sets of threshold values for the three-hour 100-gram GTT can be used to diagnose gestational diabetes: the National Diabetes Data Group (NDDG) criteria and the Carpenter/Coustan conversion criteria. Institutions should adopt one of these two criteria sets based upon their population demographics. There should NOT be variance within the facility itself, though variance may occur between facilities.	B	Reviewed, New-replaced	Recommendation 10
I-40	5	83	For patients with only one abnormal value, consider one of the following: a. Undergo a repeat three-hour 100-gram glucose challenge test approximately one month following the initial test b. Have dietary management and intermittent postprandial glucose testing performed in a manner similar to women with gestational diabetes.	C	Reviewed, New-replaced	Recommendation 10
I-40	6	83	Patients with a history of gastric bypass surgery may experience a "dumping" syndrome following ingestion of large quantities of simple sugar. An alternative to the 50-gram glucose tolerance test in these patients includes a fasting and two-hour postprandial finger sticks for one week. Target ranges are 90 mg/dL or lower fasting and 120 mg/dL or lower for postprandial.	C	Reviewed, New-replaced	Recommendation 10
I-41	1	85	There is insufficient evidence to recommend for or against routinely supplementing iron for all pregnant women.	I	Not reviewed, Deleted	
I-41	2	85	Women exhibiting signs or symptoms of anemia at any time during their pregnancy should be evaluated upon presentation.	I	Not reviewed, Deleted	
I-41	3	85	Obtain a serum ferritin if iron deficiency anemia is suspected. Recommend supplementing with at least 50 mg elemental iron (325 mg ferrous sulfate) twice a day (bid) in all pregnant women diagnosed with iron deficiency anemia (abnormal ferritin).	B	Not reviewed, Deleted	
I-42	1	86	Recommend determination of paternal erythrocyte antigen status for screen-positive women.	I	Not reviewed, Deleted	
I-42	2	86	Recommend administering anti-D prophylaxis to all unsensitized D-negative pregnant women.	B	Not reviewed, Deleted	
I-42	3	86	Recommend using either 300 mcg of anti-D immunoglobulin at 28 weeks or 100 mcg of anti-Dimmunoglobulin at 28 and 34 weeks' gestation.	I	Not reviewed, Deleted	
I-42	4	86	Pregnant women who have had isoimmunization in a previous pregnancy or who are screened positive for antibody screen should be referred to a Maternal Fetal Medicine specialist for care.	A	Not reviewed, Deleted	

2009 Location[1]			2009 Recommendation Text[2]	2009 Grade[3]	Recommendation Category[4]	2018 Recommendation[5]
Section	Number	Page				
I-43	1	88	Pregnant women should be educated about the most common symptoms of preterm labor: a. Low, dull backache b. Four or more uterine contractions per hour. Uterine contractions may be perceived by the patient as: – Menstrual-like cramps – Sensation of the "baby rolling up in a ball" – Increased uterine activity compared to previous patterns – Abdominal cramping (may be associated with diarrhea) c. Increased pelvic pressure (may be associated with thigh cramps) d. Change in vaginal discharge such as change in color of mucus, leaking of clear fluid, spotting or bleeding or discharge associated with itching or fish-like odor immediately after intercourse. e. Sensation that "something feels different" (e.g., agitation, flu-like syndrome, and sensation that baby has "dropped").	None	Not reviewed, Deleted	
I-43	2	88	A pregnant woman who experiences any of the above symptoms or is unsure about the presence of any of the above, should lie down on her side with one of her hands on her lower abdomen to palpate for uterine contractions for an additional hour. If symptoms persist or she palpates four or more uterine contractions in the hour, she should seek immediate medical care. The exception to this is the pregnant woman who notes the presence of vaginal bleeding, leaking of clear fluid from the vagina or a vaginal discharge with a fish-like odor immediately after intercourse, all of which should prompt immediate medical attention.	None	Not reviewed, Deleted	
I-43	3	88	If no diagnosis of preterm labor is established, continuation in the guideline is appropriate.	None	Not reviewed, Deleted	
I-44	1	89	Recommend instructing all pregnant women about the importance of assessing fetal movement on a daily basis beginning in the third trimester.	B	Not reviewed, Deleted	
I-44	2	89	Recommend instructing all pregnant women as to the course of action they should take if they do not perceive the minimum fetal movement counts within the time frame specific to their healthcare facility.	B	Not reviewed, Deleted	
I-45	1	90	Recommend antepartum counseling and educating all pregnant women regarding family planning, to include various temporary contraceptive means and/or permanent sterilization.	C	Not reviewed, Deleted	
I-46	1	90	Recommend screening all pregnant women for Group B streptococcus (GBS) at 35 to 37 weeks' gestation, using a rectovaginal culture and selective broth media to identify colonized women.	B	Not reviewed, Deleted	
I-46	2	90	Screening should be repeated every four weeks until delivery.	C	Not reviewed, Deleted	

2009 Location[1]			2009 Recommendation Text[2]	2009 Grade[3]	Recommendation Category[4]	2018 Recommendation[5]
Section	Number	Page				
I-46	3	90	Pregnant women with positive rectovaginal cultures should be treated with intrapartum IV chemoprophylaxis with either Penicillin or Ampicillin (if no contraindications) (a). (a)Management of the GBS-colonized parturient with a history of an allergic reaction to penicillin agents: due to emerging resistance to previous second-line antimicrobial agents, clindamycin and erythromycin (10 to 15 percent resistant strains in most centers), alternative second-line agents for women with a history of allergic reactions to penicillin or ampicillin are listed below: a. Administer cefazolin 2gm IV load, followed by 1 gm IV every eight hours, for allergic reaction other than immediate hypersensitivity b. Administer vancomycin 1 gm IV load, followed by 1 gm IV every 12 hours, for immediate hypersensitivity reaction (anaphylaxis, dyspnea, rapid onset of urticarial rash).	A	Not reviewed, Deleted	
I-46	4	90	Pregnant women who have had a previous child with early-onset GBS infection or have GBS bacteruria in the current pregnancy should receive intrapartum antibiotics, without screening cultures.	A	Not reviewed, Deleted	
I-47	1	93	Recommend screening for non-cephalic presentation for all patients at 36 weeks' gestation.	B	Not reviewed, Deleted	
I-47	2	93	There is insufficient evidence to recommend for or against Leopolds versus cervical exam as the best screening method to determine fetal presentation.	I	Not reviewed, Deleted	
I-47	3	93	Recommend ultrasound for confirmation, if non-cephalic presentation is suspected.	B	Not reviewed, Deleted	
I-47	4	93	If non-cephalic presentation is confirmed and there are no contraindications, recommend external cephalic version at 37 weeks or beyond and referral to an advanced prenatal care provider.	B	Not reviewed, Deleted	
I-48	1	94	Consider offering routine membrane sweeping to all pregnant women every visit beginning at 38 weeks.	C	Not reviewed, Deleted	
I-48	2	94	There is insufficient data to encourage or discourage this practice in women known to be GBS-colonized.	I	Not reviewed, Deleted	
I-49	1	94	In the absence of contraindications, labor induction should be offered to women who reach 41 and 0/7 weeks undelivered.	A	Not reviewed, Amended	Recommendation 12
I-49	2	95	In those patients with a favorable cervix (Bishop score > 6), induction after 39 weeks may be considered.	B	Not reviewed, Deleted	
I-49	3	95	When labor induction is offered or planned, women should be educated on the risks of induction, including length of induction, discomfort involved, and the process in determining appropriate timing of induction.	B	Not reviewed, Deleted	
I-49	4	95	Antepartum fetal testing should begin as soon as possible after 41 and 0/7 weeks if not scheduled for induction at this time.	C	Not reviewed, Amended	Recommendation 12
I-49	5	95	Testing should consist of weekly amniotic fluid assessment and twice weekly non-stress testing (NST).	C	Not reviewed, Deleted	

2009 Location[1]			2009 Recommendation Text[2]	2009 Grade[3]	Recommendation Category[4]	2018 Recommendation[5]
Section	Number	Page				
I-49	6	95	Inadequate amniotic fluid index should prompt further evaluation to determine the need for delivery.	B	Not reviewed, Deleted	
I-50	1	96	Offer vaccination before postpartum discharge to all women < 26 years of age who have not previously completed HPV vaccination series.	B	Not reviewed, Deleted	
I-50	2	96	Women who begin their HPV vaccination series in the immediate postpartum period should complete the series with subsequent vaccinations at two months and six months following the first injection in the series. The eight-week postpartum visit provides an opportunity for the second injection.	C	Not reviewed, Deleted	
I-50	3	96	Vaccination to protect against HPV in individuals with a history of dysplasia is controversial and the decision to proceed in this situation should be made between a patient and her provider.	I	Not reviewed, Deleted	
I-50	4	96	Women who have initiated the HPV vaccine series before becoming pregnant should halt the series during pregnancy, and resume after delivery.	I	Not reviewed, Deleted	
I-50	5	96	HPV vaccination may be given to lactating women.	I	Not reviewed, Deleted	
I-51	1	97	All pregnant women and fathers should receive education about Shaken Baby Syndrome prior to discharge from the hospital.	I	Not reviewed, Deleted	
I-52	1	99	Recommend against routine screening for preterm birth with fetal fibronectin (fFN) test.	D	Not reviewed, Amended	Recommendation 15
I-52	2	99	Utilization of fFN testing in symptomatic women between 24 and 34 6/7 weeks' gestation may be useful in guiding management of women with signs and symptoms of preterm labor.	B	Not reviewed, Amended	Recommendation 16
I-53	1	100	Recommend against performing cervical examination to screen for preterm birth prevention in low-risk asymptomatic pregnant women.	D	Not reviewed, Deleted	
I-54	1	100	Recommend against the use of antenatal pelvimetry (clinical or radiographic) in routine prenatal care.	D	Not reviewed, Deleted	
I-54	2	100	There is fair evidence that clinical pelvimetry is not effective in predicting the actual occurrence of cephalopelvic disproportion (CPD), and its performance is associated with significant increase in cesarean section rates.	D	Not reviewed, Deleted	
I-55	1	101	Recommend against the use of urine dipstick testing for protein and glucose during prenatal visits (the appropriate screening test for gestational diabetes is the one-hour glucola).	D	Not reviewed, Deleted	
I-55	2	101	Recommend the use of selective laboratory urinalysis for pregnant women with signs or symptoms of preeclampsia.	B	Not reviewed, Deleted	
I-56	1	102	Recommend against routine evaluation for edema in pregnancy.	D	Not reviewed, Deleted	
I-57	1	102	The evidence is insufficient to recommend for or against routine screening for cytomegalovirus (CMV).	I	Not reviewed, Deleted	
I-57	2	102	Recommend counseling pregnant women about methods to prevent acquisition of CMV during pregnancy.	C	Not reviewed, Deleted	

2009 Location[1]			2009 Recommendation Text[2]	2009 Grade[3]	Recommendation Category[4]	2018 Recommendation[5]
Section	Number	Page				
I-58	1	103	Recommend against routine testing for parvovirus in pregnancy.	D	Not reviewed, Deleted	
I-59	1	103	Recommend against routine testing for toxoplasmosis in pregnancy.	D	Not reviewed, Deleted	
I-59	2	103	Recommend counseling pregnant women about methods to prevent acquisition of toxoplasmosis during pregnancy.	C	Not reviewed, Deleted	
I-60	1	104	Recommend against routine screening for bacterial vaginosis in asymptomatic pregnant women.	D	Not reviewed, Deleted	
I-61	1	105	Recommend against routine measles/mumps/rubella (MMR) immunization during pregnancy.	D	Not reviewed, Deleted	
I-62	1	106	Recommend against routine varicella vaccination in pregnancy.	D	Not reviewed, Deleted	
I-62	2	106	Recommend serological testing early in pregnancy for all pregnant women with a negative or uncertain history.	B	Not reviewed, Deleted	
I-62	3	106	Recommend offering vaccination postpartum to pregnant women who are non-immune.	B	Not reviewed, Deleted	
I-63	1	106	Recommend against routine cervical length screening at 24 weeks' gestation.	D	Not reviewed, Deleted	
I-64	1	107	Recommend against routine repeat screening for blood group antibodies.	D	Not reviewed, Deleted	
I-64	2	107	Recommend against routine repeat screening for anemia and syphilis.	D	Not reviewed, Deleted	
I-64	3	107	Recommend providers consider repeat testing for anemia or syphilis at 24 to 28 weeks for women who are at higher risk for these conditions.	C	Not reviewed, Deleted	
I-65	1	108	Recommend against routine screening for thyroid hormone status of the mother.	D	Not reviewed, Deleted	
I-65	2	108	Recommend ensuring adequate iodine intake during pregnancy for pregnant women in areas of the country with questionable levels of dietary iodine.	C	Not reviewed, Deleted	

Appendix E: Participant List

Heather Able, MSN, RNC (Champion)
Maternity Care Coordinator, VA Northern California Health Care System
Senior Maternity Care Consultant, Women's Health Services, Office of Patient Care Services, VA Central Office, Washington, DC

Alicia Christy, MD, MHSCR, FACOG (Champion)
Deputy Director, Reproductive Health
Women's Health Services (10P4W)
Office of Patient Care Services/Veteran Health Administration, Washington, DC
Professor, Uniformed Services University of Health Sciences, Department of Obstetrics and Gynecology, Bethesda, MD

COL Lisa Foglia, MD, FACOG (Champion)
Director, Maternal Fetal Medicine Fellowship, Joint Base Lewis-McChord, WA
Associate Professor, Uniformed Services University of Health Sciences, Bethesda, MD

Lt Col Barton Staat, MD, FACOG (Champion)
Air Force Surgeon General Consultant for Obstetrics/Maternal-Fetal Medicine
Vice-Chair of Patient Safety & Quality
Associate Professor, Uniformed Services University of Health Sciences, Bethesda, MD

Grace Chang, MD, MPH
Chief, Consultation Liaison Psychiatry
VA Boston Healthcare System
Boston, MA

CPT Allison M. DeLuca, CNM, RN
Certified Nurse Midwife, OB-GYN
Madigan Army Medical Center
Joint Base Lewis-McChord, WA

Megan Gerber, MD, MPH
Medical Director, Women's Health VA Boston Healthcare System
Director, VA Advanced Fellowship in Women Veterans Health/BU General Internal Medicine Fellowship
Boston, MA

Barbara J. Hector, WHNP
Women Veterans Program Manager
South Texas Veterans Health Care System
San Antonio, TX

Maj Minette Herrick, MS, RDN, IBCLC
Chief of Health Promotion Air Force Medical Operations Agency
Joint Base San Antonio, TX

Carrie Kairys, DNP, FNP-BC
Deputy Field Director Area 2, Women's Health Services (10P4W)
Office of Patient Care Services/Veteran Health Administration
West Palm Beach, FL

LT Karla Krasnoselsky, MSC, DPT, CSCS
United States Navy
USS George Washington (CVN 73) Physical Therapist Health Promotions and Wellness Program Director

Jacqueline H. Langston, BSN, RN, Nurse Midwife
Maternity Care Coordinator
Charge Nurse, Fort McPherson Community Based Outpatient Clinic, Women's Center of Excellence
Atlanta VA Medical Center
Atlanta, GA

MAJ Sheila A. Medina, DNP, FNP-C
Army Nurse Corps
Director, Uniformed Services University of Health Sciences, Doctor of Nursing, Bethesda, MD
Practice Phase II Site, Carl R. Darnall Army Medical Center, Fort Hood, TX

Laura J. Miller, MD
Medical Director of Women's Mental Health
Edward Hines Jr. VA Hospital
Hines, IL

Ki Park, MD, MS, FSCAI
Malcolm Randall VA Medical Center
Gainesville, FL

Deanna Rolstead, MD, FACOG
Interim Chief of Gynecology, Phoenix VA Healthcare System, Phoenix, AZ
Senior Gynecology Consultant Women's Health Services, Office of Patient Care Services, VA Central Office, Washington, DC

COL Cynthia Sanchez, MSN, RN
Chief, Women's Health Service Line
PCI, G-3/5/7, Office of the Surgeon General
Falls Church, VA

CDR Robert Selvester, MD
Director, Navy Medical Modeling and Simulation Program/Emerging Technologies Navy Medicine Education, Training, and Logistics Command JB San Antonio, TX

Kristi Shearer, PhD
Clinical Psychologist
Madigan Army Medical Center
Joint Base Lewis-McChord, WA

Elaine Stuffel, BSN, MHA, RN
Chronic Disease Nurse Consultant CPG Coordinator
US Army Medical Command
Clinical Performance Assurance Directorate (CPAD)
Office of Evidence Based Practice
Joint Base San Antonio-Fort Sam Houston, TX

CDR Christopher Tatro, MD, FACOG
Chief Medical Information Officer, Bureau of Medicine and Surgery, Pacific Northwest Detachment
Bremerton, WA

Appendix F: Literature Review Search Terms and Strategy

A. Topic- Topic-specific Search Terms

The search strategies employed combinations of free-text keywords as well as controlled vocabulary terms including (but not limited to) the following concepts. Strategies for each bibliographic database follow the below tables (Table F-1, Table F-2, Table F-3, Table F-4).

Table F-1. EMTREE, Medical Subject Headings (MeSH), PsycINFO, and Keywords

	Concept	Controlled Vocabulary (EMTREE unless otherwise noted)	Keywords
General Population Terms	Pregnant women/women undergoing prenatal care	'perinatal care'/de 'perinatal period'/de pregnancy/exp pregnancy/mj 'pregnancy disorder'/exp 'pregnancy outcome'/de 'pregnant woman'/de 'prenatal care'/de 'prenatal period'/de PsycINFO adolescent pregnancy/ antepartum period/ perinatal period/ pregnancy/ prenatal care/ postnatal period/	antenatal antepartum maternal obstetric perinatal post-natal post-partum postpartum postnatal pre-natal pregnancy prenatal trimester
	Fetuses	'parameters concerning the fetus, newborn and pregnancy'/exp 'prenatal disorder'/de	fetal fetus* foetal foetus* neonat*
Question 1 – Screening and Diagnosing Gestational Diabetes Mellitus in Pregnant Women	Pregnant women at risk of developing gestational diabetes)	'pregnancy diabetes mellitus'/exp/mj	'gestational diabetes'
	Pre-existing diabetes (for exclusion)	N/A	'pre-existing' preexisting 'pre-gestational' pregestational type

	Concept	Controlled Vocabulary (EMTREE unless otherwise noted)	Keywords
Question 1 – Screening and Diagnosing Gestational Diabetes Mellitus in Pregnant Women (cont.)	Glucose tolerance, HbA1c, fasting blood sugar, other tests	diagnosis/exp/mj 'glycosylated hemoglobin'/exp/mj 'glucose tolerance test'/exp/mj	'2-step' A1c diagnos* 'glucose challenge' 'glucose tolerance' identif* measur* 'oral glucose' 'one-step' screen* 'two-step' fasting AND glucose fasting AND 'blood sugar' HbA1c test*
Question 2 – Patients Likely to Respond to Aspirin for Prevention of Preeclampsia	Aspirin	'acetylsalicylic acid'/mj	'acetylsalicylic acid' aspirin
	Prevention	N/A	manag* prevent* prophyla* therap* treat*
	Preeclampsia, preeclampsia necessitating preterm birth, recurrence in women with history	'eclampsia and preeclampsia'/mj preeclampsia/mj	eclampsia HELLP (hyperten* OR toxem*):ti AND (pregnancy/exp/mj OR (perinatal* OR pregnan*)) 'pre-eclampsia' 'pre-term' preeclampsia preterm

	Concept	Controlled Vocabulary (EMTREE unless otherwise noted)	Keywords
Question 3 – Nutritional Interventions for Pregnant Women Who Have Had Bariatric Surgery	Women with a history of bariatric surgery	'bariatric surgery'/exp 'gastric bypass surgery'/de gastrojejunostomy/de gastroplasty/de	bariatric 'metabolic surgery' biliopancreatic 'bilio-pancreatic' 'duodenal switch' 'gastric balloon' gastric NEXT/1 band* 'gastric bypass' gastric NEXT/1 sleeve* gastroplast* 'jejunoileal bypass' lapband 'lap-band' 'obesity surgery' 'roux-en-Y' 'sleeve gastrectomy' 'stomach stapling' 'weight loss surgery'
	Nutritional screening, nutritional management, dietary supplements	nutrition/exp 'nutritional disorder'/exp	anem* B B12 calcium deficien* folate 'folic acid' iron macronutrient* malnutrition micronutrient* nutrient* nutrition* supplement* vitamin*
	Dumping syndrome	'dumping syndrome'/de	dumping NEXT/1 syndrome* 'gastric emptying'
	Gestational diabetes	pregnancy diabetes mellitus'/exp/mj	'gestational diabetes' (pregnancy/mj OR maternal:ti OR pregnan*) AND diabetes
	Glucose tolerance testing	'glucose tolerance test'/exp/mj	'glucose challenge' OR 'glucose tolerance' OR 'oral glucose' OR fasting

	Concept	Controlled Vocabulary (EMTREE unless otherwise noted)	Keywords
Question 4 – Comparative Accuracy, Clinical Utility, and Cost of Methods of Aneuploidy Screening	Aneuploidy	aneuploidy/exp 'down syndrome'/de 'klinefelter syndrome'/de trisomy/exp 'turner syndrome'/de	aneuploid* 'down syndrome' 'downs syndrome' klinefelter* trisom* turner*
	Cell-free fetal DNA testing	'non invasive measurement'/de	cffDNA cellfree 'cell-free' 'fetal DNA' 'fetal nucleic acid' 'fetal nucleic acids' 'foetal DNA' 'foetal nucleic acid' 'foetal nucleic acids' 'noninvasive prenatal' 'non-invasive prenatal' 'prenatal diagnosis'
	Maternal serum, nuchal translucency, amniocentesis, and other tests	amniocentesis/exp 'chorion villus sampling'/de 'diagnostic test accuracy study'/de 'maternal serum screening'/de 'nuchal translucency measurement'/de 'prenatal diagnosis'/de 'prenatal screening'/de	AFP amniocentesis biochemical biomarker* 'chorionic villus' 'combined test' 'double test' e3 hCG 'inhibin A' marker* 'nuchal fold' 'nuchal thickness' 'nuchal translucency' PAPP-A 'quadruple test' screen* test* 'triple test' ultrasonography* ultrasound
	Topic of special interest	N/A	(advanced OR anatomy OR anomaly OR detailed OR 'level II' OR 'level 2' OR 'second trimester' OR targeted) NEXT/3 (scan OR scans OR sonogram OR sonograms OR ultrasonography OR ultrasound*)

	Concept	Controlled Vocabulary (EMTREE unless otherwise noted)	Keywords
Question 5 – Perinatal Screens for Psychiatric and Substance Use Disorders Compared with Routine Screening Methods	Perinatal surveys and other routine surveys	N/A	'4-Ps plus' '4-P plus' OR '4P plus' '4Ps plus' 'alcohol use disorders identification test' AUDIT AND alcohol C-BIAP EPDS* 'edinburg postnatal depression scale' GAD-7 GAD7 NET AND (alcohol OR drinker OR drinking) 'patient health questionnaire' PDSS PHQ PHQ9 'postpartum depression screening scale' T-ACE T-ACER-3 TACER3 TWEAK
	Drug testing	'drug analysis'/exp/mj 'drug urine level'/mj 'laboratory diagnosis'/mj urinalysis/mj 'diagnostic accuracy'/mj 'diagnostic error'/mj 'diagnostic test'/mj 'mental disease assessment'/exp/mj 'psychiatric diagnosis'/mj 'self report'/mj PsycINFO "drug usage screening"/ urinalysis/ psychological assessment/ "self-report"/	assess* bioanalysis checklist* detect* diagnos* index* indices instrument* inventories inventory measure* profile* questionnaire* scale screen* self NEXT/1 report* survey* test* tool*
	Psychiatric disorders	'mental disease'/de PsycINFO exp affective disorders/ behavior disorders/ mental disorders/	(anxiety OR behavior* OR behavior* OR mood) NEXT/1 disorder* bipolar depress* (mental* OR psychiatric) NEXT/1 (condition* OR disease* OR disorder* OR health OR ill OR illness*)

	Concept	Controlled Vocabulary (EMTREE unless otherwise noted)	Keywords
Question 5 – Perinatal Screens for Psychiatric and Substance Use Disorders Compared with Routine Screening Methods (cont.)	Substance use disorders	addiction/de 'drug abuse'/de 'drug dependence'/exp 'substance abuse'/de PsycINFO addiction/de 'drug abuse'/de 'drug dependence'/exp 'substance abuse'/de	addict* dependen* 'drug abuse' 'drug exposure' 'drug use' Illicit 'substance abuse' 'substance use' alcohol amphetamine* cocaine heroin marijuana methadone morphine opiate* opioid*
Question 6 – First Trimester Ultrasound to Establish or Confirm Gestational Age	Measurement	N/A	accura* adjust* agree* assess* calculat* confirm* determin* discrepan* establish* estimate* measur* predict*
	Pregnancy dating/Gestational age	'gestational age'/mj	(delivery OR due OR pregnancy) NEAR/2 date (fetal OR foetal OR fetus OR foetus OR gestational) NEAR/2 age 'gestational age dating' 'pregnancy dating' 'trimester dating'
	Ultrasound	ultrasound/de 'fetus echography'/exp	echograph* sonogra* ultrasonograph* ultrasound* US
	Ultrasound dating	N/A	'ultrasound dating'

	Concept	Controlled Vocabulary (EMTREE unless otherwise noted)	Keywords
Question 7 – Factors or Interventions That Improve Outcomes Related to Breastfeeding	Breastfeeding	'breast feeding'/exp/mj	'breast feeding' breastfeeding
	Breast examination	'breast examination'/de	breast NEXT/1 exam*
	Formal education programs	'breast feeding education'/exp education/de 'health education'/de 'childbirth education'/de 'health promotion'/de 'lactation consultant'/de 'nutrition education'/de 'parenting education'/de 'patient education'/de 'program evaluation'/exp	class* course* educat* program*
	Experience, preparation, promotion	N/A	attitud* consult* determinant* duration* encourag* experienc* guidance improv* initiat* knowledg* likel* prepar* promot* provider* success* support* train*
	Reoccurring concept	N/A	(breastfeeding OR 'breast feeding') AND initiat*

	Concept	Controlled Vocabulary (EMTREE unless otherwise noted)	Keywords
Question 8 – Impact of Exercise Frequency, Type, and Intensity on Maternal and Fetal Outcomes	Formal exercise	exercise/exp/mj 'physical activity'/exp/mj sport/exp/mj	aerobic* athletic* aquatic* bicycling cycling dancing exercis* fitness hiking jogging physical NEXT/1 activit* running sports swimming walking yoga
Question 9 – Pregnancy-related Complications and Risk of Adverse Life-Time Health Outcomes	Specific pregnancy complications	'eclampsia and preeclampsia'/mj 'maternal hypertension'/de preeclampsia/mj 'pregnancy diabetes mellitus'/exp/mj	eclampsia 'gestational diabetes' (gestational OR maternal OR pregnancy) AND hypertensi* 'pre-eclampsia' preeclampsia
	Adverse life-time health outcomes	'cardiovascular risk'/exp/mj 'chronic disease'/de 'life expectancy'/de OR lifespan/de	chronic course decade* future later later NEXT/2 life 'life expectancy' 'life-long' lifelong 'life-span' lifespan 'life-time' lifetime 'long term' longterm subsequent years AND (after OR 'follow-up' OR followup OR later OR 'post-partum' OR postpartum)

	Concept	Controlled Vocabulary (EMTREE unless otherwise noted)	Keywords
Question 10 – Maternal Age and Gestational Age and Consideration for Antepartum Surveillance and Planned Delivery	Women of advanced maternal age	'maternal age'/mj	(35 OR 40 OR 50) NEAR/3 (age* OR old OR year*) 40s advance* NEXT/1 age* forties middle NEXT/1 age* older
	Antepartum surveillance and planned delivery	amniocentesis/exp 'chorion villus sampling'/de 'blood pressure monitoring'/de 'diagnostic procedure'/exp echography/exp monitoring/de 'obstetric operation'/exp 'obstetric procedure'/de 'patient monitoring'/exp 'physiologic monitoring'/exp 'perinatal care'/exp 'prenatal care'/exp 'prenatal diagnosis'/de 'risk management'/de 'risk reduction'/de ultrasound/de 'uterine activity monitoring'/de	care 'expectant management' induc* manag* monitor* plan* observ* schedul* sonogra* surveillance test* ultrasound* ultrasonogra*

	Concept	Controlled Vocabulary (EMTREE unless otherwise noted)	Keywords
Question 10 – Maternal Age and Gestational Age and Consideration for Antepartum Surveillance and Planned Delivery (cont.)	Identification of risk	'fetus control'/exp 'fetus disease'/exp 'fetus mortality'/de 'fetus outcome'/de 'fetus risk'/de hypertension/de 'high risk infant'/de 'high risk patient'/de 'high risk population'/de 'high risk pregnancy'/de 'labor complication'/de 'intermediate risk patient'/de 'intermediate risk population'/de 'maternal hypertension'/de 'maternal morbidity'/de 'maternal mortality'/de miscarriage/de 'perinatal morbidity' 'perinatal mortality'/exp 'placenta disorder'/exp 'pregnancy complication'/exp 'pregnancy disorder'/de 'pregnancy loss'/de 'pregnancy outcome'/de 'pregnancy toxemia'/exp 'premature labor'/de risk/de OR 'risk assessment'/de 'risk factor'/de stillbirth/de	aneuploid* 'c-section' caesarean cesarean down* chromosom* 'gestational diabetes' 'high blood pressure' hypertensi* 'low birth weight' miscarriage* placenta* multiple* 'pregnancy loss' prematur* preterm OR risk* trisom* twin twins

B. Search Strategies

Table F-2. PubMed

Question/Hedge	Set #	Concept	Strategy
Question 1 – Screening and Diagnosing Gestational Diabetes Mellitus in Pregnant Women	#1	Population (pregnant women, women at risk of developing gestational diabetes)	"gestational diabetes"[tiab] OR (gestational[ti] AND diabetes[ti])
	#2		((maternal[ti] OR pregnan*[ti]) AND diabetes[ti]) NOT ("pre-existing"[ti] OR preexisting[ti] OR "pre-gestational"[ti] OR pregestational[ti] OR type[ti])
	#3	Combine	#1 OR #2
	#4	Intervention (glucose tolerance, HbA1c, fasting blood sugar, others)	"glucose challenge"[ti] OR "glucose tolerance"[ti] OR "oral glucose"[ti] OR "one-step"[ti] OR "two-step"[ti] OR "2-step"[ti] OR (fasting[ti] AND (glucose[ti] OR "blood sugar"[ti])) OR HbA1c[ti] OR A1c[ti] OR ((glycated[ti] OR glycosylated[ti]) AND (haemoglobin[ti] OR hemoglobin[ti])) OR diagnos*[ti] OR identif*[ti] OR measur[ti] OR screen*[ti] OR test[ti] OR tested[ti] OR testing[ti] OR tests[ti]
	#5	Combine	#3 AND #4
Question 2 – Patients Likely to Respond to Aspirin for Prevention of Preeclampsia	#1	Intervention (aspirin)	"acetylsalicylic acid"[ti] OR aspirin[ti]
	#2	Outcome (preeclampsia, preeclampsia necessitating preterm birth, recurrence in women with history)	"pre-eclampsia"[ti] OR preeclampsia[ti] OR eclampsia[ti] OR HELLP[ti] OR pre-term[ti] OR preterm[ti] OR ((hyperten*[ti] OR toxem*[ti]) AND (perinatal*[tiab] OR pregnan*[ti]))
	#3	Combine	#1 AND #2
	#4	Broad intervention (aspirin)	"acetylsalicylic acid"[tiab] OR aspirin[tiab]
	#5	Broad intervention (prevention)	prevent*[tiab] OR prophyla*[tiab] OR manag*[tiab] OR therap*[tiab] OR treat*[tiab]
	#6	Broad outcome (preeclampsia and related indications)	"pre-eclampsia"[tiab] OR preeclampsia[tiab] OR eclampsia[tiab]
	#7	Combine	(#4 OR #5) AND #6
Question 3 – Nutritional Interventions for Pregnant Women Who Have Had Bariatric Surgery	#1	Population (pregnant women)	antenatal[ti] OR fetal[ti] OR fetus*[ti] OR foetal[ti] OR foetus*[ti] OR maternal*[ti] OR neonat*[ti] OR perinatal*[ti] OR pregnan*[ti] OR prenatal*[ti]
	#2	Subpopulation (women with a history of bariatric surgery) text words	bariatric[ti] OR "metabolic surgery"[ti] OR biliopancreatic[ti] OR "bilio-pancreatic"[ti] OR "duodenal switch"[ti] OR "gastric balloon"[ti] OR "gastric band"[ti] OR "gastric banding"[ti] OR "gastric bypass"[ti] OR "gastric sleeve"[ti] OR gastroplast*[ti] OR "jejunoileal bypass"[ti] OR lapband[ti] OR "lap-band"[ti] OR "obesity surgery"[ti] OR "Roux-en-Y"[ti] OR "sleeve gastrectomy"[ti] OR "stomach stapling"[ti] OR "weight loss surgery"[ti]
	#3	Combine population sets	#1 AND #2
	#4	Limit broad set to meta-analyses and systematic reviews	#3 AND See hedge at end of table

Question/Hedge	Set #	Concept	Strategy
Question 3 – Nutritional Interventions for Pregnant Women Who Have Had Bariatric Surgery (cont.)	#5	Intervention (nutritional screening, nutritional management, dietary supplements) text words	anem*[tiab] OR deficien*[tiab] OR macronutrient*[tiab] OR malnutrition[tiab] OR micronutrient*[tiab] OR nutrient*[tiab] OR nutrition*[tiab] OR supplement*[tiab] OR vitamin*[tiab] OR B[tiab] OR B12[tiab] OR calcium[tiab] OR folate[tiab] OR "folic acid"[tiab] OR iron[tiab] OR "dumping syndrome"[tiab] OR "gastric emptying"[tiab] OR diabetes[tiab] OR "glucose challenge"[tiab] OR "glucose tolerance"[tiab] OR "oral glucose"[tiab] OR fasting[tiab]
	#6	Combine population and intervention set	#3 AND #5
	#7	Combine sets	#4 OR #6
Question 4 – Comparative Accuracy, Clinical Utility, and Cost of Methods of Aneuploidy Screening	#1	Population (pregnant women)	antenatal[tiab] OR maternal[tiab] OR obstet*[tiab] OR perinatal[tiab] OR prenatal[tiab] OR pregnan*[tiab] OR trimester[tiab]
	#2	Population (fetus)	fetal[tiab] OR fetus*[tiab] OR foetal[tiab] OR foetus*[tiab]
	#3	Condition (aneuploidy)	aneuploid*[tiab] OR "down syndrome"[tiab] OR "downs syndrome"[tiab] OR klinefelter*[tiab] OR trisom* OR turner*[tiab]
	#4	Combine sets	(#1 OR #2) AND #3
	#5	Intervention (cell-free fetal DNA testing)	cffDNA[tiab] OR cellfree[tiab] OR "cell-free"[tiab] OR "fetal DNA"[tiab] OR "fetal nucleic acid"[tiab] OR "fetal nucleic acids"[tiab] OR "foetal DNA"[tiab] OR (foetal[tiab] AND nucleic[tiab] AND acid[tiab]) OR (foetal[tiab] AND nucleic[tiab] AND acids[tiab]) OR (noninvasive[tiab] AND prenatal[tiab]) OR "non-invasive prenatal"[tiab] OR "prenatal diagnosis"[tiab]
	#6	Intervention (maternal serum, nuchal translucency, amniocentesis, and other tests)	"nuchal fold"[tiab] OR "nuchal thickness"[tiab] OR "nuchal translucency"[tiab] OR ultrasonography*[tiab] OR ultrasound[tiab] OR biochemical[tiab] OR biomarker*[tiab] OR marker*[tiab] OR PAPP-A[tiab] OR hCG[tiab] OR AFP[tiab] OR e3[tiab] OR "inhibin A"[tiab] OR "double test"[tiab] OR "triple test"[tiab] OR "quadruple test"[tiab] OR "combined test"[tiab] OR amniocentesis[tiab] OR "chorionic villus"[tiab] OR screen*[ti] OR test*[ti]
	#7	Combine sets	#4 AND (#5 OR #6)
	#8	Intervention (special topic of interest)	scan[tiab] OR scans[tiab] OR sonogram[tiab] OR sonograms[tiab] OR ultrasonography[tiab] OR ultrasound*[tiab]
	#9		anomaly[tiab] OR detailed[tiab] OR “level II”[tiab] OR “level 2”[tiab] OR targeted[tiab]
	#10		“advanced ultrasound” OR “second trimester ultrasound” OR anomaly[tiab]
	#11		“early anomaly”[tiab] OR “fetal anomaly scan”[tiab]
	#12	Combine intervention sets	#8 AND (#9 OR #10 OR #11)
	#13	Combine sets	#4 AND #12
	#14	Combine two separate intervention sets	#7 OR #13

Question/Hedge	Set #	Concept	Strategy
Question 5 – Perinatal Screens for Psychiatric and Substance Use Disorders Compared with Routine Screening Methods	#1	Population (pregnant women)	antenatal[ti] OR antepartum[ti] OR maternal[ti] OR obstet*[ti] OR perinatal[ti] OR post-natal[ti] OR postnatal[ti] OR post-partum[ti] OR postpartum[ti] OR pre-natal[ti] OR prenatal[ti] OR pregnan*[ti]
	#2	Intervention (specific perinatal surveys and other routine surveys)	T-ACE[ti] OR TWEAK[ti] OR "4-Ps plus"[ti] OR "4-P plus"[ti] OR "4P plus"[ti] OR "4Ps plus"[ti] OR (NET[ti] AND (alcohol[ti] OR drinker[ti] OR drinking[ti])) OR EPDS*[ti] OR "edinburg postnatal depression scale"[ti] OR PDSS[ti] OR "postpartum depression screening scale"[ti] OR (AUDIT[ti] AND alcohol*[ti]) OR "alcohol use disorders identification test"[ti] OR PHQ9[ti] OR PHQ[ti] OR "patient health questionnaire"[ti] OR C-BIAP[ti] OR GAD7[ti] OR GAD-7[ti] OR TACER3[ti] OR TACER-3[ti]
	#3	Intervention (any survey or laboratory screening test for psychiatric or substance use disorders)	assess*[ti] OR bioanalysis[ti] OR checklist*[ti] OR detect*[ti] OR diagnos*[ti] OR index*[ti] OR indices[ti] OR instrument*[ti] OR inventories[ti] OR inventory[ti] OR measure*[ti] OR profile*[ti] OR questionnaire*[ti] OR scale[ti] OR screen*[ti] OR "self report"[ti] OR "self reports"[ti] OR survey*[ti] OR test[ti] OR tests[ti] OR tested[ti] OR testing[ti] OR tool*[ti]
	#4	Condition (psychiatric disorder)	((mental*[ti] OR psychiatric[ti]) AND (condition*[ti] OR disease*[ti] OR disorder*[ti] OR health[ti] OR ill[ti] OR illness*[ti])) OR ((anxiety[ti] OR behavior*[ti] OR behavior*[ti] OR mood[ti]) AND disorder*[ti]) OR bipolar[ti] OR depress*[ti]
	#5	Condition (substance use disorder)	addict*[ti] OR dependen*[ti] OR "drug abuse"[ti] OR "drug exposure"[ti] OR "drug use"[ti] OR illicit[ti] OR "substance abuse"[ti] OR "substance use"[ti] OR alcohol[ti] OR amphetamine*[ti] OR cocaine[ti] OR heroin[ti] OR marijuana[ti] OR methadone[ti] OR morphine[ti] OR opiate*[ti] OR opioid*[ti]
	#6	Combine sets	#3 AND (#4 OR #5)
	#7	Combine sets	#1 AND (#2 OR #6)
Question 6 – First Trimester Ultrasound to Establish or Confirm Gestational Age	#1	Pregnancy dating/establishing gestational age	"pregnancy dating"[tiab]
	#2		(delivery[ti] OR due[ti] OR pregnancy[ti]) AND date[ti]
	#3		(fetal[ti] OR foetal[ti] OR fetus[ti] OR foetus[ti] OR gestational[ti]) AND age[ti]
	#4		"gestational age"[tiab] AND (agree*[ti] OR calculat*[ti] OR confirm*[ti] OR determin*[ti] OR establish*[ti] OR measur*[ti] OR predict*[ti])
	#5	Combine sets	#1 OR #2 OR #3 OR #4
	#6	Intervention (ultrasound)	echograph*[tiab] OR sonogra*[tiab] OR ultrasonograph*[tiab] OR ultrasound*[tiab] OR US[ti]
	#7	Combine sets	#5 AND #6

Question/Hedge	Set #	Concept	Strategy
Question 7 – Factors or Interventions That Improve Outcomes Related to Breastfeeding	#1	Population (pregnant women/women receiving prenatal care)	antenatal[ti] OR obstet*[ti] OR perinatal[ti] OR prenatal[ti] OR pregnan*[tiab]
	#2	Issue (breastfeeding)	"breast feeding"[ti] OR breastfeeding[ti]
	#3	Combine sets	#1 AND #2
	#4	Intervention (breast examination)	breast[ti] AND (exam[ti] OR exams[ti] OR examination*[ti])
	#5	Intervention (formal education programs)	class*[ti] OR course*[ti] OR educat*[ti] OR program*[ti]
	#6	Intervention (experience, preparation, promotion)	attitud*[ti] OR consult*[ti] OR determinant*[ti] OR duration*[ti] OR encourag*[ti] OR experienc*[ti] OR guidance[ti] OR improve*[ti] OR initiat*[ti] OR knowledg*[ti] OR likel*[ti] OR prepar*[ti] OR promot*[ti] OR provider*[ti] OR success*[ti] OR support*[ti] OR train*[ti]
	#7	Combine intervention sets	#4 OR #5 OR #6
	#8	Combine all sets	#3 AND #7
Question 8 – Impact of Exercise Frequency, Type, and Intensity on Maternal and Fetal Outcomes	#1	Population (pregnant women)	'perinatal care'/de OR 'perinatal period'/de OR pregnancy/exp OR 'pregnant women'/de OR 'prenatal care'/de OR 'prenatal period'/de OR (antenatal OR maternal OR obstet* OR perinatal OR prenatal OR pregnan*):ti
	#2	Population (fetal)	'parameters concerning the fetus, newborn and pregnancy'/exp OR (fetal OR fetus* OR foetal OR foetus*):ti
	#3	Issue (formal exercise)	exercise/exp/mj OR 'physical activity'/exp/mj OR sport/exp/mj OR (aerobic* OR athletic* OR aquatic* OR bicycling OR cycling OR dancing OR exercis* OR fitness OR hiking OR jogging OR running OR sports OR swimming OR walking OR yoga OR (physical NEXT/1 activit*)):ti
	#4	Combine sets	(#1 OR #2) AND #3
Question 9 – Pregnancy-related Complications and Risk of Adverse Life-Time Health Outcomes	#1	Population (pregnant women)	antenatal[ti] OR maternal[ti] OR obstet*[ti] OR perinatal[ti] OR prenatal[ti] OR pregnan*[ti]
	#2	Issue (specific pregnancy complications)	"gestational diabetes"[ti] OR "pre-eclampsia"[ti] OR preeclampsia[ti] OR eclampsia[ti] OR ((gestational[ti] OR maternal[ti] OR pregnancy[ti]) AND hypertensi*[ti])
	#3	Combine sets	#1 AND #2
	#4	Issue (adverse life-time health outcomes) EMTREE controlled vocabulary	later[tiab] AND life[tiab]
	#5	Issue (adverse life-time health outcomes) text words	(years[ti] AND (after[ti] OR "follow-up"[ti] OR followup[ti] OR later[ti] OR "post-partum"[ti] OR postpartum[ti])) OR chronic[ti] OR course[ti] OR decade*[ti] OR future[ti] OR later[ti] OR "life expectancy"[ti] OR "life-long"[ti] OR lifelong[ti] OR "life-span"[ti] OR lifespan[ti] OR "life-time"[ti] OR lifetime[ti] OR "long term"[ti] OR longterm[ti] OR subsequent[ti]
	#6	Combine sets	#4 OR #5
	#7	Combine sets	#3 AND #6

Question/Hedge	Set #	Concept	Strategy
Question 10 – Maternal Age & Gestational Age and Consideration for Antepartum Surveillance and Planned Delivery	#1	Population (pregnant women)	antenatal[tiab] OR antepartum[tiab] OR maternal[tiab] OR obstet*[tiab] OR perinatal[tiab] OR prenatal[tiab] OR pregnan*[tiab] OR trimester*[tiab]
	#2	Population (women of advanced maternal age)	40s[ti] OR forties[ti] OR older[ti] OR (middle[ti] AND age*[ti]) OR (advanc*[ti] AND age*[ti]) OR ((35[ti] OR 40[ti] OR 50[ti]) AND (age*[ti] OR old*[ti] OR year*[ti]))
	#3	Combine sets	#1 AND #2
	#4	Intervention (antepartum surveillance)	amniocentesis[ti] OR care[ti] OR chorion*[ti] OR 'expectant management' OR induc*[ti] OR manag*[ti] OR monitor*[ti] OR plan[ti] OR planned[ti] OR planning[ti] OR plans[ti] OR observ*[ti] OR sonogra*[ti] OR surveillance[ti] OR test[ti] OR tests[ti] OR tested[ti] OR testing[ti] OR ultrasound*[ti] OR ultrasonogra*[ti]
	#5	Intervention (identification of risk)	aneuploid*[ti] OR "c-section"[ti] OR caesarean[ti] OR cesarean[ti] OR down*[ti] OR chromosom*[ti] OR "gestational diabetes"[ti] OR "high blood pressure"[ti] OR hypertensi*[ti] OR "low birth weight"[ti] OR miscarriage*[ti] OR placenta*[ti] OR multiple*[ti] OR "pregnancy loss"[ti] OR prematur*[ti] OR preterm[ti] OR risk*[ti] OR trisom*[ti] OR twin[ti] OR twins[ti]
	#6	Combine sets	#3 AND (#4 OR #5)
General Hedges Applied to Each Search		Limit to newly added results (inprocess, publisher)	AND (inprocess[sb] OR publisher[sb] OR pubmednotmedline[sb])
		Exclude animal studies	NOT (mouse[ti] OR mice[ti] OR rat[ti] OR rats[ti] OR rabbit*[ti] OR sheep[ti])
		Limit to English language publications and results with abstracts	AND eng[la] AND hasabstract
		Remove undesired publication types (e.g., case reports, comments)	NOT (year-old[tiab] OR "case report"[ti] OR comment[ti])
		Limit by publication year	AND 2007:2017[edat]
Study Type Hedges Applied as Needed (per Key Question Specific Criteria provided earlier in this report)		Limit to studies that make comparisons	"case control"[tiab] OR compar*[tiab] OR "control group"[tiab] OR "controlled study"[tiab] OR "controlled trial"[tiab] OR "cross over"[tiab] OR crossover[tiab] OR "double blind"[tiab] OR "double blinded"[tiab] OR "matched controls"[tiab] OR placebo*[tiab] OR random*[tiab] OR sham[tiab] OR versus[ti] OR vs[ti]
		Limit to meta-analyses and systematic reviews	"meta-analysis"[tiab] OR "meta-analytic"[tiab] OR metaanaly*[tiab] OR "research synthesis"[tiab] OR "systematic review"[tiab] OR pooled[tiab] OR pooling[tiab] OR search*[tiab] OR "critical review"[ti] OR "evidence-based"[ti] OR cochrane database syst rev[ta]

Table F-3. Embase/MEDLINE (presented in Embase syntax)

Question/Hedge	Set #	Concept	Strategy
Question 1 – Screening and Diagnosing Gestational Diabetes Mellitus in Pregnant Women	#1	Condition (gestational diabetes)	'pregnancy diabetes mellitus'/exp/mj OR 'gestational diabetes':ti
	#2		((pregnancy/mj OR maternal:ti OR pregnan*:ti) AND diabetes:ti) NOT ('pre-existing' OR preexisting OR 'pre-gestational' OR pregestational OR type):ti
	#3	Combine sets	#1 AND #2
	#4	Intervention (glucose tolerance, HbA1c, fasting blood sugar, others)	'glycosylated hemoglobin'/exp/mj OR 'glucose tolerance test'/exp/mj OR diagnosis/exp/mj OR ('glucose challenge' OR 'glucose tolerance' OR 'oral glucose' OR 'one-step' OR 'two-step' OR '2-step' OR (fasting AND (glucose OR 'blood sugar')) OR HbA1c OR A1c OR ((glycated OR glycosylated) AND (haemoglobin OR hemoglobin))):ti OR (diagnos* OR identif* OR measur* OR screen* OR test OR tested OR testing OR tests):ti
	#5	Combine sets	#3 AND #4
Question 2 – Patients Likely to Respond to Aspirin for Prevention of Preeclampsia	#1	Focused intervention (aspirin)	'acetylsalicylic acid'/mj OR ('acetylsalicylic acid' OR aspirin):ti
	#2	Focused outcome (preeclampsia, preeclampsia necessitating preterm birth, recurrence in women with history)	'eclampsia and preeclampsia'/mj OR preeclampsia/mj OR ('pre-eclampsia' OR preeclampsia OR eclampsia OR HELLP OR 'pre-term' OR preterm):ti OR ((hyperten* OR toxem*):ti AND (pregnancy/exp/mj OR (perinatal* OR pregnan*):ti))
	#3	Combine sets	#1 AND #2
	#4	Broad intervention (aspirin)	'acetylsalicylic acid'/de OR ('acetylsalicylic acid' OR aspirin):ti,ab
	#5	Broad intervention (prevention)	(prevent* OR prophyla* OR manag* OR therap* OR treat*):ti
	#6	Broad outcome (preeclampsia and related indications)	'eclampsia and preeclampsia'/de OR preeclampsia/de OR ('pre-eclampsia' OR preeclampsia OR eclampsia):ti,ab
	#7	Combine sets	(#4 OR #5) AND #6
	#8	Combine focused and broad sets	#3 OR #7
Question 3 – Nutritional Interventions for Pregnant Women Who Have Had Bariatric Surgery	#1	Population (pregnant women)	'parameters concerning the fetus, newborn and pregnancy'/exp OR 'perinatal care'/exp OR pregnancy/exp OR 'pregnancy disorder'/exp OR 'pregnancy women'/de OR 'pregnancy outcome'/de OR 'prenatal care'/exp OR 'prenatal disorder'/exp
	#2		(antenatal OR fetal OR fetus* OR foetal OR foetus* OR maternal* OR neonat* OR perinatal* OR pregnan* OR prenatal*):ti
	#3	Combine sets	#1 OR #2
	#4	Population (women with a history of bariatric surgery)	'bariatric surgery'/exp OR 'gastric bypass surgery'/de OR gastrojejunostomy/de OR gastroplasty/de

Question/Hedge	Set #	Concept	Strategy
Question 3 – Nutritional Interventions for Pregnant Women Who Have Had Bariatric Surgery (cont.)	#5		(bariatric OR 'metabolic surgery' OR biliopancreatic OR 'bilio-pancreatic' OR 'duodenal switch' OR 'gastric balloon' OR (gastric NEXT/1 band*) OR 'gastric bypass' OR (gastric NEXT/1 sleeve*) OR gastroplast* OR 'jejunoileal bypass' OR lapband OR 'lap-band' OR 'obesity surgery' OR 'Roux-en-Y' OR 'sleeve gastrectomy' OR 'stomach stapling' OR 'weight loss surgery'):ti
	#6	Combine sets	#4 OR #5
	#7	Combine population and subpopulation sets	#3 AND #6
	#8	Meta-analyses and systematic reviews	See hedge at end of table
	#9	Condition (nutritional disorders)	nutrition/exp OR 'nutritional disorder'/exp
	#10	Specific nutrients	(anem* OR deficien* OR macronutrient* OR malnutrition OR micronutrient* OR nutrient* OR nutrition* OR supplement* OR vitamin* OR B OR B12 OR calcium OR folate OR 'folic acid' OR iron):ti,ab
	#11	Combine sets	#9 OR #10
	#12	Topic of special interest (care of diabetes screening in women who experience dumping syndrome)	'dumping syndrome'/de OR (dumping NEXT/1 syndrome* OR 'gastric emptying'):ti,ab
	#13		'pregnancy diabetes mellitus'/exp/mj OR 'gestational diabetes':ti OR ((pregnancy/mj OR maternal:ti OR pregnan*:ti) AND diabetes:ti)
	#14		'glucose tolerance test'/exp/mj OR 'glucose challenge' OR 'glucose tolerance' OR 'oral glucose' OR fasting
	#15	Combine sets	#12 OR #13 OR #14
	#16	Combine population with meta-analysis, topic, and intervention sets	#7 AND (#8 OR #11 OR #15)
Question 4 – Comparative Accuracy, Clinical Utility, and Cost of Methods of Aneuploidy Screening	#1	Population (pregnant women)	'perinatal period'/de OR pregnancy/exp OR 'pregnant women'/de OR 'prenatal period'/de OR (antenatal OR maternal OR obstet* OR perinatal OR prenatal OR pregnan* OR trimester):ti,ab
	#2	Population (fetuses)	'parameters concerning the fetus, newborn and pregnancy'/exp OR (fetal OR fetus* OR foetal OR foetus*):ti,ab
	#3	Condition (aneuploidy)	aneuploidy/exp OR 'down syndrome'/de OR trisomy/exp OR 'klinefelter syndrome'/de OR 'turner syndrome'/de OR (aneuploid* OR "down syndrome" OR "downs syndrome" OR klinefelter* OR trisom* OR turner*):ti,ab
	#4	Combine sets	(#1 OR #2) AND #3
	#5	Intervention (cell-free fetal DNA testing)	'non invasive measurement'/de OR (cffDNA OR cellfree OR 'cell-free' OR 'fetal DNA' OR 'fetal nucleic acid' OR 'fetal nucleic acids' OR 'foetal DNA' OR 'foetal nucleic acid' OR 'foetal nucleic acids' OR 'noninvasive prenatal' OR 'non-invasive prenatal' OR 'prenatal diagnosis'):ti,ab

Question/Hedge	Set #	Concept	Strategy
Question 4 – Comparative Accuracy, Clinical Utility, and Cost of Methods of Aneuploidy Screening (cont.)	#6	Intervention (maternal serum, nuchal translucency, amniocentesis, and other tests)	amniocentesis/exp OR 'chorion villus sampling'/de OR 'diagnostic test accuracy study'/de OR 'maternal serum screening'/de OR 'nuchal translucency measurement'/de OR 'prenatal diagnosis'/de OR 'prenatal screening'/de OR ('nuchal fold' OR 'nuchal thickness' OR 'nuchal translucency' OR ultrasonography* OR ultrasound OR biochemical OR biomarker* OR marker* OR PAPP-A OR hCG OR AFP OR e3 OR 'inhibin A' OR 'double test' OR 'triple test' OR 'quadruple test' OR 'combined test' OR amniocentesis OR 'chorionic villus'):ti,ab OR (screen* OR test*):ti
	#7	Topic of special interest	((advanced OR anatomy OR anomaly OR detailed OR 'level II' OR 'level 2' OR 'second trimester' OR targeted) NEXT/3 (scan OR scans OR sonogram OR sonograms OR ultrasonography OR ultrasound*)):ti,ab
	#8	Combine sets	#4 AND (#5 OR #6 OR #7)
Question 5 – Perinatal Screens for Psychiatric and Substance Use Disorders Compared with Routine Screening Methods	#1	Population (pregnant women)	'perinatal care'/de OR 'perinatal period'/de OR pregnancy/exp OR 'pregnant women'/de OR 'prenatal care'/de OR 'prenatal period'/de OR (antenatal OR antepartum OR maternal OR obstet* OR perinatal OR post-natal OR postnatal OR post-partum OR postpartum OR pre-natal OR prenatal OR pregnan*):ti
	#2	Intervention (specific perinatal surveys and other routine surveys)	(T-ACE OR TWEAK OR '4-Ps plus' OR '4-P plus' OR '4P plus' OR '4Ps plus' OR (NET AND (alcohol OR drinker OR drinking)) OR EPDS* OR 'edinburg postnatal depression scale' OR PDSS OR 'postpartum depression screening scale' OR (AUDIT AND alcohol*) OR 'alcohol use disorders identification test' OR PHQ9 OR PHQ OR 'patient health questionnaire' OR C-BIAP OR GAD7 OR GAD-7 OR TACER3 OR TACER-3):ti
	#3	Intervention (laboratory tests and general testing concepts)	'drug analysis'/exp/mj OR 'drug urine level'/mj OR 'laboratory diagnosis'/mj OR urinalysis/mj OR 'diagnostic accuracy'/mj OR 'diagnostic error'/mj OR 'diagnostic test'/mj OR 'mental disease assessment'/exp/mj OR 'psychiatric diagnosis'/mj OR 'self report'/mj OR (assess* OR bioanalysis OR checklist* OR detect* OR diagnos* OR index* OR indices OR instrument* OR inventories OR inventory OR measure* OR profile* OR questionnaire* OR scale OR screen* OR (self NEXT/1 report*) OR survey* OR test OR tests OR tested OR testing OR tool*):ti
	#4	Condition (psychiatric disorder)	'mental disease'/de OR (((mental* OR psychiatric) NEXT/1 (condition* OR disease* OR disorder* OR health OR ill OR illness*)) OR ((anxiety OR behavior* OR behavior* OR mood) NEXT/1 disorder*) OR bipolar OR depress*):ti
	#5	Condition (substance use disorder)	addiction/de OR 'drug abuse'/de OR 'drug dependence'/exp OR 'substance abuse'/de OR (addict* OR dependen* OR 'drug abuse' OR 'drug exposure' OR 'drug use' OR illicit OR 'substance abuse' OR 'substance use' OR alcohol OR amphetamine* OR cocaine OR heroin OR marijuana OR methadone OR morphine OR opiate* OR opioid*):ti
	#6	Combine sets	#3 AND (#4 OR #5)
	#7	Combine sets	#1 AND (#2 OR #6)

Question/Hedge	Set #	Concept	Strategy
Question 6 – First Trimester Ultrasound to Establish or Confirm Gestational Age	#1	Pregnancy dating/ establishing gestational age	(gestational age dating' OR 'pregnancy dating' OR 'trimester dating'):ti,ab
	#2		((delivery OR due OR pregnancy) NEAR/2 date):ti
	#3		((fetal OR foetal OR fetus OR foetus OR gestational) NEAR/2 age):ti
	#4		'gestational age'/mj AND (accura* OR adjust* OR agree* OR assess* OR calculat* OR confirm* OR determin* OR discrepan* OR establish* OR estimate* OR measur* OR predict*):ti
	#5	Combine sets	#1 OR #2 OR #3 OR #4
	#6	Intervention (ultrasound)	ultrasound/de OR 'fetus echography'/exp OR echograph* OR sonogra* OR ultrasonograph* OR ultrasound* OR US:ti
	#7	Combine sets	(#5 AND #6) OR 'ultrasound dating':ti,ab
Question 7 – Factors or Interventions That Improve Outcomes Related to Breastfeeding	#1	Population (pregnant women/women receiving prenatal care)	'perinatal care'/de OR 'perinatal period'/de OR pregnancy/exp OR 'pregnant women'/de OR 'prenatal care'/de OR 'prenatal period'/de OR (antenatal OR obstet* OR perinatal OR prenatal OR pregnan*):ti
	#2	Topic (breastfeeding)	'breast feeding'/exp/mj OR ('breast feeding' OR breastfeeding):ti
	#3	Combine sets	#1 AND #2
	#4	Intervention (breast examination)	'breast examination'/de OR (breast NEXT/1 exam*):ti
	#5	Intervention (formal education programs)	'breast feeding education'/exp OR education/de OR 'health education'/de OR 'childbirth education'/de OR 'health promotion'/de OR 'lactation consultant'/de OR 'nutrition education'/de OR 'parenting education'/de OR 'patient education'/de OR 'program evaluation'/exp OR (class* OR course* OR educat* OR program*):ti
	#6	Intervention (experience, preparation, promotion)	(attitud* OR consult* OR determinant* OR duration* OR encourag* OR experienc* OR guidance OR improv* OR initiat* OR knowledg* OR likel* OR prepar* OR promot* OR provider* OR success* OR support* OR train*):ti
	#7	Combine intervention sets	#4 OR #5 OR #6
	#8	Combine population, topic, and intervention sets	#3 AND #7
	#9	Reoccurring concept	(breastfeeding OR 'breast feeding'):ti AND initiat*:ti
	#10	Combine sets	#8 OR #9

Question/Hedge	Set #	Concept	Strategy
Question 8 – Impact of Exercise Frequency, Type, and Intensity on Maternal and Fetal Outcomes	#1	Population (pregnant women)	'perinatal care'/de OR 'perinatal period'/de OR pregnancy/exp OR 'pregnant women'/de OR 'prenatal care'/de OR 'prenatal period'/de OR (antenatal OR maternal OR obstet* OR perinatal OR prenatal OR pregnan*):ti
	#2	Population (fetuses)	'parameters concerning the fetus, newborn and pregnancy'/exp OR (fetal OR fetus* OR foetal OR foetus*):ti
	#3	Issue (formal exercise)	exercise/exp/mj OR 'physical activity'/exp/mj OR sport/exp/mj OR (aerobic* OR athletic* OR aquatic* OR bicycling OR cycling OR dancing OR exercis* OR fitness OR hiking OR jogging OR running OR sports OR swimming OR walking OR yoga OR (physical NEXT/1 activit*)):ti
	#4	Combine sets	(#1 OR #2) AND #3
Question 9 – Pregnancy-related Complications and Risk of Adverse Life-Time Health Outcomes	#1	Population (pregnant women)	'perinatal care'/de OR 'perinatal period'/de OR pregnancy/exp OR 'pregnant women'/de OR 'prenatal care'/de OR 'prenatal period'/de OR (antenatal OR maternal OR obstet* OR perinatal OR prenatal OR pregnan*):ti
	#2	Issue (specific pregnancy complications)	'pregnancy diabetes mellitus'/exp/mj OR 'eclampsia and preeclampsia'/mj OR preeclampsia/mj OR 'maternal hypertension'/de OR ('gestational diabetes' OR 'pre-eclampsia' OR preeclampsia OR eclampsia):ti OR ((gestational OR maternal OR pregnancy) AND hypertensi*):ti
	#3	Combine sets	#1 AND #2
	#4	Issue (adverse life-time health outcomes)	'cardiovascular risk'/exp/mj OR 'chronic disease'/de OR 'life expectancy'/de OR lifespan/de
	#5		(later NEXT/2 life):ti,ab OR (years AND (after OR 'follow-up' OR followup OR later OR 'post-partum' OR postpartum)):ti OR (chronic OR course OR decade* OR future OR later OR 'life expectancy' OR 'life-long' OR lifelong OR 'life-span' OR lifespan OR 'life-time' OR lifetime OR 'long term' OR longterm OR subsequent):ti
	#6	Combine sets	#4 OR #5
	#7	Combine population, complications, and adverse outcomes sets	#3 AND #6
Question 10 – Maternal Age & Gestational Age and Consideration for Antepartum Surveillance and Planned Delivery	#1	Population (pregnant women)	'perinatal period'/de OR pregnancy/exp OR 'pregnant women'/de OR 'prenatal period'/de OR (antenatal OR antepartum OR maternal OR obstet* OR perinatal OR prenatal OR pregnan* OR trimester*):ti,ab
	#2	Population (advanced maternal age)	'maternal age'/mj OR (40s OR forties OR older OR (middle NEXT/1 age*) OR (advanc* NEXT/2 age) OR ((35 OR 40 OR 50) NEAR/3 (age* OR old* OR year*))):ti
	#3	Combine sets	#1 AND #2

Question/Hedge	Set #	Concept	Strategy
Question 10 – Maternal Age and Gestational Age and Consideration for Antepartum Surveillance and Planned Delivery (cont.)	#4	Intervention (antepartum surveillance and planned delivery)	amniocentesis/exp OR 'chorion villus sampling'/de OR 'blood pressure monitoring'/de OR 'diagnostic procedure'/exp OR echography/exp OR monitoring/de OR 'obstetric operation'/exp OR 'obstetric procedure'/de OR 'patient monitoring'/exp OR 'physiologic monitoring'/exp OR 'perinatal care'/exp OR 'prenatal care'/exp OR 'prenatal diagnosis'/de OR 'risk management'/de OR 'risk reduction'/de OR ultrasound/de OR 'uterine activity monitoring'/de OR (care OR induc* OR manag* OR monitor* OR plan* OR observ* OR schedul* OR sonogra* OR surveillance OR test OR tests OR tested OR testing OR ultrasound* OR ultrasonogra*):ti
	#5	Intervention (identification of risk)	'fetus control'/exp OR 'fetus disease'/exp OR 'fetus mortality'/de OR 'fetus outcome'/de OR 'fetus risk'/de OR hypertension/de OR 'high risk infant'/de OR 'high risk patient'/de OR 'high risk population'/de OR 'high risk pregnancy'/de OR 'labor complication'/de OR 'intermediate risk patient'/de OR 'intermediate risk population'/de OR 'maternal hypertension'/de OR 'maternal morbidity'/de OR 'maternal mortality'/de OR miscarriage/de OR 'perinatal morbidity' OR 'perinatal mortality'/exp OR 'placenta disorder'/exp OR 'pregnancy complication'/exp OR 'pregnancy disorder'/de OR 'pregnancy loss'/de OR 'pregnancy outcome'/de OR 'pregnancy toxemia'/exp OR 'premature labor'/de OR risk/de OR 'risk assessment'/de OR 'risk factor'/de OR stillbirth/de OR (aneuploid* OR 'c-section' OR caesarean OR cesarean OR down* OR chromosom* OR 'gestational diabetes' OR 'high blood pressure' OR hypertensi* OR 'low birth weight' OR miscarriage* OR placenta* OR multiple* OR 'pregnancy loss' OR prematur* OR preterm OR risk* OR trisom* OR twin OR twins):ti
	#6	Combine sets	#3 AND (#4 OR #5)
General Hedges Applied to Each Search		Limit to humans and newly added publications	AND ([humans]/lim OR [article in press]/lim OR [in process]/lim)
		Exclude lingering animal studies	NOT (mouse OR mice OR rabbit* OR rat OR rats OR sheep OR swine):ti
		Limit to English language publications and to results with abstracts	AND [English]/lim AND [abstracts]/lim
		Remove undesired publication types (e.g., conferences, editorials)	NOT ('conference paper'/exp OR ('case report' OR book OR editorial OR erratum OR letter OR note OR 'short survey')/de OR (book OR conference OR editorial OR erratum OR letter OR note OR 'short survey'):it OR 'year old':ti,ab OR (book OR 'conference proceeding'):pt OR comment:ti)
		Limit by publication year	AND [2008-2017]/py

Question/Hedge	Set #	Concept	Strategy
Study Type Hedges Applied as Needed (per Key Question Specific Criteria provided earlier in this report)		Limit to meta-analyses and systematic reviews	AND (('meta analysis' OR 'systematic review')/de OR ('meta analysis' OR 'meta analytic' OR metaanaly* OR 'research synthesis' OR 'systematic review' OR pooled OR pooling OR search*):ti,ab OR ('critical review' OR 'evidence based'):ti OR cochrane:jt)
		Limit to randomized controlled trials	AND ('random sample'/de OR 'randomized controlled trial'/de OR 'randomized controlled trial (topic)'/de OR randomization/de OR random*:ti,ab)
		Limit to controlled clinical trials/comparative studies	AND (('comparative study'/exp OR 'controlled study'/exp) OR ('case control' OR compar* OR 'control group' OR 'controlled study' OR 'controlled trial' OR 'cross over' OR crossover OR 'double blind' OR 'double blinded' OR 'matched controls' OR placebo* OR random* OR sham):ti,ab OR (versus OR vs):ti)
		Limit to cost-effectiveness analyses and other studies that address cost	AND (cost/exp OR 'economic evaluation'/exp OR 'health care cost'/exp OR cost*:ti,ab OR (afford* OR dollar* OR economic* OR expens* OR insur* OR paid OR pay* OR provider* OR save* OR saving* OR spend* OR spent):ti)
		Limit to cohort studies	AND ('cohort analysis'/de OR 'diagnostic test accuracy study'/de OR 'longitudinal study'/de OR 'prospective study'/de OR (cohort OR longitudinal OR prospective):ti,ab)
		Limit to studies reporting validity, sensitivity and specificity, clinical utility	AND (‘diagnostic accuracy’/de OR ‘diagnostic test accuracy study’/de OR ‘diagnostic value’/de OR error/exp OR ‘major clinical study’/de OR ‘quality control’/exp OR ‘predictive value’/de OR ‘receiver operating characteristic’/de OR ‘sensitivity and specificity’ OR ‘validation study’/de OR validity/exp OR ((false OR true) NEXT/1 (negative* OR positive*)):ti,ab OR (accuracy OR accurate* OR ‘predictive value’ OR ROC OR ‘receiver operating characteristic’ OR sensitivity OR specificity OR validity OR variab* OR utility):ti,ab)

Table F-4. PsycINFO (presented in OVID syntax)

Question	Set #	Concept	Strategy
Question 5 – Perinatal Screens for Psychiatric and Substance Use Disorders Compared with Routine Screening Methods	#1	Population (pregnant women)	adolescent pregnancy/ OR pregnancy/ OR antepartum period/ OR perinatal period/ OR prenatal care/ OR postnatal period/ OR (antenatal OR antepartum OR maternal OR obstet* OR perinatal OR post-natal OR postnatal OR post-partum OR postpartum OR pre-natal OR prenatal OR pregnan*).ti.
	#2	Intervention (specific perinatal surveys and other routine surveys)	(T-ACE OR TWEAK OR "4-Ps plus" OR "4-P plus" OR "4P plus" OR "4Ps plus" OR (NET AND (alcohol OR drinker OR drinking)) OR EPDS* OR "edinburg postnatal depression scale" OR PDSS OR "postpartum depression screening scale" OR (AUDIT AND alcohol*) OR "alcohol use disorders identification test" OR PHQ9 OR PHQ OR "patient health questionnaire" OR C-BIAP OR GAD7 OR GAD-7 OR TACER3 OR TACER-3).ti.
	#3	Intervention (any survey or biologic screening test for psychiatric or substance use disorders)	"drug usage screening"/ OR urinalysis/ OR psychological assessment/ OR "self-report"/ OR (assess* OR bioanalysis OR checklist* OR detect* OR diagnos* OR index* OR indices OR instrument* OR inventories OR inventory OR measure* OR profile* OR questionnaire* OR scale OR screen* OR (self ADJ1 report*) OR survey* OR test OR tests OR tested OR testing OR tool*).ti.
	#4	Condition (psychiatric disorder)	exp affective disorders/ OR behavior disorders/ OR mental disorders/ OR (((mental* OR psychiatric) ADJ1 (condition* OR disease* OR disorder* OR health OR ill OR illness*)) OR ((anxiety OR behavior* OR behavior* OR mood) ADJ1 disorder*) OR bipolar OR depress*).ti.
	#5	Condition (substance use disorder)	exp addiction/ OR exp drug abuse/ OR "substance use disorder"/ OR (addict* OR dependen* OR "drug abuse" OR "drug exposure" OR "drug use" OR illicit OR "substance abuse" OR "substance use" OR alcohol OR amphetamine* OR cocaine OR heroin OR marijuana OR methadone OR morphine OR opiate* OR opioid*).ti.
	#6	Combine sets	3 AND (4 OR 5)
	#7	Combine sets	1 AND (2 OR 6)
	#8	Exclude animal studies	7 NOT (mouse OR mice OR rat OR rats OR rabbit* OR sheep).ti.
	#9	Limit to English language publications	8 AND English.lg.
	#10	Limit to results with abstracts	Limit 9 to abstracts
	#11	Remove undesired publication types (e.g., case reports, comments)	10 NOT ((chapter OR "column/opinion" OR comment OR "comment/reply" OR dissertation OR editorial OR letter OR review-book).dt. OR (book OR encyclopedia OR "dissertation abstract").pt. OR "case report".ti,ab. OR "year-old".ti,ab.)
	#12	Limit by publication year	limit #11 to yr=”2008 - -2017”
	#13	Limit to meta-analyses and systematic reviews	12 AND (meta analysis/ OR ("meta analysis" OR "meta analytic" OR metaanaly* OR "research synthesis" OR "systematic review" OR pooled OR pooling OR search*).ti,ab. OR ("critical review" OR "evidence based").ti.)

Question	Set #	Concept	Strategy
Question 5 – Perinatal Screens for Psychiatric and Substance Use Disorders Compared with Routine Screening Methods (cont.)	#14	Limit to comparative/controlled studies	12 AND (random sampling/ OR ("case control" OR compar* OR "control group" OR "controlled study" OR "controlled trial" OR "cross over" OR crossover OR "double blind" OR "double blinded" OR "matched controls" OR placebo* OR random* OR sham).ti,ab. OR (versus OR vs).ti.)
	#15	Combine sets	13 OR 14

Appendix G: Abbreviation List

Abbreviation	Definition
ACIP	Advisory Committee on Immunization Practices
ACOG	American Congress of Obstetricians and Gynecologists
AHRQ	Agency for Healthcare Research and Quality
AND	Academy of Nutrition and Dietetics
AUDIT-C	Alcohol Use Disorders Identification Test- Consumption
BMI	body mass index
cffDNA	cell-free fetal deoxyribonucleic acid
COI	conflict of interest
COR	contracting officer's representative
CPG	clinical practice guideline
CRS	congenital rubella syndrome
CVD	cardiovascular disease
CVS	chorionic villus sampling
DoD	Department of Defense
EBPWG	Evidence-Based Practice Work Group
E-HITS	Extended - Hurt, Insult, Threaten, Scream
EPDS	Edinburgh Postnatal Depression Scale
FDA	U.S. Food and Drug Administration
GBS	Group B streptococcus
GDM	gestational diabetes mellitus
GRADE	Grading of Recommendations Assessment, Development and Evaluation
GTT	glucose tolerance test
gm	gram
HbA1c	glycosylated hemoglobin A1c
HSV	herpes simplex virus
HPV	human papillomavirus
IAP	intrapartum antibiotics for prophylaxis
IOM	Institute of Medicine
IPV	intimate partner violence
KQ	key question
lbs	pounds
LMP	last menstrual period
MCPAP	Massachusetts Child Psychiatry Access Project
MDD	major depressive disorder
mcg	microgram(s)
MMR	measles/mumps/rubella
MEDDAC	U.S. Army Medical Department Activities
MSAFP	maternal serum alpha-fetoprotein

Abbreviation	Definition
NAS	neonatal abstinence exposure
NAM	National Academy of Medicine
NET	Normal drinker, Eye-opener, Tolerance
NDDG	National Diabetes Data Group
NICE	National Institute for Health and Care Excellence
NSDUH	National Survey on Drug Use and Health
NTD	neural tube defect
OEF	Operation Enduring Freedom
OIF	Operation Iraqi Freedom
Pap test	Papanicolaou test
PCC	patient-centered care
PHQ-9	9-item Patient Health Questionnaire
PICOTS	population, intervention, comparison, outcome, timing and setting framework
PID	pelvic inflammatory disease
PTSD	posttraumatic stress disorder
RADIUS	Routine Antenatal Diagnostic Imaging with Ultrasound
RCT	randomized controlled trial
RDN	Registered Dietitian Nutritionist
SDM	shared decision making
SMFM	Society for Maternal-Fetal Medicine
SR	systematic review
SUD	Substance use disorder(s)
TACE	Tolerance, Annoyed, Cut down, Eye-opener
Td	tetanus-diphtheria
Tdap	tetanus, diphtheria, and pertussis
TORCH	toxoplasmosis, other (syphilis, varicella-zoster, parvovirus B19), rubella, cytomegalovirus (CMV), and herpes infections, are some of the most common infections associated with congenital anomalies
TWEAK	Tolerance, Worried, Eye-opener, Amnesia,[K] Cut-down
U.S.	United States
USPSTF	U.S. Preventive Services Task Force
VA	Department of Veterans Affairs
VHA	Veterans Health Administration
VZV	varicella zoster virus
VZIG	VZV immune globulin
WHO	World Health Organization

References

1. U.S. Department of Veteran Affairs, Department of Defense. Guideline for guidelines. Veterans Health Administration, Office of Quality & Performance, Evidence Review Subgroup; Revised April 10, 2013.
2. Eunice Kennedy Shriver National Institute of Child Health and Human Development. *Pregnancy: Condition information*. https://www.nichd.nih.gov/health/topics/pregnancy/conditioninfo/Pages/default.aspx. Accessed April 5, 2017.
3. Bruckner TA, Cheng YW, Caughey AB. Increased neonatal mortality among normal-weight births beyond 41 weeks of gestation in California. *Am J Obstet Gynecol.* Oct 2008;199(4):421 e421-427.
4. Linder N, Hiersch L, Fridman E, et al. Post-term pregnancy is an independent risk factor for neonatal morbidity even in low-risk singleton pregnancies. *Arch Dis Child Fetal Neonatal Ed.* Jul 2017;102(4):F286-F290.
5. ACOG Committee opinion no 579: Definition of term pregnancy. *Obstet Gynecol.* Nov 2013;122(5):1139-1140.
6. Hamilton BE, Martin JA, Osterman MJ, Curtin SC, Matthews TJ. Births: Final data for 2014. *Natl Vital Stat Rep.* Dec 2015;64(12):1-64.
7. Hamilton BE, Kirmeyer SE. Trends and variations in reproduction and intrinsic rates: United States, 1990-2014. *Natl Vital Stat Rep.* Feb 2017;66(2):1-14.
8. Mathews TJ, Hamilton BE. Mean age of mothers is on the rise: United States, 2000-2014. *NCHS Data Brief.* Jan 2016(232):1-8.
9. Centers for Disease Control and Prevention. *Pregnancy complications*. 2017; https://www.cdc.gov/reproductivehealth/maternalinfanthealth/pregcomplications.htm. Accessed April 5, 2017.
10. Centers for Disease Control and Prevention. *Advancing the health of mothers in the 21st century*. 2017; https://www.cdc.gov/chronicdisease/resources/publications/aag/maternal.htm. Accessed April 5, 2017.
11. Nguyen TT, Hawkins SS. Current state of US breastfeeding laws. *Matern Child Nutr.* Jul 2013;9(3):350-358.
12. Centers for Disease Control and Prevention. *Trends in infant mortality in the United States, 2005-2014*. 2017. Accessed April 5, 2017.
13. Centers for Disease Control and Prevention. *Protecting our next generation at a glance 2016*. 2016; https://www.cdc.gov/chronicdisease/resources/publications/aag/infant-health.htm. Accessed April 5, 2017.
14. Martin JA, Hamilton BE, Osterman MJ, Driscoll AK, Mathews TJ. Births: Final data for 2015. *Natl Vital Stat Rep.* Jan 2017;66(1):1.
15. U.S. National Library of Medicine. *Cesarean section*. 2017; https://medlineplus.gov/cesareansection.html. Accessed April 5, 2017.
16. Martin JA, Hamilton BE, Osterman MJ. Births in the United States, 2015. *NCHS Data Brief.* Sep 2016(258):1-8.
17. Bukowinski AT, Conlin AMS, Gumbs GR, Khodr ZG, Chang RN, Faix DJ. Department of defense birth and infant health registry: Select reproductive health outcomes, 2003-2014. *MSMR.* Nov 2017;24(11):39-49.
18. Stahlman S, Witkop CT, Clark LL, Taubman SB. Pregnancies and live births, active component service women, U.S. Armed Forces, 2012-2016. *MSMR.* Nov 2017;24(11):2-9.

19. Zephyrin LC, Katon J, Hoggatt KJ, et al. State of reproductive health in women Veterans- VA reproductive health diagnoses and organization of care. Women's Health Services, Veterans Health Administration, Department of Veterans Affairs; 2014.
20. Stahlman S, Witkop CT, Clark LL, Taubman SB. Complications and care related to pregnancy, labor, and delivery among active component service women, U.S. Armed Forces, 2012-2016. *MSMR.* Nov 2017;24(11):22-29.
21. Mattocks KM, Skanderson M, Goulet JL, et al. Pregnancy and mental health among women veterans returning from Iraq and Afghanistan. *J Womens Health (Larchmt).* Dec 2010;19(12):2159-2166.
22. Braun LA, Kennedy HP, Womack JA, Wilson C. Integrative literature review: U.S. military women's genitourinary and reproductive health. *Mil Med.* Jan 2016;181(1):35-49.
23. Appolonio KK, Fingerhut R. Postpartum depression in a military sample. *Mil Med.* Nov 2008;173(11):1085-1091.
24. Ko JY, Rockhill KM, Tong VT, Morrow B, Farr SL. Trends in postpartum depressive symptoms - 27 states, 2004, 2008, and 2012. *MMWR Morb Mortal Wkly Rep.* Feb 17 2017;66(6):153-158.
25. Newberry SJ, Ahmadzai N, Motala A, et al. AHRQ methods for effective health care. *Surveillance and identification of signals for updating systematic reviews: Implementation and early experience*. Rockville (MD): Agency for Healthcare Research and Quality (US); 2013.
26. Guirguis-Blake J, Calonge N, Miller T, Siu A, Teutsch S, Whitlock E. Current processes of the U.S. Preventive Services Task Force: Refining evidence-based recommendation development. *Ann Intern Med.* Jul 17 2007;147(2):117-122.
27. *The guidelines manual.* London: National Institute for Health and Care Excellence;2012. http://www.nice.org.uk/article/pmg6/resources/non-guidance-the-guidelines-manual-pdf.
28. Martinez Garcia L, McFarlane E, Barnes S, Sanabria AJ, Alonso-Coello P, Alderson P. Updated recommendations: An assessment of NICE clinical guidelines. *Implement Sci.* 2014;9:72.
29. White CM, Ip S, McPheeters M, et al. AHRQ methods for effective health care using existing systematic reviews to replace de novo processes in conducting comparative effectiveness reviews. *Methods guide for effectiveness and comparative effectiveness reviews*. Rockville (MD): Agency for Healthcare Research and Quality (US); 2008.
30. Institute of Medicine (US) Committe on Standards for Developing Trustworthy Clinical Practice Guidelines, R Graham, M Mancher, D Miller Wolman, et al., editors. *Clinical practice guidelines we can trust.* Washington, DC: National Academies Press;2011.
31. Schunemann HJ, Fretheim A, Oxman AD. Improving the use of research evidence in guideline development: 10. Integrating values and consumer involvement. *Health Res Policy Syst.* 2006;4:22.
32. Bertakis KD, Azari R. Patient-centered care is associated with decreased health care utilization. *J Am Board Fam Med.* May-Jun 2011;24(3):229-239.
33. Robinson JH, Callister LC, Berry JA, Dearing KA. Patient-centered care and adherence: Definitions and applications to improve outcomes. *J Am Acad Nurse Pract.* Dec 2008;20(12):600-607.
34. *Crossing the quality chasm: A new health system for the 21st century.* Washington DC: National Academies Press;2001.
35. U. S. Preventive Services Task Force. Screening for preeclampsia: U.S. Preventive Services Task Force recommendation statement. *JAMA.* 2017;317(16):1661-1667.
36. Triunfo S, Lanzone A. Impact of maternal under nutrition on obstetric outcomes. *J Endocrinol Invest.* Jan 2015;38(1):31-38.
37. Katon J, Mattocks K, Zephyrin L, et al. Gestational diabetes and hypertensive disorders of pregnancy among women veterans deployed in service of operations in Afghanistan and Iraq. *J Womens Health (Larchmt).* Oct 2014;23(10):792-800.

38. Centers for Disease Control and Prevention. *Weight gain during pregnancy*. 2016; https://www.cdc.gov/reproductivehealth/maternalinfanthealth/pregnancy-weight-gain.htm. Accessed August 14, 2017.
39. Lynch MM, Amoozegar JB, McClure EM, et al. Improving safe use of medications during pregnancy: The roles of patients, physicians, and pharmacists. *Qualitative Health Research.* 2017;27(13):2071-2080.
40. Xiong X, Buekens P, Fraser WD, Beck J, Offenbacher S. Periodontal disease and adverse pregnancy outcomes: A systematic review. *BJOG.* Feb 2006;113(2):135-143.
41. Dasanayake AP, Gennaro S, Hendricks-Munoz KD, Chhun N. Maternal periodontal disease, pregnancy, and neonatal outcomes. *MCN Am J Matern Child Nurs.* Jan-Feb 2008;33(1):45-49.
42. Michalowicz BS, Hodges JS, DiAngelis AJ, et al. Treatment of periodontal disease and the risk of preterm birth. *N Engl J Med.* Nov 02 2006;355(18):1885-1894.
43. *Oral health care during pregnancy: A national consensus statement.* Washington, DC: National Maternal and Child Oral Health Resource Center;2012.
44. The use of dental radiographs: Update and recommendations. *J Am Dent Assoc.* Sep 2006;137(9):1304-1312.
45. Updated recommendations for use of tetanus toxoid, reduced diphtheria toxoid, and acellular pertussis vaccine (Tdap) in pregnant women--Advisory Committee on Immunization Practices (ACIP), 2012. *MMWR Morb Mortal Wkly Rep.* Feb 22 2013;62(7):131-135.
46. Englund J, Glezen WP, Piedra PA. Maternal immunization against viral disease. *Vaccine.* Aug-Sep 1998;16(14-15):1456-1463.
47. Centers for Disease Control and Prevention. *Maternal vaccines: Part of a healthy pregnancy*. 2016; https://www.cdc.gov/vaccines/pregnancy/pregnant-women/index.html#vaccines-during. Accessed June 6, 2017.
48. Smego RA, Jr., Asperilla MO. Use of acyclovir for varicella pneumonia during pregnancy. *Obstet Gynecol.* Dec 1991;78(6):1112-1116.
49. Paryani SG, Arvin AM. Intrauterine infection with varicella-zoster virus after maternal varicella. *N Engl J Med.* Jun 12 1986;314(24):1542-1546.
50. Brunell PA. Fetal and neonatal varicella-zoster infections. *Semin Perinatol.* Jan 1983;7(1):47-56.
51. Smith WJ, Jackson LA, Watts DH, Koepsell TD. Prevention of chickenpox in reproductive-age women: Cost-effectiveness of routine prenatal screening with postpartum vaccination of susceptibles. *Obstet Gynecol.* Oct 1998;92(4 Pt 1):535-545.
52. Marin M, Guris D, Chaves SS, Schmid S, Seward JF. Prevention of varicella: Recommendations of the Advisory Committee on Immunization Practices (ACIP). *MMWR Recomm Rep.* Jun 22 2007;56(RR-4):1-40.
53. McElhaney RD, Jr., Ringer M, DeHart DJ, Vasilenko P. Rubella immunity in a cohort of pregnant women. *Infect Control Hosp Epidemiol.* Jan 1999;20(1):64-66.
54. Chang TW, DesRosiers S, Weinstein L. Clinical and serologic studies of an outbreak of rubella in a vaccinated population. *N Engl J Med.* Jul 30 1970;283(5):246-248.
55. Horstmann DM, Schluederberg A, Emmons JE, Evans BK, Randolph MF, Andiman WA. Persistence of vaccine-induced immune responses to rubella: Comparison with natural infection. *Rev Infect Dis.* Mar-Apr 1985;7 Suppl 1:S80-85.
56. Centers for Disease Control and Prevention. *Pregnancy*. https://www.cdc.gov/pregnancy/index.html. Accessed January 2, 2018.
57. Goh YI, Bollano E, Einarson TR, Koren G. Prenatal multivitamin supplementation and rates of pediatric cancers: A meta-analysis. *Clin Pharmacol Ther.* May 2007;81(5):685-691.
58. Bodnar LM, Tang G, Ness RB, Harger G, Roberts JM. Periconceptional multivitamin use reduces the risk of preeclampsia. *Am J Epidemiol.* Sep 01 2006;164(5):470-477.

59. Operation Supplement Safety. *Dietary supplements and women's health*. https://www.opss.org/articles/dietary-supplements-and-womens-health. Accessed August 15, 2017.
60. Operation Supplement Safety *Should I take dietary supplements while pregnant?* https://www.opss.org/faqs/should-i-take-dietary-supplements-while-pregnant. Accessed August 2017, 2017.
61. United States Department of Agriculture. *Definitions of food security*. 2017; https://www.ers.usda.gov/topics/food-nutrition-assistance/food-security-in-the-us/definitions-of-food-security/. Accessed January 2, 2018.
62. Academy of Nutrition and Dietetics. *Nutrition care manual products*. 2017; https://www.nutritioncaremanual.org/?err=NLI. Accessed August 15, 2017.
63. U.S. Preventive Services Task Force. *Intimate partner violence and abuse of elderly and vulnerable adults: Screening*. 2013; https://www.uspreventiveservicestaskforce.org/Page/Document/UpdateSummaryFinal/intimate-partner-violence-and-abuse-of-elderly-and-vulnerable-adults-screening. Accessed June 14, 2014.
64. Iverson KM, King MW, Gerber MR, et al. Accuracy of an intimate partner violence screening tool for female VHA patients: A replication and extension. *J Trauma Stress.* Feb 2015;28(1):79-82.
65. Westin M, Saltvedt S, Bergman G, et al. Routine ultrasound examination at 12 or 18 gestational weeks for prenatal detection of major congenital heart malformations? A randomised controlled trial comprising 36,299 fetuses. *BJOG.* Jun 2006;113(6):675-682.
66. Taipale P, Ammala M, Salonen R, Hiilesmaa V. Two-stage ultrasonography in screening for fetal anomalies at 13-14 and 18-22 weeks of gestation. *Acta Obstet Gynecol Scand.* Dec 2004;83(12):1141-1146.
67. Neilson JP. Ultrasound for fetal assessment in early pregnancy. *Cochrane Database Syst Rev.* 2000(2):CD000182.
68. Mongelli M, Gardosi J. Gestation-adjusted projection of estimated fetal weight. *Acta Obstet Gynecol Scand.* Jan 1996;75(1):28-31.
69. Wilcox M, Gardosi J, Mongelli M, Ray C, Johnson I. Birth weight from pregnancies dated by ultrasonography in a multicultural British population. *BMJ.* Sep 04 1993;307(6904):588-591.
70. Hofmeyr GJ, Hannah ME. Planned caesarean section for term breech delivery. *Cochrane Database Syst Rev.* 2001(1):CD000166.
71. Thorp JM, Jr., Jenkins T, Watson W. Utility of leopold maneuvers in screening for malpresentation. *Obstet Gynecol.* Sep 1991;78(3 Pt 1):394-396.
72. Hofmeyr GJ, Kulier R. Cephalic version by postural management for breech presentation. *Cochrane Database Syst Rev.* 2000(3):CD000051.
73. Hofmeyr GJ, Kulier R. External cephalic version for breech presentation at term. *Cochrane Database Syst Rev.* 2000(2):CD000083.
74. Ickovics JR, Kershaw TS, Westdahl C, et al. Group prenatal care and perinatal outcomes: A randomized controlled trial. *Obstet Gynecol.* Aug 2007;110(2 Pt 1):330-339.
75. Baldwin KA. Comparison of selected outcomes of centeringpregnancy versus traditional prenatal care. *J Midwifery Womens Health.* Jul-Aug 2006;51(4):266-272.
76. Carter EB, Temming LA, Akin J, et al. Group prenatal care compared with traditional prenatal care: A systematic review and meta-analysis. *Obstet Gynecol.* Sep 2016;128(3):551-561.
77. Di Mascio D, Magro-Malosso ER, Saccone G, Marhefka GD, Berghella V. Exercise during pregnancy in normal-weight women and risk of preterm birth: A systematic review and meta-analysis of randomized controlled trials. *Am J Obstet Gynecol.* Nov 2016;215(5):561-571.

78. Aune D, Sen A, Henriksen T, Saugstad OD, Tonstad S. Physical activity and the risk of gestational diabetes mellitus: A systematic review and dose-response meta-analysis of epidemiological studies. *Eur J Epidemiol.* Oct 2016;31(10):967-997.
79. Magro-Malosso ER, Saccone G, Di Mascio D, Di Tommaso M, Berghella V. Exercise during pregnancy and risk of preterm birth in overweight and obese women: A systematic review and meta-analysis of randomized controlled trials. *Acta Obstet Gynecol Scand.* Mar 2017;96(3):263-273.
80. Harrison AL, Shields N, Taylor NF, Frawley HC. Exercise improves glycaemic control in women diagnosed with gestational diabetes mellitus: A systematic review. *J Physiother.* Oct 2016;62(4):188-196.
81. Wiebe HW, Boule NG, Chari R, Davenport MH. The effect of supervised prenatal exercise on fetal growth: A meta-analysis. *Obstet Gynecol.* May 2015;125(5):1185-1194.
82. Elliott-Sale KJ, Barnett CT, Sale C. Exercise interventions for weight management during pregnancy and up to 1 year postpartum among normal weight, overweight and obese women: A systematic review and meta-analysis. *Br J Sports Med.* Oct 2015;49(20):1336-1342.
83. Centers for Disease Control and Prevention. *Perceived exertion (Borg Rating of Perceived Exertion Scale)*. 2015; https://www.cdc.gov/physicalactivity/basics/measuring/exertion.htm. Accessed June 6, 2017.
84. Gong H, Ni C, Shen X, Wu T, Jiang C. Yoga for prenatal depression: A systematic review and meta-analysis. *BMC Psychiatry.* Feb 05 2015;15:14.
85. Muktabhant B, Lawrie TA, Lumbiganon P, Laopaiboon M. Diet or exercise, or both, for preventing excessive weight gain in pregnancy. *Cochrane Database Syst Rev.* Jun 15 2015(6):CD007145.
86. Centers for Disease Control and Prevention. *Physical activity - healthy pregnant or postpartum women*. 2015; https://www.cdc.gov/physicalactivity/basics/pregnancy/index.htm. Accessed June 14, 2017.
87. Read JS, Klebanoff MA. Sexual intercourse during pregnancy and preterm delivery: Effects of vaginal microorganisms. The Vaginal Infections and Prematurity Study Group. *Am J Obstet Gynecol.* Feb 1993;168(2):514-519.
88. Mozurkewich EL, Luke B, Avni M, Wolf FM. Working conditions and adverse pregnancy outcome: A meta-analysis. *Obstet Gynecol.* Apr 2000;95(4):623-635.
89. Gabbe SG, Turner LP. Reproductive hazards of the American lifestyle: Work during pregnancy. *Am J Obstet Gynecol.* Apr 1997;176(4):826-832.
90. Teitelman AM, Welch LS, Hellenbrand KG, Bracken MB. Effect of maternal work activity on preterm birth and low birth weight. *Am J Epidemiol.* Jan 1990;131(1):104-113.
91. Luke B, Mamelle N, Keith L, et al. The association between occupational factors and preterm birth: A United States nurses' study. Research Committee of the Association of Women's Health, Obstetric, and Neonatal Nurses. *Am J Obstet Gynecol.* Sep 1995;173(3 Pt 1):849-862.
92. American Academy of Pediatrics. Guidelines for perinatal care. 6th: American Academy of Pediatrics and the American College of Obstetricians and Gynecologists; 1998.
93. AAP Committee on Fetus and Newborn and ACOG Committee on Obstetric Practice. Guidelines for perinatal care. 8th: American Academy of Pediatrics and the American College of Obstetricians and Gynecologists; 2017.
94. Mahomed K. Folate supplementation in pregnancy. *Cochrane Database Syst Rev.* 2000(2):CD000183.
95. Folic acid for the prevention of neural tube defects: U.S. Preventive Services Task Force recommendation statement. *Ann Intern Med.* May 05 2009;150(9):626-631.

96. Bibbins-Domingo K, Grossman DC, Curry SJ, et al. Folic acid supplementation for the prevention of neural tube defects: US Preventive Services Task Force recommendation statement. *JAMA.* Jan 10 2017;317(2):183-189.
97. Werler MM, Hayes C, Louik C, Shapiro S, Mitchell AA. Multivitamin supplementation and risk of birth defects. *Am J Epidemiol.* Oct 01 1999;150(7):675-682.
98. Lumley J, Watson L, Watson M, Bower C. Periconceptional supplementation with folate and/or multivitamins for preventing neural tube defects. *Cochrane Database Syst Rev.* 2001(3):CD001056.
99. De-Regil LM, Pena-Rosas JP, Fernandez-Gaxiola AC, Rayco-Solon P. Effects and safety of periconceptional oral folate supplementation for preventing birth defects. *Cochrane Database Syst Rev.* Dec 14 2015(12):CD007950.
100. Centers for Disease Control and Prevention. *Folic acid, occurrence prevention*. 2016; https://www.cdc.gov/ncbddd/folicacid/recommendations.html. Accessed October 4, 2017.
101. Hofmeyr GJ, Atallah AN, Duley L. Calcium supplementation during pregnancy for preventing hypertensive disorders and related problems. *Cochrane Database Syst Rev.* Jul 19 2006(3):CD001059.
102. Mahomed K, Gulmezoglu AM. Pyridoxine (vitamin B6) supplementation in pregnancy. *Cochrane Database Syst Rev.* 2000(2):CD000179.
103. Mahomed K, Gulmezoglu AM. Vitamin D supplementation in pregnancy. *Cochrane Database Syst Rev.* 2000(2):CD000228.
104. Forray A. Substance use during pregnancy. *F1000Res.* 2016;5.
105. *Results from the 2013 National Survey on Drug Use and Health: Summary of national findings.* Rockville, MD: Substance Abuse and Mental Health Services Administration;2014.
106. Substance Abuse and Mental Health Services Administration. *New report examines the non-medical use of opioids among women of childbearing age*. 2017; https://www.samhsa.gov/newsroom/press-announcements/201701171100. Accessed May 30, 2017.
107. Hoggatt KJ, Lehavot K, Krenek M, Schweizer CA, Simpson T. Prevalence of substance misuse among US veterans in the general population. *Am J Addict.* Jun 2017;26(4):357-365.
108. Viteri OA, Soto EE, Bahado-Singh RO, Christensen CW, Chauhan SP, Sibai BM. Fetal anomalies and long-term effects associated with substance abuse in pregnancy: A literature review. *Am J Perinatol.* Apr 2015;32(5):405-416.
109. Hackshaw A, Rodeck C, Boniface S. Maternal smoking in pregnancy and birth defects: A systematic review based on 173 687 malformed cases and 11.7 million controls. *Hum Reprod Update.* Sep-Oct 2011;17(5):589-604.
110. Caputo C, Wood E, Jabbour L. Impact of fetal alcohol exposure on body systems: A systematic review. *Birth Defects Res C Embryo Today.* Jun 2016;108(2):174-180.
111. Tolia VN, Patrick SW, Bennett MM, et al. Increasing incidence of the neonatal abstinence syndrome in U.S. neonatal ICUs. *New England Journal of Medicine.* 2015;372(22):2118-2126.
112. Gallagher B, Shin Y, Roohan P. Opioid prescriptions among women of reproductive age enrolled in Medicaid — New York, 2008–2013. *MMWR Morb Mortal Wkly Rep* 2016;65:415–417.
113. Ko J, Patrick S, Tong V, Patel R, Lind J, Barfield W. Incidence of neonatal abstinence syndrome — 28 states, 1999–2013. *MMWR Morb Mortal Wkly Rep* 2016;65:799–802.
114. Burns E, Gray R, Smith LA. Brief screening questionnaires to identify problem drinking during pregnancy: A systematic review. *Addiction.* Apr 2010;105(4):601-614.
115. Bager H, Christensen LP, Husby S, Bjerregaard L. Biomarkers for the detection of prenatal alcohol exposure: A review. *Alcohol Clin Exp Res.* Feb 2017;41(2):251-261.

116. Cucciare M, Lewis E, Hoggart K, et al. Factors affecting women's disclosure of alcohol misuse in primary care: A qualitative study with US military veterans. *Women's Health Issues.* 2016;26:232-239.
117. McQuire C, Paranjothy S, Hurt L, Mann M, Farewell D, Kemp A. Objective measures of prenatal alcohol exposure: A systematic review. *Pediatrics.* Sep 2016;138(3).
118. Yonkers KA, Howell HB, Gotman N, Rounsaville BJ. Self-report of illicit substance use versus urine toxicology results from at-risk pregnant women. *J Subst Use.* Oct 1 2011;16(5):372-389.
119. Mullen PD, Carbonari JP, Tabak ER, Glenday MC. Improving disclosure of smoking by pregnant women. *Am J Obstet Gynecol.* Aug 1991;165(2):409-413.
120. Lumley J, Oliver SS, Chamberlain C, Oakley L. Interventions for promoting smoking cessation during pregnancy. *Cochrane Database Syst Rev.* Oct 18 2004(4):CD001055.
121. Dolan-Mullen P, Ramirez G, Groff JY. A meta-analysis of randomized trials of prenatal smoking cessation interventions. *Am J Obstet Gynecol.* Nov 1994;171(5):1328-1334.
122. Panjari M, Bell R, Bishop S, Astbury J, Rice G, Doery J. A randomized controlled trial of a smoking cessation intervention during pregnancy. *Aust N Z J Obstet Gynaecol.* Aug 1999;39(3):312-317.
123. Wisborg K, Henriksen TB, Jespersen LB, Secher NJ. Nicotine patches for pregnant smokers: A randomized controlled study. *Obstet Gynecol.* Dec 2000;96(6):967-971.
124. Chang G, Wilkins-Haug L, Berman S, Goetz MA. Brief intervention for alcohol use in pregnancy: A randomized trial. *Addiction.* Oct 1999;94(10):1499-1508.
125. Handmaker NS, Miller WR, Manicke M. Findings of a pilot study of motivational interviewing with pregnant drinkers. *J Stud Alcohol.* Mar 1999;60(2):285-287.
126. Reynolds KD, Coombs DW, Lowe JB, Peterson PL, Gayoso E. Evaluation of a self-help program to reduce alcohol consumption among pregnant women. *Int J Addict.* Mar 1995;30(4):427-443.
127. Horrigan TJ, Piazza NJ, Weinstein L. The substance abuse subtle screening inventory is more cost effective and has better selectivity than urine toxicology for the detection of substance abuse in pregnancy. *J Perinatol.* Sep-Oct 1996;16(5):326-330.
128. Howell EM, Heiser N, Harrington M. A review of recent findings on substance abuse treatment for pregnant women. *J Subst Abuse Treat.* Apr 1999;16(3):195-219.
129. Chamberlain C, O'Mara-Eves A, Porter J, et al. Psychosocial interventions for supporting women to stop smoking in pregnancy. *Cochrane Database of Systematic Reviews.* 2017(2).
130. O'Connor E, Rossom RC, Henninger M, Groom HC, Burda BU. Primary care screening for and treatment of depression in pregnant and postpartum women: Evidence report and systematic review for the US Preventive Services Task Force. *JAMA.* Jan 26 2016;315(4):388-406.
131. El-Den S, O'Reilly CL, Chen TF. A systematic review on the acceptability of perinatal depression screening. *J Affect Disord.* Dec 01 2015;188:284-303.
132. Yawn BP, Pace W, Wollan PC, et al. Concordance of Edinburgh Postnatal Depression Scale (EPDS) and Patient Health Questionnaire (PHQ-9) to assess increased risk of depression among postpartum women. *J Am Board Fam Med.* Sep-Oct 2009;22(5):483-491.
133. World Health Organization. *Breastfeeding*. 2018; http://www.who.int/topics/breastfeeding/en/. Accessed January 2, 2018.
134. Centers for Disease Control and Prevention. *Breastfeeding*. 2017; https://www.cdc.gov/breastfeeding/index.htm. Accessed September 21, 2017.
135. Office on Women's Health, U.S. Department of Health and Human Services. *Breastfeeding*. 2017; https://www.womenshealth.gov/breastfeeding/. Accessed December 22, 2017.
136. Hartley BM, O'Connor ME. Evaluation of the 'Best Start' breast-feeding education program. *Arch Pediatr Adolesc Med.* Aug 1996;150(8):868-871.

137. Fairlie TG, Gillman MW, Rich-Edwards J. High pregnancy-related anxiety and prenatal depressive symptoms as predictors of intention to breastfeed and breastfeeding initiation. *J Womens Health (Larchmt).* Jul 2009;18(7):945-953.
138. Wouk K, Lara-Cinisomo S, Stuebe AM, Poole C, Petrick JL, McKenney KM. Clinical interventions to promote breastfeeding by Latinas: A meta-analysis. *Pediatrics.* Jan 2016;137(1).
139. ACOG Practice Bulletin No. 77: Screening for fetal chromosomal abnormalities. *Obstet Gynecol.* Jan 2007;109(1):217-227.
140. Practice Bulletin No. 163: Screening for fetal aneuploidy. *Obstet Gynecol.* May 2016;127(5):e123-137.
141. Akolekar R, Beta J, Picciarelli G, Ogilvie C, D'Antonio F. Procedure-related risk of miscarriage following amniocentesis and chorionic villus sampling: A systematic review and meta-analysis. *Ultrasound Obstet Gynecol.* Jan 2015;45(1):16-26.
142. Chard RL, Norton ME. Genetic counseling for patients considering screening and diagnosis for chromosomal abnormalities. *Clin Lab Med.* Jun 2016;36(2):227-236.
143. Haddow JE, Palomaki GE, Knight GJ, Cunningham GC, Lustig LS, Boyd PA. Reducing the need for amniocentesis in women 35 years of age or older with serum markers for screening. *N Engl J Med.* Apr 21 1994;330(16):1114-1118.
144. Haddow JE, Palomaki GE, Knight GJ, et al. Prenatal screening for Down's syndrome with use of maternal serum markers. *N Engl J Med.* Aug 27 1992;327(9):588-593.
145. Malone FD, Canick JA, Ball RH, et al. First-trimester or second-trimester screening, or both, for Down's syndrome. *N Engl J Med.* Nov 10 2005;353(19):2001-2011.
146. Malone FD, Wald NJ, Canick JA, et al. First- and second-trimester evaluation of risk (faster) trial: Principal results of the NICHD multicenter down syndrome screening study. *American Journal of Obstetrics & Gynecology.*189(6):S56.
147. Wapner R, Thom E, Simpson JL, et al. First-trimester screening for trisomies 21 and 18. *N Engl J Med.* Oct 09 2003;349(15):1405-1413.
148. Wald NJ, Rodeck C, Hackshaw AK, Walters J, Chitty L, Mackinson AM. First and second trimester antenatal screening for Down's syndrome: The results of the Serum, Urine and Ultrasound Screening Study (SURUSS). *Health Technol Assess.* 2003;7(11):1-77.
149. Gil MM, Quezada MS, Revello R, Akolekar R, Nicolaides KH. Analysis of cell-free DNA in maternal blood in screening for fetal aneuploidies: Updated meta-analysis. *Ultrasound Obstet Gynecol.* Mar 2015;45(3):249-266.
150. Mackie FL, Hemming K, Allen S, Morris RK, Kilby MD. The accuracy of cell-free fetal DNA-based non-invasive prenatal testing in singleton pregnancies: A systematic review and bivariate meta-analysis. *BJOG.* Jan 2017;124(1):32-46.
151. Oepkes D, Page-Christiaens GC, Bax CJ, et al. Trial by Dutch laboratories for evaluation of non-invasive prenatal testing. Part I-clinical impact. *Prenat Diagn.* Dec 2016;36(12):1083-1090.
152. Norton ME, Baer RJ, Wapner RJ, Kuppermann M, Jelliffe-Pawlowski LL, Currier RJ. Cell-free DNA vs sequential screening for the detection of fetal chromosomal abnormalities. *Am J Obstet Gynecol.* Jun 2016;214(6):727 e721-726.
153. Stokowski R, Wang E, White K, et al. Clinical performance of non-invasive prenatal testing (NIPT) using targeted cell-free DNA analysis in maternal plasma with microarrays or next generation sequencing (NGS) is consistent across multiple controlled clinical studies. *Prenat Diagn.* Dec 2015;35(12):1243-1246.
154. Johansen P, Richter SR, Balslev-Harder M, et al. Open source non-invasive prenatal testing platform and its performance in a public health laboratory. *Prenat Diagn.* Jun 2016;36(6):530-536.

155. Danilenko-Dixon DR, Van Winter JT, Nelson RL, Ogburn PL, Jr. Universal versus selective gestational diabetes screening: Application of 1997 American Diabetes Association recommendations. *Am J Obstet Gynecol.* Oct 1999;181(4):798-802.
156. Griffin ME, Coffey M, Johnson H, et al. Universal vs. Risk factor-based screening for gestational diabetes mellitus: Detection rates, gestation at diagnosis and outcome. *Diabet Med.* Jan 2000;17(1):26-32.
157. Williams CB, Iqbal S, Zawacki CM, Yu D, Brown MB, Herman WH. Effect of selective screening for gestational diabetes. *Diabetes Care.* Mar 1999;22(3):418-421.
158. Classification and diagnosis of diabetes mellitus and other categories of glucose intolerance. National Diabetes Data Group. *Diabetes.* Dec 1979;28(12):1039-1057.
159. Carpenter MW, Coustan DR. Criteria for screening tests for gestational diabetes. *Am J Obstet Gynecol.* Dec 01 1982;144(7):768-773.
160. Report of the Expert Committee on the Diagnosis and Classification of Diabetes Mellitus. *Diabetes Care.* 2002;25(suppl 1):s5-s20.
161. Berggren EK, Boggess KA, Mathew L, Culhane J. First trimester maternal glycated hemoglobin and sex hormone-binding globulin do not predict third trimester glucose intolerance of pregnancy. *Reprod Sci.* Apr 2017;24(4):613-618.
162. Scifres CM, Abebe KZ, Jones KA, et al. Gestational diabetes diagnostic methods (GD2M) pilot randomized trial. *Matern Child Health J.* Jul 2015;19(7):1472-1480.
163. Donovan L, Hartling L, Muise M, Guthrie A, Vandermeer B, Dryden DM. Screening tests for gestational diabetes: A systematic review for the U.S. Preventive Services Task Force. *Ann Intern Med.* Jul 16 2013;159(2):115-122.
164. Solomon CG, Willett WC, Carey VJ, et al. A prospective study of pregravid determinants of gestational diabetes mellitus. *JAMA.* Oct 01 1997;278(13):1078-1083.
165. Hoffman CS, Messer LC, Mendola P, Savitz DA, Herring AH, Hartmann KE. Comparison of gestational age at birth based on last menstrual period and ultrasound during the first trimester. *Paediatr Perinat Epidemiol.* Nov 2008;22(6):587-596.
166. Verburg BO, Steegers EA, De Ridder M, et al. New charts for ultrasound dating of pregnancy and assessment of fetal growth: Longitudinal data from a population-based cohort study. *Ultrasound Obstet Gynecol.* Apr 2008;31(4):388-396.
167. Gülmezoglu AM, Crowther CA, Middleton P, Heatley E. Induction of labour for improving birth outcomes for women at or beyond term. *The Cochrane database of systematic reviews.* 06/13 2012;6:CD004945-CD004945.
168. Olesen AW, Westergaard JG, Olsen J. Perinatal and maternal complications related to postterm delivery: A national register-based study, 1978-1993. *Am J Obstet Gynecol.* Jul 2003;189(1):222-227.
169. Stephansson O, Dickman PW, Johansson A, Cnattingius S. Maternal weight, pregnancy weight gain, and the risk of antepartum stillbirth. *Am J Obstet Gynecol.* Feb 2001;184(3):463-469.
170. Zizzo AR, Kirkegaard I, Pinborg A, Ulbjerg N. Decline in stillbirths and perinatal mortality after implementation of a more aggressive induction policy in post-date pregnancies: A nationwide register study. *Acta Obstet Gynecol Scand.* Feb 10 2017.
171. Heimstad R, Romundstad PR, Salvesen KA. Induction of labour for post-term pregnancy and risk estimates for intrauterine and perinatal death. *Acta Obstet Gynecol Scand.* 2008;87(2):247-249.
172. Sanchez-Ramos L, Olivier F, Delke I, Kaunitz AM. Labor induction versus expectant management for postterm pregnancies: A systematic review with meta-analysis. *Obstet Gynecol.* Jun 2003;101(6):1312-1318.
173. Guidetti DA, Divon MY, Langer O. Postdate fetal surveillance: Is 41 weeks too early? *Am J Obstet Gynecol.* Jul 1989;161(1):91-93.

174. Rosen DJ, Michaeli G, Markov S, Greenspoon JS, Goldberger SB, Fejgin MD. Fetal surveillance. Should it begin at 40 weeks' gestation in a low-risk population? *J Reprod Med.* Feb 1995;40(2):135-139.
175. Wu P, Haththotuwa R, Kwok CS, et al. Preeclampsia and future cardiovascular health: A systematic review and meta-analysis. *Circ Cardiovasc Qual Outcomes.* Feb 2017;10(2).
176. Brown MC, Best KE, Pearce MS, Waugh J, Robson SC, Bell R. Cardiovascular disease risk in women with pre-eclampsia: Systematic review and meta-analysis. *Eur J Epidemiol.* Jan 2013;28(1):1-19.
177. Wang Z, Wang Z, Wang L, et al. Hypertensive disorders during pregnancy and risk of type 2 diabetes in later life: A systematic review and meta-analysis. *Endocrine.* Mar 2017;55(3):809-821.
178. Fadl H, Magnuson A, Ostlund I, Montgomery S, Hanson U, Schwarcz E. Gestational diabetes mellitus and later cardiovascular disease: A Swedish population based case-control study. *BJOG.* Nov 2014;121(12):1530-1536.
179. Gunderson EP, Chiang V, Pletcher MJ, et al. History of gestational diabetes mellitus and future risk of atherosclerosis in mid-life: The coronary artery risk development in young adults study. *J Am Heart Assoc.* Mar 12 2014;3(2):e000490.
180. Kessous R, Shoham-Vardi I, Pariente G, Sherf M, Sheiner E. An association between gestational diabetes mellitus and long-term maternal cardiovascular morbidity. *Heart.* Aug 2013;99(15):1118-1121.
181. Retnakaran R, Shah BR. Mild glucose intolerance in pregnancy and risk of cardiovascular disease: A population-based cohort study. *CMAJ.* Sep 15 2009;181(6-7):371-376.
182. Cirillo PM, Cohn BA. Pregnancy complications and cardiovascular disease death: 50-year follow-up of the child health and development studies pregnancy cohort. *Circulation.* Sep 29 2015;132(13):1234-1242.
183. Fraser A, Nelson SM, Macdonald-Wallis C, et al. Associations of pregnancy complications with calculated cardiovascular disease risk and cardiovascular risk factors in middle age: The Avon Longitudinal Study of Parents and Children. *Circulation.* Mar 20 2012;125(11):1367-1380.
184. Jorgensen KT, Pedersen BV, Jacobsen S, Biggar RJ, Frisch M. National cohort study of reproductive risk factors for rheumatoid arthritis in Denmark: A role for hyperemesis, gestational hypertension and pre-eclampsia? *Ann Rheum Dis.* Feb 2010;69(2):358-363.
185. Wahlberg J, Ekman B, Nystrom L, Hanson U, Persson B, Arnqvist HJ. Gestational diabetes: Glycaemic predictors for fetal macrosomia and maternal risk of future diabetes. *Diabetes Res Clin Pract.* Apr 2016;114:99-105.
186. Waldman M, Sheiner E, Sergienko R, Shoham-Vardi I. Can we identify risk factors during pregnancy for thrombo-embolic events during the puerperium and later in life? *J Matern Fetal Neonatal Med.* Jun 2015;28(9):1005-1009.
187. Auger N, Fraser WD, Paradis G, Healy-Profitos J, Hsieh A, Rheaume MA. Preeclampsia and long-term risk of maternal retinal disorders. *Obstet Gynecol.* Jan 2017;129(1):42-49.
188. Auger N, Fraser WD, Schnitzer M, Leduc L, Healy-Profitos J, Paradis G. Recurrent pre-eclampsia and subsequent cardiovascular risk. *Heart.* Feb 2017;103(3):235-243.
189. Drost JT, Arpaci G, Ottervanger JP, et al. Cardiovascular risk factors in women 10 years post early preeclampsia: The Preeclampsia Risk EValuation in FEMales study (PREVFEM). *Eur J Prev Cardiol.* Oct 2012;19(5):1138-1144.
190. Young B, Hacker MR, Rana S. Physicians' knowledge of future vascular disease in women with preeclampsia. *Hypertens Pregnancy.* 2012;31(1):50-58.
191. Dugoff L, Hobbins JC, Malone FD, et al. Quad screen as a predictor of adverse pregnancy outcome. *Obstet Gynecol.* Aug 2005;106(2):260-267.
192. Summers AM, Langlois S, Wyatt P, Wilson RD. Prenatal screening for fetal aneuploidy. *J Obstet Gynaecol Can.* Feb 2007;29(2):146-179.

193. Morris RK, Cnossen JS, Langejans M, et al. Serum screening with Down's syndrome markers to predict pre-eclampsia and small for gestational age: Systematic review and meta-analysis. *BMC Pregnancy Childbirth.* Aug 04 2008;8:33.
194. Chitayat D, Langlois S, Douglas Wilson R, et al. Prenatal screening for fetal aneuploidy in singleton pregnancies. *Journal of Obstetrics and Gynaecology Canada.* 2011;33(7):736-750.
195. Audibert F, Gagnon A, Douglas Wilson R, et al. Prenatal screening for and diagnosis of aneuploidy in twin pregnancies. *Journal of Obstetrics and Gynaecology Canada.* 2011;33(7):754-767.
196. Leitich H, Egarter C, Kaider A, Hohlagschwandtner M, Berghammer P, Husslein P. Cervicovaginal fetal fibronectin as a marker for preterm delivery: A meta-analysis. *Am J Obstet Gynecol.* May 1999;180(5):1169-1176.
197. Ramsey PS, Andrews WW. Biochemical predictors of preterm labor: Fetal fibronectin and salivary estriol. *Clin Perinatol.* Dec 2003;30(4):701-733.
198. Honest H, Bachmann LM, Gupta JK, Kleijnen J, Khan KS. Accuracy of cervicovaginal fetal fibronectin test in predicting risk of spontaneous preterm birth: Systematic review. *BMJ.* Aug 10 2002;325(7359):301.
199. Buekens P, Alexander S, Boutsen M, Blondel B, Kaminski M, Reid M. Randomised controlled trial of routine cervical examinations in pregnancy. European Community Collaborative Study Group on Prenatal Screening. *Lancet.* Sep 24 1994;344(8926):841-844.
200. Esplin MS, Elovitz MA, Iams JD, et al. Predictive accuracy of serial transvaginal cervical lengths and quantitative vaginal fetal fibronectin levels for spontaneous preterm birth among nulliparous women. *JAMA.* Mar 14 2017;317(10):1047-1056.
201. Goldenberg RL, Iams JD, Das A, et al. The preterm prediction study: Sequential cervical length and fetal fibronectin testing for the prediction of spontaneous preterm birth. National institute of child health and human development maternal-fetal medicine units network. *Am J Obstet Gynecol.* Mar 2000;182(3):636-643.
202. Revah A, Hannah ME, Sue AQAK. Fetal fibronectin as a predictor of preterm birth: An overview. *Am J Perinatol.* 1998;15(11):613-621.
203. Tekesin I, Marek S, Hellmeyer L, Reitz D, Schmidt S. Assessment of rapid fetal fibronectin in predicting preterm delivery. *Obstet Gynecol.* Feb 2005;105(2):280-284.
204. ACOG practice bulletin. Management of preterm labor. Number 43, May 2003. *Int J Gynaecol Obstet.* Jul 2003;82(1):127-135.
205. Practice Bulletin No. 171: Management of preterm labor. *Obstet Gynecol.* Oct 2016;128(4):e155-164.
206. Berghella V, Saccone G. Fetal fibronectin testing for prevention of preterm birth in singleton pregnancies with threatened preterm labor: A systematic review and metaanalysis of randomized controlled trials. *Am J Obstet Gynecol.* Oct 2016;215(4):431-438.
207. Roberge S, Nicolaides K, Demers S, Hyett J, Chaillet N, Bujold E. The role of aspirin dose on the prevention of preeclampsia and fetal growth restriction: Systematic review and meta-analysis. *Am J Obstet Gynecol.* Feb 2016;216(2):110-120 e116.
208. Block-Abraham DM, Turan OM, Doyle LE, et al. First-trimester risk factors for preeclampsia development in women initiating aspirin by 16 weeks of gestation. *Obstet Gynecol.* Mar 2014;123(3):611-617.
209. Gan J, He H, Qi H. Preventing preeclampsia and its fetal complications with low-dose aspirin in East Asians and non-East Asians:A systematic review and meta-analysis. *Hypertens Pregnancy.* Aug 2016;35(3):426-435.
210. U.S. Preventive Services Task Force. *Low-dose aspirin use for the prevention of morbidity and mortality from preeclampsia: Preventive medication* 2016; https://www.uspreventiveservicestaskforce.org/Page/Document/RecommendationStatementFina

l/low-dose-aspirin-use-for-the-prevention-of-morbidity-and-mortality-from-preeclampsia-preventive-medication. Accessed October 11, 2017.
211. da Fonseca EB, Bittar RE, Carvalho MH, Zugaib M. Prophylactic administration of progesterone by vaginal suppository to reduce the incidence of spontaneous preterm birth in women at increased risk: A randomized placebo-controlled double-blind study. *Am J Obstet Gynecol.* Feb 2003;188(2):419-424.
212. Fonseca EB, Celik E, Parra M, Singh M, Nicolaides KH. Progesterone and the risk of preterm birth among women with a short cervix. *New England Journal of Medicine.* 2007;357(5):462-469.
213. Meis PJ, Klebanoff M, Thom E, et al. Prevention of recurrent preterm delivery by 17 alpha-hydroxyprogesterone caproate. *New England Journal of Medicine.* 2003;348(24):2379-2385.
214. Deeks ED. 17 alpha-Hydroxyprogesterone caproate (Makena): In the prevention of preterm birth. *Paediatr Drugs.* Oct 01 2011;13(5):337-345.
215. Matthews TJ, Hamilton BE. First births to older women continue to rise. *NCHS Data Brief.* May 2014(152):1-8.
216. Smith GC. Life-table analysis of the risk of perinatal death at term and post term in singleton pregnancies. *Am J Obstet Gynecol.* Feb 2001;184(3):489-496.
217. Barton JR, Sibai AJ, Istwan NB, Rhea DJ, Desch CN, Sibai BM. Spontaneously conceived pregnancy after 40: Influence of age and obesity on outcome. *Am J Perinatol.* Oct 2014;31(9):795-798.
218. Rendtorff R, Hinkson L, Kiver V, Droge L, Henrich W. Pregnancies in women aged 45 years and older - a 10-year retrospective analysis in Berlin. *Geburtshilfe Frauenheilkd.* 2017;77(3):268-275.
219. Chaudhary S, Contag S. The effect of maternal age on fetal and neonatal mortality. *J Perinatol.* Mar 30 2017.
220. Walker KF, Bugg GJ, Macpherson M, et al. Randomized trial of labor induction in women 35 years of age or older. *N Engl J Med.* Mar 03 2016;374(9):813-822.
221. Johnson JA, Tough S. Delayed child-bearing. *J Obstet Gynaecol Can.* Jan 2012;34(1):80-93.
222. Centers for Disease Control and Prevention. *Defining overweight and obesity*. 2016; https://www.cdc.gov/obesity/adult/defining.html. Accessed September 9 2017.
223. Devlieger R, Guelinckx I, Jans G, Voets W, Vanholsbeke C, Vansant G. Micronutrient levels and supplement intake in pregnancy after bariatric surgery: A prospective cohort study. *PLoS One.* 2014;9(12):e114192.
224. Jans G, Guelinckx I, Voets W, et al. Vitamin K1 monitoring in pregnancies after bariatric surgery: A prospective cohort study. *Surg Obes Relat Dis.* Sep-Oct 2014;10(5):885-890.
225. National Institutes of Health, Office of Dietary Supplements. *Vitamin A*. 2016; https://ods.od.nih.gov/factsheets/VitaminA-HealthProfessional/. Accessed September 11, 2017.
226. Bar-Zohar D, Azem F, Klausner J, Abu-Abeid S. Pregnancy after laparoscopic adjustable gastric banding: Perinatal outcome is favorable also for women with relatively high gestational weight gain. *Surg Endosc.* Oct 2006;20(10):1580-1583.
227. Dixon JB, Dixon ME, O'Brien PE. Birth outcomes in obese women after laparoscopic adjustable gastric banding. *Obstet Gynecol.* Nov 2005;106(5 Pt 1):965-972.
228. Wax JR, Pinette MG, Cartin A, Blackstone J. Female reproductive issues following bariatric surgery. *Obstet Gynecol Surv.* Sep 2007;62(9):595-604.
229. SAGES guideline for clinical application of laparoscopic bariatric surgery. *Surg Endosc.* Oct 2008;22(10):2281-2300.
230. ACOG Committee opinion number 315, September 2005. Obesity in pregnancy. *Obstet Gynecol.* Sep 2005;106(3):671-675.
231. Agency for Health Research and Quality. The Effective Health Care Program stakeholder guide Appendix D: Research questions & PICO(TS) 2011.

https://www.ahrq.gov/research/findings/evidence-based-reports/stakeholderguide/appendixc.html.

232. Andrews JC, Schunemann HJ, Oxman AD, et al. Grade guidelines: 15. Going from evidence to recommendation-determinants of a recommendation's direction and strength. *J Clin Epidemiol.* Jul 2013;66(7):726-735.
233. Andrews J, Guyatt G, Oxman AD, et al. Grade guidelines: 14. Going from evidence to recommendations: The significance and presentation of recommendations. *J Clin Epidemiol.* Jul 2013;66(7):719-725.
234. Langer O, Brustman L, Anyaegbunam A, Mazze R. The significance of one abnormal glucose tolerance test value on adverse outcome in pregnancy. *Am J Obstet Gynecol.* Sep 1987;157(3):758-763.
235. Lindsay MK, Graves W, Klein L. The relationship of one abnormal glucose tolerance test value and pregnancy complications. *Obstet Gynecol.* Jan 1989;73(1):103-106.
236. Naylor CD, Sermer M, Chen E, Farine D. Selective screening for gestational diabetes mellitus. Toronto Trihospital Gestational Diabetes Project Investigators. *N Engl J Med.* Nov 27 1997;337(22):1591-1596.
237. ACOG Committee opinion no. 246: Primary and preventive care: Periodic assessments.: Compendium of Selected Publications; 2001:210.