In pregnant individuals with risk factors for preeclampsia, prophylactic low-dose aspirin is recommended to reduce the risk of developing preeclampsia. Fifteen distinct risk factors are recognized, including elements of current and past medical and obstetrical history, family history, and examination findings. We present checklists intended to reduce the chance that risk factors might be inadvertently overlooked and to improve the probability of aspirin being recommended for all appropriate candidates. We also suggest how such a checklist can be implemented into practice.

**Key words:** checklist, low-dose aspirin, preeclampsia prevention

**Introduction**

Preeclampsia complicates approximately 3% to 4% of pregnancies in the United States and is a major cause of maternal and perinatal morbidity and mortality. Several known risk factors can be recognized by the late first trimester or early second trimester to identify those at increased risk of preeclampsia. A review by the United States Preventive Services Task Force (USPSTF) lists 6 high-risk factors (preeclampsia in a previous pregnancy, multifetal gestation, chronic hypertension, type 1 or 2 diabetes mellitus, renal disease, and autoimmune disease) and 9 moderate-risk factors (nulliparity, obesity, having a mother or sister who had preeclampsia, African American race, low socioeconomic status, age of 35 years or older, history of low birthweight or small-for-gestational age, previous adverse pregnancy outcome, and interpregnancy interval of more than 10 years).

Prophylactic administration of low-dose aspirin starting in the second trimester in persons at increased risk of preeclampsia reduces the risk of developing preeclampsia by approximately 25%. In 2014, a USPSTF Recommendation Statement concluded that low-dose aspirin should be recommended for individuals with any high-risk factors and should be considered for those with several moderate-risk factors. A joint committee opinion by the American College of Obstetricians and Gynecologists (ACOG) and Society for Maternal-Fetal Medicine (SMFM) recommends aspirin prophylaxis for individuals with any high-risk factors or with more than 1 moderate-risk factor.

It is difficult or impossible for many healthcare providers to remember a list of 15 risk factors (6 high-risk factors and 9 moderate-risk factors) to decide whether to recommend aspirin for a pregnant individual. The risk factors are scattered throughout various parts of the prenatal record (medical history, pregnancy history, history of present illness, family history, and examination findings). Furthermore, a routine prenatal care intake interview might never ascertain some of the factors, such as a history of preeclampsia in a mother or sister or maternal personal history of low birthweight. These items are not included on ACOG’s Antepartum Record form and are likely absent from most other prenatal record forms.

Screening for preeclampsia risk factors fulfills 2 criteria for the use of a checklist: first, it is a procedure with multiple steps (items to be reviewed), and second, the omission of an item could have adverse consequences (failure to prevent preeclampsia when it might have been prevented). Therefore, we developed checklists to aid in the screening of preeclampsia risk factors. The checklists bring the disparate elements of history and examination findings together into a single location. Routine use of these checklists should facilitate a thorough assessment of those factors and help minimize errors of omission. The goal is to prevent individuals with risk factors from “falling through the cracks” because risk factors were missed.

We offer 2 sample checklists: one that would be appropriate for a healthcare provider to use during the initial prenatal care visit and another that would be appropriate for a patient to self-complete before or during the initial visit. We
offer suggestions on how practices might modify, implement, and use such a checklist. We anticipate that each practice will prefer 1 version or the other for routine use and will need to solve certain implementation issues before use.

**Comments on the Checklists**

For example, a checklist that can be completed by the healthcare provider at the first prenatal visit is presented in Box 1. This checklist is a straightforward listing of USPSTF’s high-risk and moderate-risk factors.

A version that can be completed by the patient before the first prenatal visit is presented in Box 2. The boxed section at the bottom of the form is intended to be completed by the provider. This form asks the patient to fill in height and prepregnancy weight; using these responses, the provider calculates the body mass index. Patient-reported height and prepregnancy weight are generally valid approximations, although exceptions may occur. One item on the USPSTF list that is missing from the patient version of the checklist is “low socioeconomic status.”

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**BOX 1**

Sample checklist of preeclampsia risk factors suitable for completion by healthcare providers

<table>
<thead>
<tr>
<th>Preeclampsia Risk Factors</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>High-Risk Factors</strong> (Recommend prophylactic low-dose aspirin if any of these risk factors are present):</td>
<td></td>
</tr>
<tr>
<td>□ yes □ no</td>
<td>Preeclampsia in a previous pregnancy</td>
</tr>
<tr>
<td>□ yes □ no</td>
<td>Multifetal pregnancy</td>
</tr>
<tr>
<td>□ yes □ no</td>
<td>Chronic hypertension (high blood pressure)</td>
</tr>
<tr>
<td>□ yes □ no</td>
<td>Diabetes mellitus (type 1 or type 2)</td>
</tr>
<tr>
<td>□ yes □ no</td>
<td>Kidney disease</td>
</tr>
<tr>
<td>□ yes □ no</td>
<td>Autoimmune disorder (lupus, rheumatoid arthritis, etc.)</td>
</tr>
<tr>
<td>□ yes □ no</td>
<td>Antiphospholipid or anticardiolipin syndrome</td>
</tr>
<tr>
<td><strong>Moderate-Risk Factors</strong> (Consider prophylactic low-dose aspirin if more than 1 of these factors are present):</td>
<td></td>
</tr>
<tr>
<td>□ yes □ no</td>
<td>Nulliparity</td>
</tr>
<tr>
<td>□ yes □ no</td>
<td>Obesity (body mass index 30 kg/m² or greater)</td>
</tr>
<tr>
<td>□ yes □ no</td>
<td>Mother or sister had preeclampsia</td>
</tr>
<tr>
<td>□ yes □ no</td>
<td>African ancestry (based on patient self-report)</td>
</tr>
<tr>
<td>□ yes □ no</td>
<td>Low socioeconomic status</td>
</tr>
<tr>
<td>□ yes □ no</td>
<td>Maternal age 35 years or older</td>
</tr>
<tr>
<td>□ yes □ no</td>
<td>Patient born with low birthweight or small-for-gestational age</td>
</tr>
<tr>
<td>□ yes □ no</td>
<td>Previous pregnancy with small-for-gestational age or other adverse outcome</td>
</tr>
<tr>
<td>□ yes □ no</td>
<td>Interpregnancy interval more than 10 years</td>
</tr>
</tbody>
</table>

Provider Signature ___________________________ Date ___________________________

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several challenges with assessing this item, such as the lack of a standardized definition and potential for stigmatization. If providers choose to include this item, an evidence-based, a priori definition should be included to reduce the likelihood of provider bias. Indicators that have been used as proxies for low socioeconomic status include insurance status, education, and income level.\textsuperscript{17}

In developing the checklists, we relied on high-risk and moderate-risk categories defined by the USPSTF\textsuperscript{7} because they are widely accepted throughout the United States.\textsuperscript{11} We designed the checklists using guidance from “A Checklist for Checklists” by Ariadne Labs.\textsuperscript{18} Despite the challenge of including 15 risk factors, the forms are designed to be as simple and uncluttered as possible. Each checklist is limited to a single page, uses a black sans-serif typeface on a white background, avoids the use of color, and includes a version date.

All items require a yes-or-no response to encourage an answer for each item. Items presented only as “check if yes” responses are potentially confusing because an unchecked item might signify either a “no” answer or a missed item.
Suggestions for Implementation

First, each practice should decide whether it will use a checklist at all or whether it will have providers rely on memory for preeclampsia risk-factor screening. The checklists are designed to be used by prenatal care providers (physician offices, clinics) and not primarily within inpatient hospital settings. Before implementing the checklists, we recommend assembling a team of relevant practice personnel, such as physicians and nurses involved in prenatal care, medical assistants, front-office staff, and others who may interact with the checklist. Team meetings and individual interviews can be used to seek input from all personnel. Team goals should be to develop a timetable for implementation, identify and solve any barriers to implementation, monitor usage and effectiveness of the checklist, and develop a strategy for sustainability. A proven, formal implementation framework such as the Behavior Change Wheel (based on the COM-B system of capability, opportunity, and motivation),18 Consolidated Framework for Implementation Research (CIFR),20 or reach, effectiveness, adoption, implementation, maintenance model (RE-AIM)21 are examples that may help to guide key steps in the implementation process.

Each practice will need to decide whether to use the provider-completed form (Box 1) or the patient-completed form (Box 2). There is generally no advantage for a practice to use both forms.

A decision should be made about the format of the checklist and the way it will be administered: either as a paper form to be filed in the patient chart, an electronic form incorporated into the practice’s electronic medical record (EMR), or verbally by provider interview and not incorporated as a separate item in the patient record. If paper forms are used, the practice must designate which patients will be given the form (eg, all new pregnant patients, all patients with a new prenatal visit, all patients presenting for their first ultrasound examination in pregnancy). If electronic forms are developed, the practice may need to have information technology specialists modify the EMR to automatically tabulate the answers to the questions and present a “flag” or “pop-up” warning if preeclampsia risk factors are identified. The SMFM Informatics Committee has liaisons with EMR vendors and may be able to encourage the incorporation of these checklists into their standard prenatal record packages.

The practice should develop a written process regarding who will be responsible for completing the form (physician, nurse, or medical assistant for the provider-completed checklist in Box 1) or for giving the form to the patient (front-desk staff or medical assistant for the patient-completed checklist in Box 2) and for evaluating the responses (physician or nurse).

Each practice should develop a consensus regarding the patients for whom low-dose aspirin is initiated. The ACOG and SMFM Committee Opinion concludes that low-dose aspirin should be recommended for patients with any high-risk factors and considered for patients with more than 1 moderate-risk factor.11 Each practice should also decide on the gestational age range for starting aspirin. The ACOG and SMFM Committee Opinion recommends that low-dose aspirin prophylaxis be initiated at 12 to 28 weeks of gestation (optimally before 16 weeks) and continued daily until delivery.11 The practice should also develop a consensus regarding the dosage of aspirin. The ACOG and SMFM Committee Opinion recommends a dosage of 81 mg daily,11 but some practices may consider a higher dosage.10

REFERENCES

From the Patient Safety and Quality Committee, Society for Maternal-Fetal Medicine, Washington, DC.

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All questions or comments regarding the document should be referred to the SMFM Patient Safety and Quality Committee at smfm@smfm.org.