Society for Maternal-Fetal Medicine
High-risk pregnancy experts

SMFM Special Statement

smfm.org

# Society for Maternal-Fetal Medicine Special Statement: Emergency checklist, planning worksheet, and system preparedness bundle for placenta accreta spectrum

Society for Maternal-Fetal Medicine (SMFM); Brett D. Einerson, MD, MPH; Andrew J. Healy, MD; Amy Lee, MD; Christine Warrick, MD; C. Andrew Combs, MD, PhD; and Afshan B. Hameed, MD; SMFM Patient Safety and Quality Committee

The Pan-American Society for the Placenta Accreta Spectrum (PAS2), the Society of Gynecologic Oncology (SGO), the Society for Obstetric Anesthesia and Perinatology (SOAP), and the Society of OB/GYN Hospitalists (SOGH) endorse this document.

Placenta accreta spectrum is a life-threatening complication of pregnancy that is underdiagnosed and can result in massive hemorrhage, disseminated intravascular coagulation, massive transfusion, surgical injury, multisystem organ failure, and even death. Given the rarity and complexity, most obstetrical hospitals and providers do not have comprehensive expertise in the diagnosis and management of placenta accreta spectrum. Emergency management, antenatal interdisciplinary planning, and system preparedness are key pillars of care for this life-threatening disorder. We present an updated sample checklist for emergent and unplanned cases, an antenatal planning worksheet for known or suspected cases, and a bundle of activities to improve system and team preparedness for placenta accreta spectrum.

**Key words:** algorithms, blood transfusion, clinical decision support, disseminated intravascular coagulation, hysterectomy, massive transfusion protocol, patient safety, placenta diseases, placenta increta, placenta percreta, postpartum hemorrhage

## Introduction

Placenta accreta spectrum (PAS) is a disorder of abnormal placental attachment to the uterus that often results in massive obstetrical hemorrhage at the time of delivery.[1–3] Many patients with PAS experience severe maternal morbidity, hysterectomy, operative injury (including urinary tract damage), disseminated intravascular coagulation (DIC), and need for intensive care unit (ICU) admission.[2,4–6] Death has been reported in 1% to 7% of severe cases and may occur even at busy and experienced medical centers.[7–9] Morbidity persists beyond hospital discharge; PAS is strongly associated with long-term symptoms of anxiety and depression, pelvic pain, birth trauma, and post-traumatic stress disorder.[10–14]

The estimated pooled rate of PAS in pregnancy is 0.17%, but the true incidence is unknown and is likely increasing in the United States and worldwide.[15] Although PAS is common enough for practicing obstetricians to encounter during their careers, it remains rare enough that most obstetrical hospitals and providers do not have adequate expertise in diagnosis and management. Safe PAS care requires coordinated interdisciplinary teams committed to continuous quality improvement, effective and rapid communication, and iterative case-based team learning.

PAS presents a challenge to even the most well-equipped centers. Since 2018, the Society for Maternal-Fetal Medicine (SMFM) has posted sample checklists for the management of PAS on its website. Here, we present an updated sample checklist for emergent and unplanned cases of PAS, an antenatal planning worksheet for known or suspected cases of PAS, and a bundle of activities to improve system and team preparedness for PAS. Key updates include increased focus on system preparation for all obstetrical hospitals, regardless of PAS experience; building a specific PAS team at PAS referral centers; defining the format of prenatal interdisciplinary team planning meetings;

Corresponding author: The Society for Maternal-Fetal Medicine: Patient Safety & Quality Committee. smfm@smfm.org

and approaches to reducing surgical blood loss during hysterectomy. In addition, we provide a narrative explanation for many of the checklist items.

## How to use this document

Figure 1 is a checklist for emergent and unplanned cases of PAS. This may be printed and used as an "operating room (OR) checklist" at any obstetrical hospital when unexpected PAS is encountered. It is intended to be used regardless of the hospital or team experience but is particularly targeted to those with less experience and volume to assist in an emergency. It can be used for cases of diagnosis just before delivery or for cases diagnosed at the time of delivery (including intraoperatively). The emergency checklist may be laminated and placed in multiple locations, such as the OR, code book, anesthesia cart, and obstetrical hemorrhage cart for ease of access during an emergency.

Figure 2 is an antenatal planning worksheet intended for use by PAS referral centers to guide the discussion at interdisciplinary team meetings (Figure 2, part 1) and to prepare all the resources, consultations, and equipment for planning safe PAS surgery (Figure 2, part 2). These documents may be attached to the patient's medical record (electronically) or updated and stored in a file folder used at interdisciplinary meetings. Ideally, the antenatal planning worksheet (Figure 2) would "follow" the patient through their care from PAS diagnosis through surgery and thereafter.

The activity bundle shown in Figure 3 is intended for use by obstetrical hospitals to determine whether they have the resources and experience to serve as a referral center that routinely manages PAS (Figure 3, part 1). In addition, Figure 3 outlines ways to optimize the interdisciplinary approach to planning for PAS cases (Figure 3, part 2).

Each figure should be considered a template or guide that may be modified to meet the needs of the local hospital and team. The field of PAS research is nascent and rapidly evolving. PAS teams often grow, improve, and standardize as volume, team learning, and experience evolve.[16] As standards of care and team members change, PAS checklists will require periodic review and revision. Each section is $\leq$2 pages in length. This allows for a printed version (front and back) to be stored in an easily accessible place. Other standard checklist design principles are followed, such as use of a nonserif font, avoidance of unnecessary color, and inclusion of a version date.

## Emergency checklist for unexpected or undiagnosed PAS

The emergency checklist shown in Figure 1 is designed to assist hospitals and providers who encounter "unexpected" or "undiagnosed" PAS. In some cases, patients may present to an obstetrical hospital with scant prenatal care, and a new suspected diagnosis of PAS will require quick decision-making to determine the optimal location and timing for delivery. In other cases, the diagnosis of PAS may be missed until the day of delivery or may only become apparent during the process of delivery. Up to 50% of PAS cases go undiagnosed until delivery.[6,17]

We emphasize the importance of considering consultation with or transport to a PAS referral center when possible, even if the diagnosis is made intraoperatively or during delivery. Definitive management of PAS with hysterectomy or another strategy is not absolutely or immediately required in a stable patient even if cesarean delivery has already started or delivery of the fetus has already occurred. In many circumstances, closing the abdomen or transporting the patient to a more experienced hospital is feasible and safer than attempting surgical treatment of PAS in less-prepared settings. As such, the "crucial questions" to ask when PAS is newly diagnosed or encountered during delivery are as follows: (1) "Is this hospital optimally equipped to manage PAS?" and, if not (2), "Does this patient need to be delivered now, or can transport to a more experienced center be safely arranged?"

Each checklist component (Figure 1) contains crucial information to discuss during a multidisciplinary preoperative timeout and throughout the delivery and surgical course. Component 1 is a checklist for the management of PAS with a focus on reducing morbidity. After considering the 2 crucial questions, the following sections correspond to 4 potential time points in the process of PAS management: (1) if proceeding with delivery; (2) after delivery of the neonate, but before further treatment; (3) if proceeding with hysterectomy; and (4) if encountering massive or uncontrolled hemorrhage.

When proceeding with delivery, it is important to assess the placental location, plan the laparotomy approach carefully, and avoid placental disruption during the delivery of the neonate. This can be accomplished with a combination of presurgical ultrasound to identify the placental location, intraoperative assessment of the surgical field and location of placental or vascular involvement, and (if needed) intraoperative placental mapping with sterile ultrasound. Surgical teams should strategically plan laparotomy for best exposure in case a fundal hysterotomy is needed, particularly when there is previa or lower uterine segment placenta. This is typically best accomplished by a midline vertical incision. If a Pfannenstiel incision is used for delivery and more exposure is needed, the surgical team can perform partial transection of the rectus muscles and extension of the skin incision (modified Maylard).

After delivery of the neonate, when PAS is present, the team should pause to assess stability and resources and consider alternatives to immediate surgical treatment of PAS. If the hospital is not optimally equipped to manage PAS, and the patient is stable with no active bleeding, then closure of the uterus and abdomen and prompt transport to an experienced PAS referral center should be strongly considered. In unstable patients or patients with active hemorrhage, the team should mobilize the required surgical resources and equipment (Figure 1, component 2 and

component 3), if not already done, and proceed with hysterectomy for definitive surgical management.

If proceeding with hysterectomy, it is important to communicate clearly with the entire team, mobilize resources and consultants promptly, use surgical or procedural techniques described in this section to reduce and manage blood loss, and aggressively transfuse blood products when indicated.[18,19] Surgical and procedural consultants should be alerted and mobilized early, as rapid hemorrhage can occur unexpectedly during PAS surgery. The patient and family should be alerted of changes in the plan. Repositioning to lithotomy may be beneficial as this allows for periodic assessment of vaginal bleeding, which may otherwise go unrecognized. In addition, it enables the surgical team to access the vagina for an instrument from below during colpotomy and allows for cystoscopy or ureteral stenting prophylactically or at the end of the case. Active hemorrhage should be treated with tranexamic acid and transfusion in a balanced ratio (per local protocol for massive transfusion). The use of uterotonics (e.g., oxytocin) is not included here, as their use for PAS is controversial.[20] Members of the surgical, anesthesia, blood bank, and other teams should practice clear, closed-loop communication regarding changes in blood loss, alterations in anesthesia approach, and need for ongoing treatments and transfusion. In addition, the team should perform periodic check-ins to reevaluate bleeding and resuscitation status and anticipate the next tasks (Figure 1, component 4).

Damage control surgery, with the intent of reducing or stopping bleeding by rapidly completing hysterectomy, may be required in cases of massive hemorrhage. To temporarily reduce the flow of massive hemorrhage during hysterectomy, manual aortic compression or aortic cross-clamping under the guidance of an experienced surgeon can be lifesaving. Aortic balloon compression can be considered, although this emergency procedure is not often available outside of busy trauma centers. In massive hemorrhage, balanced transfusion (with or without a cell saver) should be used to support the cardiopulmonary status of the patient and replace blood lost with frequent assessment of blood counts and coagulation factors. Point-of-care coagulation testing may aid in guided transfusion. When multiple units of blood products are administered, hypocalcemia should be corrected. Antibiotics should be readministered per local protocol (e.g., after 3 hours and an estimated blood loss of $>$1500 mL). If DIC occurs during surgery, abdominopelvic packing with a vacuum and delayed primary closure of the abdomen should be considered to allow for coagulopathy to resolve.

Finally, when surgery for an unexpected case of PAS is nearing an end, the following important post-surgical items should be addressed:

1. Surgical teams should agree on and report the extent and location of PAS disease in both operative reports and pathology requisition forms to ensure adequate documentation and optimize pathologic evaluation.
2. The disposition and immediate plans for the patient should be reviewed and physician-to-physician communication should occur between the surgical team and the accepting postsurgical team (e.g., ICU or transport).
3. Teams should consider specific PAS-related plans for pain control, maintenance or discontinuation of venous and arterial lines, contingency plans for additional hemorrhage control (e.g., criteria for take-back or planned multivessel embolization), infection prevention, venous thromboembolism prevention, management of indwelling bladder catheters and ureteral stents, and approaches to manage the psychological and emotional support of patients, family members, and team members (as potential "second victims" of a harrowing event).
4. Lastly, a surgical debrief with the entire team should be performed promptly or planned for the near future. When unexpected PAS occurs, it is important that the teams involved discuss what worked, discuss what did not work, and identify opportunities to improve care for the next time.

## Antenatal planning worksheet

The antenatal planning worksheet (Figure 2) is designed to enable interdisciplinary teams to communicate treatment plans and ensure adequate preparation for delivery and surgery for suspected PAS.

Part 1 of the worksheet contains a series of questions to prompt discussion at the interdisciplinary meeting. The steps of the meeting include: (1) review of images to determine the surgical approach, (2) review of histories pertinent for preparing for surgery, and (3) decisions regarding details of the surgery. Each step has a heading with questions to guide the discussion. There is space for note-taking on the right of the page. Under each question are example phrases that may arise during the interdisciplinary meeting. These italicized phrases are not intended to be exhaustive.

If implemented optimally, part 1 of the worksheet should spark interdisciplinary discussion under each step. First, the team should review the imaging. For this step, we did not list specific modalities (ultrasound or magnetic resonance imaging) or propose a checklist of PAS signs as approaches to diagnosis differ substantially between institutions. Alternatively, we focus on questions about the imaging that lead directly to discussions of antenatal and surgical management: "Where is the disease and where might the surgical difficulties lie?" Review of imaging focused on descriptions of the disease should lead directly to a discussion of an individualized approach to antenatal and surgical management. For example, if the imaging review includes a discussion of suspected parametrial involvement and significant pelvic hypervascularity, this might prompt the

FIGURE 1
**Sample emergency checklist for unexpected or undiagnosed PAS**

## Checklist: Management of Unexpected or Undiagnosed Placenta Accreta Spectrum

**Component 1: Management to Prevent & Reduce Morbidity**

**CRITICAL QUESTIONS**
1. *Does this hospital have the resources to manage PAS? (Section 3) and if not;*
2. *Can transport to a PAS referral center be safely arranged?*

**IF PROCEEDING WITH DELIVERY**
- ☐ Mobilize resources & team (**Component 2**)
- ☐ Determine placental location (before or during surgery)
- ☐ Consider midline vertical incision
- ☐ Deliver neonate *away from* the placenta, may be fundal
- ☐ Avoid placental delivery and cord traction if PAS is evident

**AFTER DELIVERY OF NEONATE**
- ☐ In stable delivered patient, consider temporizing & transport
- ☐ In unstable or hemorrhaging patient, proceed to hysterectomy

**IF PROCEEDING WITH HYSTERECTOMY**
- ☐ Communicate change plan to patient/family, OR staff, & consultants
- ☐ Obtain equipment and resources (**Component 3**)
- ☐ Consider lithotomy to assess blood loss and assist vaginally
- ☐ Consider use of: ureteral stents, vessel sealing device, supracervical hysterectomy, vaginal instrumentation to define colpotomy
- ☐ TXA for active hemorrhage
- ☐ Balanced transfusion of blood products
- ☐ Perform periodic evaluation of case status (**Component 4**)

**FOR UNCONTROLLED HEMORRHAGE**
- ☐ Call for additional help: e.g., trauma surgery, anesthesia, OR staff
- ☐ Consider aortic compression (manual or IR)
- ☐ Consider abdomio-pelvic packing if uncontrolled DIC

**Component 2: Mobilize resources & team**

- ☐ Obtain two large bore peripheral IVs and arterial access
- ☐ Prepare for massive transfusion protocol
- ☐ Notify available subspecialties: anesthesia, OB/GYN, pelvic surgeon, trauma/vascular surgeon, NICU, blood bank
- ☐ Determine optimal operating theater (e.g., Main OR)
- ☐ Update procedural consents
- ☐ Identify Health Care Proxy

**Component 3: Suggested procedural equipment**
*A detailed list of PAS OR equipment is in Section 2*

- ☐ Anesthesia: airway, arterial & venous line kits
- ☐ Blood products in the room and checked
- ☐ Blood warmer / rapid infuser
- ☐ Hysterectomy kit, with abdominal wall retractor
- ☐ Cesarean kit
- ☐ Ultrasound with sterile probe cover
- ☐ Cystoscopy tower, tray, and ureteral stents
- ☐ Newborn resuscitation equipment, warmer
- ☐ Arterial occlusive balloon kit, if available

**Component 4: Periodic Reevaluation**
*Every 15-30 minutes*

- ☐ Evaluate vaginal blood loss and total blood loss
- ☐ Consider lab work or point-of care coagulation testing
- ☐ Anticipate additional blood product needs
- ☐ Avoid and correct hypothermia and hypocalcemia
- ☐ Re-dose surgical antibiotics, if indicated
- ☐ Update patient support persons, when appropriate
- ☐ Inform ICU of admission, if applicable

Version Date: November 2, 2023

*DIC*, disseminated intravascular coagulation; *ICU*, intensive care unit; *IR*, interventional radiology; *NICU*, neonatal intensive care unit; *OR*, operating room; *PAS*, placenta accreta spectrum; *TXA*, tranexamic acid.

*Society for Maternal-Fetal Medicine. Updated placenta accreta checklist. Am J Obstet Gynecol 2024.*

team to increase the surgical expertise available at the start of the hysterectomy or plan for prophylactic endovascular intervention. Imaging that shows a particularly distorted bladder may lead to a discussion of how to best prevent urinary tract injury and whether preoperative urologic consultation should be pursued.

Review of history should focus on comorbidities, obstetrical considerations, anesthetic concerns, and blood bank issues unique to the current patient. Discussion of comorbidities may lead to additional consultations outside of the PAS team. A history of recurrent preterm birth or preterm preeclampsia may alter obstetrical management. Anesthesia concerns and optimal pain control plans should be addressed. Special patient-specific considerations can be identified. For example, a patient may refuse blood product administration or hysterectomy because of religious and cultural beliefs.

Finally, important discussions from the interdisciplinary meeting should be recorded under the third step. These include timing, location, surgical team, and a backup plan for the surgery. Unique aspects of the hemorrhage prevention and treatment plan should be delineated. Standard or alternative approaches to the anesthesia and urology plan should be discussed.

Part 2 of the worksheet is a to-do list for PAS planning from diagnosis to postoperative care. At the top is a system-specific emergency contact list for easy access to locate these key care team players. Systems differ in team approaches to surgery and PAS preparation and may adapt the list to their needs. For example, in centers that use prophylactic multivessels pelvic artery embolization, interventional radiology and the hybrid OR scheduler may be a part of the contact list.

A list for antenatal preparation is on the left of the page. Patients should undergo expert PAS imaging and be discussed at an interdisciplinary team planning meeting if time and circumstances allow. Blood type, antibody screen, and early third-trimester (or recent) hemoglobin should be

FIGURE 2
**Sample antenatal planning worksheet for PAS**

**Antenatal Planning Worksheet: Interdisciplinary Team Plan (Part 1)**

Date: _____

**PATIENT INFORMATION**
Name:
MRN/DOB:
EDD:
PAS Risk Factors:
Comorbidities:

Other:

**TEAM AND PROVIDERS**
Referring:
MFM/OB:
Anesthesiologist:
Consultants:
Urology Y/N GynOnc Y/N
Radiology Y/N Trauma Y/N
Other:
Healthcare Proxy:

**1. Review of Imaging to Determine Surgical Approach**
- ☐ Where is the placenta located?
  *(e.g., anterior previa with extension toward bladder on left)*
- ☐ What severity of disease is present or suspected?
  *(e.g., suspect FIGO Grade 3a)*
- ☐ What degree of hypervascularity is present?
  *(e.g., significant uterovesical or cervical hypervascularity)*
- ☐ Where does the team anticipate surgical difficulties?
  *(e.g., suspected parametrial or bladder involvement)*

**2. Review of Histories to Prepare for Surgery**
- ☐ Are there comorbidities that require preoperative consultation? Y/N
  *(e.g., hematologic disorders, complex surgical history)*
- ☐ Is the patient at risk of early delivery (<34 weeks)? Y/N
  *(e.g., history of preterm birth, short cervix, antenatal bleeding)*
- ☐ Are there significant anesthesia concerns? Y/N
  *(e.g., difficult airway, contraindications to neuraxial)*
- ☐ Does the patient have unique pain control needs? Y/N
  *(e.g., opiate sensitivity or dependence)*
- ☐ Are there unique blood bank considerations? Y/N
  *(e.g., antibodies, refusal of blood products)*
- ☐ Are there unique fertility preservation or sterilization requests? Y/N

**3. Decide on Details for Surgery**
- ☐ Surgery location, team, and backup plan:
  *(e.g., main OR, GynOnc and MFM to start +/- trauma surgery backup)*
- ☐ Surgical timing and plan:
  *(e.g., vertical incision, planned cesarean hysterectomy at 35 weeks)*
- ☐ Hemorrhage plan:
  *(e.g., IR on standby, 6 PRBC / 6 FFP in OR)*
- ☐ Anesthesia plan:
  *(e.g., neuraxial convert to general, IV & arterial access)*
- ☐ Urology plan:
  *(e.g., stents, urology present)*
- ☐ Special considerations:
  *(e.g., avoid hysterectomy if possible, opiate-sparing protocol)*

*DOB*, date of birth; *EDD*, estimated due date; *FFP*, fresh frozen plasma; *FIGO*, International Federation of Gynaecology and Obstetrics; *GynOnc*, gynecologic oncology; *IR*, interventional radiology; *IV*, intravenous; *MFM*, maternal-fetal medicine; *MRN*, medical record number; *NICU*, neonatal intensive care unit; *OB*, obstetrician; *OR*, operating room; *PACU*, postanesthesia care unit; *PAS*, placenta accreta spectrum; *PRBC*, packed red blood cells; *VTE*, venous thromboembolism.

*Society for Maternal-Fetal Medicine. Updated placenta accreta checklist. Am J Obstet Gynecol 2024.*

known. If complex antibodies are present, teams should work with the blood bank to procure an adequate supply of crossmatched blood well before the surgical day. If significant anemia is diagnosed, further workup may be needed, and optimization of hemoglobin (e.g., iron supplementation or infusion) should be achieved antenatally. Psychological and emotional support is a crucial unmet need of patients with PAS.[10,13] A formal system of support should start

FIGURE 2
**Continued**

**Antenatal Planning Worksheet: Interdisciplinary Team Plan (Part 2)**

Date of planned admission: _____ Date of planned surgery: _____

**EMERGENCY CONTACT LIST**

| | |
|---|---|
| PAS Team Lead: | Gyn Onc / Gyn Surgery: |
| Anesthesiology: | Operating Room: |
| MFM: | Labor and Delivery: |
| Urology / Urogyn: | Neonatal / NICU: |
| Vascular Surgery: | Trauma Surgery: |
| Other: | |

**Antenatal Preparation**

- ☐ PAS expert imaging complete
- ☐ Interdisciplinary team plan complete
- ☐ Advanced directive signed
- ☐ Blood type & antibody screen
- ☐ Confirm recent pap smear result
- ☐ Recent hemoglobin & platelets
- ☐ Hemoglobin optimization, if indicated
  *(e.g., IV iron infusion)*
- ☐ Other labs, if indicated
  *(e.g., coagulation panel, creatinine)*
- ☐ Psychological counseling arranged
- ☐ Preoperative consultations complete *(fill in):*
  - ☐
  - ☐
  - ☐
- ☐ Antenatal steroids indicated? *Y / N*
- ☐ Antenatal steroids administered? *Y / N / n/a*

**PAS-Specific Operating Room Equipment**

- ☐ Fetal monitor, if viable
- ☐ NICU resuscitation equipment
- ☐ Neuraxial anesthesia tray, if planned
- ☐ Video laryngoscope
- ☐ Blood bank cooler
- ☐ Blood & IV fluid rapid infuser
- ☐ Cell saver
- ☐ Arterial line and central line kits
- ☐ Cesarean tray, with cord blood tubes & clips
- ☐ Cystoscopy tray, stents, and tower
- ☐ Self-retaining or table-mounted retractors
- ☐ Hysterectomy tray, with surgeon preferences
- ☐ Hemorrhage control devices
  *(e.g., surgical clips, bipolar device, linear stapler-cutter)*
- ☐ Interv. Radiology equipment
  *(e.g., C-arm, endovascular catheters)*
- ☐ Table-mounted leg stirrups

**Admission**

- ☐ Antenatal steroids administered, if indicated
- ☐ Consent forms signed, in chart
- ☐ Preop labs complete, if indicated
- ☐ Active antibody screen
- ☐ Crossmatch of blood, per protocol
  *(e.g., 6 units PRBC and FFP)*
- ☐ All preoperative consultations complete
- ☐ Preop fetal monitoring completed
- ☐ Preop infection prevention
  *(e.g., chlorhexidine wipe / bath)*

**Operating Room**

***Pre-operation***

- ☐ Surgical consultants contacted
- ☐ NICU staff and equipment ready
- ☐ Surgical equipment ready *(see sample on right)*
- ☐ Pre-/Intra-operative fetal monitoring ready
- ☐ Umbilical cord clamping protocol reviewed
- ☐ Cell saver prepared, if indicated
- ☐ Blood cooler in room, verified and checked
- ☐ Interdisciplinary timeout performed

***Post-operation***

- ☐ Determine surgical grade *(eg, FIGO grade 1)*
- ☐ Quantify / estimate blood loss
- ☐ Decide on postoperative disposition
  *(e.g., ICU, PACU, surgical or postpartum floor)*
- ☐ Re-dose antibiotics, if indicated
- ☐ Urinary catheter & stent plan
- ☐ Endovascular intervention plan, if indicated
- ☐ Lab testing plan
- ☐ Specimen labeled and sent to pathology
- ☐ Pain management plan
- ☐ VTE prevention plan, first timed dose

Version Date November 2, 2023

*Society for Maternal-Fetal Medicine. Updated placenta accreta checklist. Am J Obstet Gynecol 2024.*

antenatally and continue through the time of delivery and after delivery. Each system should assess and mobilize psychological support resources, including social workers, psychologists, family life specialists, or psychiatrists, as appropriate. Preoperative consultations should be obtained before delivery, as indicated.

Following antenatal preparation is a list for antenatal admission. Patients with PAS may require admission at any time in the second and third trimesters of pregnancy based on their clinical presentation, and facilities may routinely admit patients a day or days in advance. In any case, on arrival of a patient with PAS, several items should be assessed. Appropriate administration of antenatal steroids for fetal prematurity should be confirmed. Laboratory test results for blood counts and transfusion preparedness should be obtained. Finally, the team should confirm that all preoperative consultations have occurred and that preoperative plans for fetal monitoring and infection prevention are enacted.

On the right side of the page are day-of-surgery preoperative and postoperative lists. There is some overlap in this section with the checklist (Figure 1) as it also focuses on the OR but on expected cases. The preoperative list emphasizes the availability of appropriate team members and resources. The postoperative list emphasizes clarity in planning between the surgical, anesthesia, and postsurgical teams.

Finally, part 2 provides a suggested list of PAS-specific OR equipment. More detailed equipment lists may be needed for each institution, but this is a suggested minimum requirement list. The emphasis is on equipment for anesthesia; patient positioning; intravenous and arterial access; surgical equipment for delivery, cystoscopy, and hysterectomy; and hemorrhage control. The difficulty of surgery cannot always be predicted, so even in cases where uterine-sparing (conservative) management is planned or the need for hysterectomy is unclear from antenatal imaging, this equipment should be readily available in case urgent hysterectomy or salvage surgery is required.

## System and team preparedness bundle

Figure 3 provides one framework for the hospital system to determine whether it has adequate resources and expertise to manage PAS surgery instead of referring to a higher level

FIGURE 3
**Bundle of activities to improve system and team preparedness for PAS**

**Activity Bundle: Optimizing Interdisciplinary Care for PAS (Part 1)**

**System and Team Preparedness**

**Suggested services and resources for hospital systems caring for patients with PAS**

- ☐ Maternal Level of Care III (subspecialty) or higher care
- ☐ Blood bank services with unquestioned ability for massive transfusion
- ☐ On-site adult intensive care facilities that accept pregnant/postpartum patients
- ☐ Neonatal intensive care facilities
- ☐ Adequate experience in managing complex maternal and obstetric complications like PAS
- ☐ 24-hour prompt/emergent access to all of the following
  - ○ PAS Imaging Expertise
  - ○ Experienced obstetrician (may be maternal-fetal medicine)
  - ○ Anesthesiologist with complex obstetric expertise (preferably OB Anesthesia)
  - ○ Surgeon experienced in complex pelvic surgery (may be gynecologic oncology)
  - ○ Urologist
  - ○ Neonatologist
  - ○ Interventional radiologist
  - ○ Blood bank specialist
  - ○ Vascular surgeon
  - ○ Colorectal or acute care general surgeon
  - ○ Intraoperative blood salvage services

Version Date: November 2, 2023

*OB*, obstetric; *PAS*, placenta accreta spectrum.

*Society for Maternal-Fetal Medicine. Updated placenta accreta checklist. Am J Obstet Gynecol 2024.*

FIGURE 3
**Continued**

**Activity Bundle: Optimizing Interdisciplinary Care for PAS (Part 2)**

☐ **Identify PAS program "champion(s)"**
- Member or members of the Department of OB/GYN committed to organizing, operationalizing PAS care
- Ideally, this person or people would have experience across the clinical spectrum of care in PAS diagnosis, delivery, pelvic surgery, and recovery.
- Willing Co-Champions from radiology, anesthesiology, gynecologic surgery, and pathology are beneficial

☐ **Build an interdisciplinary "PAS Team" with active membership from:**
- OB / MFM lead
- PAS imaging experts (radiology and/or MFM)
- OB Anesthesiology
- Pathologist with interest in PAS
- Pelvic surgical experts (eg, gynecologic oncologists)
- Interventional Radiology
- Social Support Staff (eg, social work)
- Psychological Support for perinatal grief, birth trauma, and PTSD
- Other surgical staff, depending on the site:
  (may include Trauma or General Surgery, Urogynecology, Urology, Vascular Surgery, General Obstetric, Minimally Invasive Gynecology)

☐ **Implement interdisciplinary PAS planning meetings in the form of either:**
(a) Scheduled in-person or virtual treatment planning conferences (preferred), or;
(b) Formalized, scheduled electronic communications.

Components of successful formalized PAS meetings:
- Pathology review, emphasis on correlating imaging and surgical findings with pathologic diagnosis
- Surgical debriefs
- Assessment of each case for quality and safety improvement

☐ **Organize and identify a PAS surgical team**
- Separate from OB team, if possible
- Including experts in antenatal care, cesarean delivery, and pelvic surgery

☐ **Develop a PAS care protocol**
This should be organized for the interdisciplinary meeting template in Figure 2, including consensus-derived *standardized* approaches to:
- Diagnosis, including standardized imaging protocols and reporting
- Preoperative consultations
- Antenatal management and delivery timing
- Anesthesia (eg, neuraxial versus general, vascular access, postop pain control, airway assessment)
- Delivery location (L&D, Main OR, Hybrid OR)
- Transfusion preparedness and administration (eg, number of units in the OR, use of thromboelastography, fibrinogen concentrate availability (Fibryga/RiaSTAP), cell saver, tranexamic acid use)
- Indications for endovascular intervention
- Operative management and techniques (eg, incision, ureteral stents, intra-operative ultrasound)

Version Date: November 2, 2023

*Society for Maternal-Fetal Medicine. Updated placenta accreta checklist. Am J Obstet Gynecol 2024.*

of care and a second framework to optimize system and team preparedness for PAS.

Previous authors aimed to define what constitutes a PAS referral center (sometimes called a "center of excellence [COE]").[21] This process is challenging because of the paucity of high-quality evidence or validated quality metrics. Many hospitals with adequate resources (e.g., a level III hospital with 24-hour access to interventional radiology and a large blood bank) may not have sufficient expertise or volume of PAS cases. Conversely, some providers may

have extensive PAS training and personal experience but work within a system that does not have all PAS-related services. A formal accreditation process to determine which centers should be PAS referral centers or "COE" currently does not exist in the United States. We do not aim to propose an accreditation process and do not wish to restrict access to high-quality care for PAS. However, we believe this document can be helpful for hospitals to identify opportunities for improvement when considering the management of complex PAS cases.

Figure 3, part 1, is designed to help centers determine whether PAS cases can safely be planned and managed in their center. All suggested criteria and resources are consistent with the SMFM and American College of Obstetricians and Gynecologists (ACOG) Levels of Maternal Care Obstetric Care Consensus[1] and the ACOG, Society of Gynecologic Oncology, and SMFM PAS Obstetric Care Consensus.[2] PAS referral centers may not have access to every item on the list. Thus, the items are suggested, not strictly required, in centers managing PAS surgery.

A key but undefined criterion of optimal PAS care is "adequate experience in managing complex maternal and obstetrical complications, such as PAS." The ACOG and SMFM have previously endorsed the regionalization of care for patients with PAS, stating that "outcomes are better if women (with PAS) are managed in hospitals with high delivery volume."[1] However, few data exist to directly inform what minimum number of PAS cases constitutes "adequate" for a hospital or surgeon and the care team, and this number likely varies by institution, individual, and even disease severity. Past literature suggests that experience matters in PAS care. Higher volume, multidisciplinary care is associated with better PAS outcomes.[16,22,23] Low-volume surgeons and low-volume centers performing hysterectomy (not just for PAS) have higher rates of surgical complications.[24–26] For these reasons, surgeons and hospitals should earnestly consider whether they have "adequate" PAS expertise and cases when determining whether PAS cases should be referred or managed locally.

If a center has the resources and expertise to plan and manage PAS cases, a second key step in system and team preparedness is to consider the recommendations in Figure 3, part 2. These recommendations focus on interdisciplinary team-based care (which is associated with improved outcomes),[22,23] formalized interdisciplinary communication, and development of a local PAS care protocol.

Identifying a PAS program champion is imperative because PAS is a disorder that requires care coordination across multiple specialties. A single provider or specialty cannot be an expert in all aspects of PAS care, including antenatal diagnosis and imaging, perioperative care, and pathologic evaluation. PAS champions can organize the diverse array of specialists needed and can be responsible for the remaining recommended steps. Often this program champion will come from the obstetrics and gynecology department, but this is not a requirement. After a program champion is identified, the remaining tasks involve the establishment of a dedicated interdisciplinary PAS team, implementation of interdisciplinary treatment planning meetings, organization of a PAS surgical team for deliveries, and development of a consensus-derived standard care protocol for the institution.

## REFERENCES


1. Levels of maternal care. Obstetric care Consensus No. 9. Obstet Gynecol 2019;134:e41–55.
2. American College of Obstetricians and Gynecologists; Society for Maternal-Fetal Medicine. Obstetric care Consensus No. 7: placenta accreta spectrum. Obstet Gynecol 2018;132:e259–75.
3. Silver RM, Branch DW. Placenta accreta spectrum. N Engl J Med 2018;378:1529–36.
4. Eller AG, Porter TF, Soisson P, Silver RM. Optimal management strategies for placenta accreta. BJOG 2009;116:648–54.
5. Warshak CR, Ramos GA, Eskander R, et al. Effect of predelivery diagnosis in 99 consecutive cases of placenta accreta. Obstet Gynecol 2010;115:65–9.
6. Bailit JL, Grobman WA, Rice MM, et al. Morbidly adherent placenta treatments and outcomes. Obstet Gynecol 2015;125:683–9.
7. O'Brien JM, Barton JR, Donaldson ES. The management of placenta percreta: conservative and operative strategies. Am J Obstet Gynecol 1996;175:1632–8.
8. Silver RM, Landon MB, Rouse DJ, et al. Maternal morbidity associated with multiple repeat cesarean deliveries. Obstet Gynecol 2006;107:1226–32.
9. Zuckerwise LC, Craig AM, Newton JM, Zhao S, Bennett KA, Crispens MA. Outcomes following a clinical algorithm allowing for delayed hysterectomy in the management of severe placenta accreta spectrum. Am J Obstet Gynecol 2020;222:179.e1–9.
10. Tol ID, Yousif M, Collins SL. Post traumatic stress disorder (PTSD): the psychological sequelae of abnormally invasive placenta (AIP). Placenta 2019;81:42–5.
11. Grover B, Einerson BD, Keenan KD, et al. Patient-reported health outcomes and quality of life after peripartum hysterectomy for placenta accreta spectrum. Am J Perinatol 2022;39:281–7.
12. Bartels HC, Mulligan KM, Lalor JG, Higgins MF, Brennan DJ. A life changing experience: an interpretative phenomenological analysis of women's experiences of placenta accreta spectrum. Eur J Obstet Gynecol Reprod Biol 2020;254:102–8.
13. Einerson BD, Watt MH, Sartori B, Silver R, Rothwell E. Lived experiences of patients with placenta accreta spectrum in Utah: a qualitative study of semi-structured interviews. BMJ Open 2021;11:e052766.
14. Bartels HC, Terlizzi K, Cooney N, et al. Quality of life and sexual function after a pregnancy complicated by placenta accreta spectrum. Aust N Z J Obstet Gynaecol 2021;61:708–14.
15. Jauniaux E, Chantraine F, Silver RM, Langhoff-Roos J. FIGO Placenta Accreta Diagnosis and Management Expert Consensus Panel. FIGO consensus guidelines on placenta accreta spectrum disorders: epidemiology. Int J Gynecol Obstet 2018;140:265–73.
16. Shamshirsaz AA, Fox KA, Erfani H, et al. Multidisciplinary team learning in the management of the morbidly adherent placenta: outcome improvements over time. Am J Obstet Gynecol 2017;216:612.e1–5.
17. Fitzpatrick KE, Sellers S, Spark P, Kurinczuk JJ, Brocklehurst P, Knight M. Incidence and risk factors for placenta accreta/increta/percreta in the UK: a national case-control study. PLoS One 2012;7:e52893.
18. Butwick AJ, Goodnough LT. Transfusion and coagulation management in major obstetric hemorrhage. Curr Opin Anaesthesiol 2015;28:275–84.
19. Einerson BD, Weiniger CF. Placenta accreta spectrum disorder: updates on anesthetic and surgical management strategies. Int J Obstet Anesth 2021;46:102975.

**20.** Collins SL, Alemdar B, van Beekhuizen HJ, et al. Evidence-based guidelines for the management of abnormally invasive placenta: recommendations from the International Society for Abnormally Invasive Placenta. Am J Obstet Gynecol 2019;220:511–26.
**21.** Silver RM, Fox KA, Barton JR, et al. Center of excellence for placenta accreta. Am J Obstet Gynecol 2015;212:561–8.
**22.** Eller AG, Bennett MA, Sharshiner M, et al. Maternal morbidity in cases of placenta accreta managed by a multidisciplinary care team compared with standard obstetric care. Obstet Gynecol 2011;117:331–7.
**23.** Shamshirsaz AA, Fox KA, Salmanian B, et al. Maternal morbidity in patients with morbidly adherent placenta treated with and without a standardized multidisciplinary approach. Am J Obstet Gynecol 2015;212:218.e1–9.
**24.** Wright JD, Herzog TJ, Shah M, et al. Regionalization of care for obstetric hemorrhage and its effect on maternal mortality. Obstet Gynecol 2010;115:1194–200.
**25.** Mowat A, Maher C, Ballard E. Surgical outcomes for low-volume vs high-volume surgeons in gynecology surgery: a systematic review and meta-analysis. Am J Obstet Gynecol 2016;215:21–33.
**26.** Matsuo K, Youssefzadeh AC, Mandelbaum RS, et al. Hospital surgical volume-outcome relationship in caesarean hysterectomy for placenta accreta spectrum. BJOG 2022;129:986–93.

All authors and committee members have filed a disclosure of interests delineating personal, professional, business, or other relevant financial or nonfinancial interests concerning this publication. Any substantial conflicts of interest have been addressed through a process approved by the Society for Maternal-Fetal Medicine (SMFM) Board of Directors. The SMFM has neither solicited nor accepted any commercial involvement in the specific content development of this publication.

This document has undergone an internal peer review through a multilevel committee process within the SMFM. This review involves critique and feedback from the SMFM Patient Safety and Quality and Document Review Committees and final approval by the SMFM Executive Committee. The SMFM accepts sole responsibility for the document content. SMFM publications do not undergo editorial and peer review by the *American Journal of Obstetrics & Gynecology*. The SMFM Patient Safety and Quality Committee reviews publications every 36 to 48 months and issues updates as needed. Further details regarding SMFM publications can be found at www.smfm.org/publications.

The SMFM recognizes that obstetrical patients have diverse gender identities and is striving to use gender-inclusive language in all of its publications. The SMFM will be using the terms “pregnant person” and “pregnant individual” instead of “pregnant woman” and will use the singular pronoun “they.” When describing study populations used in research, the SMFM will use the gender terminology reported by the study investigators.

Reprints will not be available.