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ORIGINAL ARTICLE

# Risk-stratification, resource availability, and choice of surgical location for the management of parturients with abnormal placentation: a survey of United States-based obstetric anesthesiologists

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## ABSTRACT

**Background:** Parturients with abnormally adherent placentas present anesthetic challenges that include risk-stratification, management planning and resource utilization. The labor and delivery unit may be remote from the main operating room services.

**Methods:** Division chiefs of North American obstetric anesthesiology services were surveyed about their practices and management of parturients with an abnormally adherent placenta.

**Results:** Eighty-four of 122 chiefs, representing 103 hospital sites, responded to the survey (response rate 69%). Sixty-one percent of respondents agreed that women with preoperative placental imaging that was “suspicious” of placenta accreta represented a lower risk category; all other suggested descriptions fell into a higher risk category. Seventy-nine percent of respondents indicated that lower risk cases were managed on the labor and delivery unit, while 71% indicated that higher risk cases would be managed in the main operating room. Institutions where all cases were managed on the labor and delivery unit had better access to human and technical resources, were less remote from their main operating areas, and promoted neuraxial rather than general anesthesia, even for parturients perceived to be at higher risk.

**Conclusions:** Obstetric anesthesia leaders identified patients at lower clinical risk and those less likely to require greater resources. Additional resources were available in institutions where all abnormal placentation cases were managed on the labor and delivery unit. Practitioners should consider risk-stratification and resource availability when planning high-risk cases.

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**Keywords:** Anesthesia; Obstetric; Abnormally adherent placentation; Cesarean delivery; Resource allocation

## Introduction

In the United States the incidence of abnormally adherent placentation has increased in conjunction with the rise in cesarean delivery (CD) rate, and now exceeds 1 in 500 pregnancies.<sup>1,2</sup> Risk-categorization is determined both by the extent of placental invasion into the uterine wall and surrounding structures (for which imaging remains imperfect), and by the risk of massive hemorrhage, predictors for which have not been clearly defined.<sup>3</sup> The American College of Obstetricians and Gynecologists (ACOG) recommends collaborative

delivery planning involving obstetricians, anesthesiologists, uro-gynecologic surgeons, interventional radiologists, maternal-fetal medicine specialists, hematologists and neonatologists.<sup>2</sup> The best outcomes occur when deliveries are well-coordinated, necessitating a multidisciplinary team with ready availability and mobility of needed resources.<sup>4–6</sup> The ACOG further recommends that patients with abnormal placentation should be delivered in “an operating room with the personnel and support services needed to manage potential complications,”<sup>2</sup> and smaller hospitals should transfer patients with suspected abnormal placentation if it is unlikely that they have sufficient blood supply, subspecialty providers or other personnel necessary to meet patient needs. Competing needs of services and resource availability may cause difficulties in how individual hospitals can meet these guidelines.

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This survey sought to determine risk-stratification processes and decision-making factors in United States (US) institutions.

## Methods

The Medical College of Wisconsin (MCW) Institutional Review Board approved the study. In December 2016, a link to an 18-question anonymous online survey was sent using Research Electronic Data Capture (REDCap) survey software to section chiefs of obstetric anesthesia programs accredited by the North American Accreditation Council for Graduate Medical Education (ACGME). This included all academic units, some of which were medical-college based and some community-based. Three general reminder emails and personal emails were sent to non-responders.

Participants answered questions regarding their practice for parturients with abnormal placentation who were scheduled for CD. The first question sought consent and was the only mandatory question (Appendix A). Physicians who identified themselves as managing two separate labor and delivery (L&D) units completed the survey for each unit, and the responses were reported as if from two separate respondents.

Research Electronic Data Capture servers are housed in a local data center at MCW and all web-based information transmission is encrypted with a 256 bit SSL certificate. Data backups are performed nightly and stored in a separate location ([www.project-redcap.org](http://www.project-redcap.org)).

Data analyses were performed using SPSS version 24 (IBM Corp, Armonk, NY, USA). Data distribution was non-normal and the non-parametric Kruskal–Wallis test with Bonferroni correction was used for group comparisons.  $P < 0.05$  was considered statistically significant.

## Results

Of 138 ACGME-accredited anesthesia residency programs, 122 provided contact information for the section chief of obstetric anesthesia or equivalent. The other programs were either unreachable after multiple attempts or reported that their residents practised obstetric anesthesia at a separate hospital faculty, not affiliated with the ACGME program. Almost 70% (84/122) of potential respondents completed the survey.

Nineteen physicians managed two separate L&D units, resulting in a total of 103 response sets. Of these, 88.4% identified their unit as part of an academic institution while 11.6% were community practices. Twenty-five percent of practices had fewer than 2000 deliveries per year, 45.3% had 2000–4000 and 28.4% had more than 4000 deliveries per year. More than 85% of respondent's units managed five or more parturients with abnormal placentation per year. Occasionally comments revealed unanticipated respondent concerns or excep-

tions to numeric or Likert-scale choices and these are included in Table 1.

Respondents were asked to stratify parturients with abnormal placentation into low- or high-risk groups, based on factors including preoperative imaging and maternal comorbidities (Fig. 1). Imaging that was merely suspicious of placenta accreta was most often viewed as low-risk (61%). All other clinical features (confirmed percreta or increta, scheduled hysterectomy, planned Intensive Care Unit (ICU) admission, and maternal comorbidities) indicated higher risk to most respondents (Table 1).

Participants used their definition of low- or high-risk to consider where these cases would be performed at their institutions under non-urgent conditions (Fig. 2). Respondents could choose the L&D unit or main operating rooms (OR). Seventy-nine percent of programs indicated that low-risk cases would be performed on L&D, while 71% of programs indicated that high-risk cases would be performed in the main OR.

Respondents were then grouped by preferred locations for low- and high-risk cases. For 26 institutions (25.2%), respondents indicated that both would be performed on the L&D unit; in 44 institutions (42.7%) low-risk cases would be performed on the L&D unit and high-risk cases in the main OR; in 19 (18.4%) institutions all abnormal placentation cases, regardless of perceived risk, would be performed in the main OR.

For subsequent analysis, these preferred locations were used to subdivide the participants into the following: “All L&D,” “Mixed” and “All Main,” respectively. The groups were similar in the number of academic versus community institutions (12–13% of all three groups), and in the number of abnormal placentation cases encountered per year – only three programs in each group had fewer than five cases. The “All L&D” institutions had higher annual delivery volumes, with 92.3% of these institutions reporting more than 2000 deliveries per year, as opposed to 68.2% of the “Mixed” group and 73.7% of the “All Main” group.

Participants ranked five factors which determined the preferred location for management. Results are shown in Table 2, with a rank of “5” indicating the most important factor. Perceived risk of case ranked highest overall, followed by access to surgeons, distance from L&D to the main OR and its associated resources, surgeon preference, and administrative factors. There was a notable difference in ranking of “surgical preference” between the location groups: while most programs ranked this as “2,” 29% of the “All L&D” programs ranked this as “5,” indicating that it was the main driver of decision making. Only 16% of the “Mixed” and 6% of the “All Main” respondents ranked this as “5.”

Respondents were asked to indicate whether they viewed their L&D as remote: 85% of all respondents felt remote from their main ORs. In the subgroup

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