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Practice variation in late preterm deliveries: A physician survey

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Abstract

Objective—Late preterm (LPT) neonates account for over 70% of all preterm births in the US. Approximately 60% of LPT births are the result of non-spontaneous deliveries.

The optimal timing of delivery for many obstetric conditions at LPT gestations is unclear, likely resulting in obstetric practice variation. The purpose of this study is to identify variation in the obstetrical management of LPT pregnancies.

Study design—We surveyed obstetrical providers in NC identified from NC Medical Board and NC Obstetrical and Gynecological Society membership lists. Participants answered demographic questions and 6 multiple-choice vignettes on management of LPT pregnancies.

Result—We obtained 215/859 (29%) completed surveys; 167 (78%) from Obstetrics/Gynecology, 27 (13%) from Maternal-Fetal Medicine, and 21 (10%) from Family Medicine physicians. Overall, we found more agreement on respondents' management of chorioamnionitis (97% would proceed with delivery), mild preeclampsia (84% would delay delivery/expectantly manage), and fetal growth restriction (80% would delay delivery/expectantly manage). We found less agreement on the management of severe preeclampsia (71% would proceed with delivery), premature preterm rupture of membranes (69% would proceed with delivery), and placenta previa (67% would delay delivery/expectantly manage). Management of LPT pregnancies complicated by PPRM, FGR, and placenta previa vary by specialty.

Conclusion—Obstetrical providers report practice variation in the management of LPT pregnancies. Variation might be influenced by provider specialty. The absence of widespread agreement on best practice might be a source of modifiable LPT birth.

Keywords

late preterm birth; practice variation; variation preterm birth

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Conflict of interest

The authors declare no conflict of interest.

Introduction

Over 70% of preterm births are late preterm (LPT; gestational ages 34 0/7th and 36 6/7th weeks).¹ Approximately 60% of LPT births are not preceded by spontaneous preterm labor, instead delivery is prompted by maternal and/or fetal co-morbidities.² LPT newborns are at increased risk for mortality and long-term adverse neurodevelopmental outcomes compared to term newborns.³⁻⁷

LPT births increased 25% between 1990 and 2006 and paralleled rising rates of cesarean deliveries and labor inductions among LPT pregnancies.^{8,9,10} Prior studies suggest that higher rates of LPT births were in part due to this change in obstetrical practice, primarily in the setting of non-emergent indications for delivery.^{10,11} The majority of non-spontaneous LPT births are associated with several common maternal and/or fetal co-morbidities, including pregnancy-associated hypertension, placental disorders, preterm premature rupture of membranes (PPROM), and fetal growth restriction (FGR).^{2,9,12-16} The presence of these co-morbidities can result in stable non-emergent situations or require urgent delivery to avoid both maternal and fetal morbidity or mortality. Obstetric practice has traditionally considered 34 weeks' gestation a marker of maturity and management of many pregnancy complications changes at this point, with fewer attempts made to prolong the pregnancy.^{11,17} Variation in the timing of delivery of stable non-emergent indications might be a source of modifiable LPT birth.¹² Further efforts to delay LPT birth or decrease preventable LPT births should include a focus on the management of the most common co-morbidities affecting LPT pregnancies and triggers for delivery.

A paucity of evidence supporting an optimal timing of delivery of LPT pregnancies complicated by these co-morbidities can lead to practice variation in the management of non-spontaneous LPT births. Health care provider practice variation is known to contribute to variation in health care utilization.^{18,19} Practice variation is a source of potentially modifiable LPT birth. Other potential sources of variation in LPT births include disparities in access to care and quality of care.¹⁷ The purpose of this study is to identify variation in the obstetrical management of LPT pregnancies in North Carolina.

Subjects and methods

The study was completed between May and September 2010. We developed a clinical vignette-based survey of obstetrical providers (Obstetrics/Gynecology [OB/GYN], Maternal-Fetal Medicine [MFM], or Family Medicine [FM]) that we modified after testing in a pilot study among OB/GYN residents and MFM fellows (n=10) at an academic center. The pilot study sought and received vignette-specific feedback from expert participants about the clarity and interpretation of each vignette. Their feedback led to minor modification in survey wording. We then administered final web-based and print versions of the survey to obstetrical providers in North Carolina. We chose to administer two versions of the survey to optimize recruitment, since no truly comprehensive email list of obstetrical providers in North Carolina is available. (Figure 1) We recruited participants for the web-based survey from an email address list of members of the NC Obstetrical and Gynecological Society, and in that recruitment we made clear respondents could take the

web-based version or request a print version for which we would provide return postage. To assure that we were reaching all providers, not just those who had supplied the Society with email addresses, we also recruited study participants by sending a print version of the survey, along with a cover letter from the first author, to business addresses provided by the NC Medical Board list of active physicians who in their 2007 license information indicated performing obstetrical deliveries. That letter also noted that the recipient may have received the web-based survey, if his or her email address was on the Society's list. Because of its licensing information, we considered the physician list provided by the NC Medical Board as the most accurate representation of the number of potential respondents in the state (n=910; OB/GYN=691, MFM=48, FM=136), but we expected the highest response rate from the web-based survey. After exclusion of physicians from other specialties and those with incomplete addresses, we identified 859 (OB/GYN=685, MFM=45, FM=129) addresses for the print survey mailing. We found 375 physicians in the NC Medical Board list who did not have email addresses in the NC Obstetrical and Gynecologic Society member list. Four-hundred and eighty four physicians were present on both lists. The NC Obstetrical and Gynecologic Society member list included physicians from other OB/GYN subspecialties and we were not able to restrict the recruitment emails exclusively to specific physicians. We excluded midwife providers from this study, as they are less likely to be the primary delivery decision-makers for a high-risk preterm pregnancy.

We sent recruitment emails to 915 members of the NC Obstetrical and Gynecologic Society and mailed 859 print surveys to business addresses provided by the NC Medical Board. In order to prevent participants from completing both versions of the survey, we conducted the recruitment in sequence, sending the web-based version to our email list first, and mailing the print version several weeks later, asking participants to complete only one version. We did not collect personal identifying information and any information provided by the NC Medical Board was used only to obtain business-mailing addresses.

We collected respondents' demographic information, including practice specialty (OB/GYN, MFM, or FM), trainee vs. board certified status, type of hospital(s) where respondents practiced most often, level of available newborn services, number of years in practice, and whether they perform obstetrical deliveries as part of their practice. Respondents could choose more than one type of hospital setting: sole county/community, rural county/community, urban county/community, or major tertiary/teaching hospital. We asked them to choose the level of newborn services (neonatal intensive care unit [NICU], special care nursery [SCN], intermediate care nursery [ICN], and newborn nursery [NBN]) available at the hospital where they practiced most often; their choices reflect their own perceptions of the level of hospital and newborn services, rather than their choice from a list of predefined service levels.

We presented respondents with 6 clinical vignettes of LPT pregnancies complicated by one of the following co-morbidities: severe preeclampsia at 34 1/7th weeks' gestation, mild preeclampsia at 36 2/7th weeks' gestation, placenta previa at 36 2/7th weeks' gestation, PPROM at 34 6/7th weeks' gestation, chorioamnionitis at 34 6/7th weeks' gestation, and FGR with normal fetal testing at 36 1/7th weeks' gestation. We chose these co-morbidities as they are common conditions complicating pregnancy at LPT gestation and have varying

levels of evidence for optimal timing of delivery. MFM physicians and neonatologists participated in the development of all clinical vignettes. We used a multiple-choice question format to ask participants their preferred next step in management and provided a space for comments after each vignette. Responses to vignettes could include options to proceed with delivery (either at the respondent's hospital or transfer for delivery at a higher level facility) or delay delivery (administer corticosteroids followed by delivery after 48 hours, perform amniocentesis for fetal lung maturity testing followed by delivery if fetal lung maturity was confirmed, or delay delivery until term or spontaneous labor). We included options for inpatient or outpatient expectant management for vignettes on preeclampsia and placenta previa. (see Figure 2 for sample of a vignette). The University of North Carolina Institutional Review Board approved this study.

Statistical analysis

We collapsed responses to each clinical vignette into two categories, "proceed with delivery" and "expectant management or delay delivery". Since a majority of LPT newborns do not require intensive care services at birth, but might require a higher level of care than newborn nurseries provide, we created two categories of newborn services: NBN only and > NBN (which includes SCN, ICN, and NICU). We used chi-square or Fisher's exact test for analysis of categorical variables and one-way analysis of variance or Kruskal-Wallis tests for analysis of continuous variables. We did not adjust for multiple comparisons given the exploratory nature of the analysis. All data analyses were performed using STATA 10.1 statistical software package (College Station, Texas).

Results

Of the initial total of 250 survey responses, 96 (38%) are web-based surveys and 154 (62%) are print surveys. The overall response rate for both survey administrations was 29% (250/859). We excluded 35 responses for incomplete data and/or trainee status of the respondent. Our final analysis includes 215 completed surveys, of whom, most were from OB/GYN physicians (78%, n=167); 13% (n=27) were from MFM and 10% (n=21) were from FM physicians. (Table 1) Response rate varies by specialty: approximately 56% of MFM physicians responded, as did 24% of OB/GYN, and 15% of FM physicians recruited for the study. Respondents reported a mean of 19 +/- 8 years in practice and we did not find a significant difference in experience between specialties. Most respondents (94%, n=202) were performing obstetrical deliveries as part of their practice at the time of the survey. Of those no longer performing deliveries (n=13), the majority (85%, n=11) had stopped in the last 6 years. A majority of respondents (69%, n=149) practice at urban or tertiary/teaching hospitals, while 38% (n=82) practice in rural or sole county/community hospitals. Fourteen percent (n=30) of respondents practice in hospitals where a NBN is the highest level of newborn services, while 62% (n=134) of respondents practice in a hospital with newborn services they identify as a NICU.

Respondents favored proceeding with delivery for LPT pregnancies complicated by chorioamnionitis (97%), severe preeclampsia (71%), and PPROM (69%). (Figure 3) Respondents favored expectant management or delaying delivery for LPT pregnancies

complicated by mild preeclampsia (84%), FGR with normal fetal testing (80%), and placenta previa (67%). (Figure 3) When presented with the option to transfer for delivery at a higher level facility, 11% of respondents chose this response for severe preeclampsia, 6.5% for chorioamnionitis, 3.7% for PPRM, 1.4% for placenta previa, and 0.93% for FGR. Two vignettes included the option to administer corticosteroids followed by delivery after 48 hours; 3.3% of respondents chose this option for management of severe preeclampsia and 2.8% for management of chorioamnionitis. Two vignettes included the option to perform amniocentesis followed by delivery if fetal lung maturity was confirmed; 1.4% of respondents chose this option for management of severe preeclampsia and 30% for management of placenta previa.

Respondents' management preferences varied by specialty. (Figure 4) For an LPT pregnancy complicated by FGR with normal fetal testing, 23% of OB/GYN physicians favored delivery compared to 4% of MFM ($p=0.02$) and 10% of FM ($p=0.26$). In the case of PPRM, 89% of MFM and 72% of OB/GYN physicians favored delivery compared to 24% of FM ($p<0.001$). For an LPT pregnancy complicated by placenta previa, 56% of MFM physicians favored delivery compared to 29% of OB/GYN ($p=0.01$) and 38% of FM physicians ($p=0.26$).

Although respondents' management preferences did not vary significantly by hospital type, we did find differences in management preferences based on the level of newborn services. (Figure 5) Of respondents practicing in hospitals with higher levels of newborn care, 72% favored delivery for PPRM compared to 50% of respondents from hospitals with only a newborn nursery ($p=0.02$). In contrast, 90% of respondents practicing in hospitals with only a NBN favored delivery for severe preeclampsia compared to 68% of respondents in hospitals with higher levels of newborn care ($p=0.02$). Repeating the analysis after excluding responses from physicians no longer performing obstetrical deliveries ($n=13$) did not significantly alter our findings.

Discussion

A survey of obstetrical care providers demonstrates practice variation in the management of LPT pregnancies complicated by common co-morbidities. Our results suggest that variation is influenced by provider specialty and level of available newborn services. Variation in management of LPT pregnancies is also influenced by the associated co-morbidity, with negligible variability in the management of chorioamnionitis and significant variability in the management of placenta previa, PPRM, and FGR.

Preterm delivery in the presence of maternal or fetal co-morbidities may be necessary in order to prevent further maternal and/or fetal morbidity and mortality. Estimates of potentially preventable LPT births resulting from elective or non-indicated and "soft call" deliveries range from 6% to 23%.^{2,12,20} Variation likely results, in part, from the lack of widespread agreement on best practice and will occur when providers disagree about the "safest" or "best" choice in care. Without strong evidence supporting the optimal timing of delivery of LPT pregnancies complicated by common co-morbidities, providers' training and specialty, previous experience, and practice environment will likely determine practice.

US birth certificate data show a 5% decrease in LPT births between 2006 and 2009.¹ An increased awareness of LPT neonatal morbidity and subsequent quality improvement initiatives, designed to decrease elective LPT and early term births, likely explain this decline in LPT births.^{21–23} It is possible that decreased variation in the management of common co-morbidities affecting LPT pregnancies, if accomplished without compromising maternal outcomes, might further decrease neonatal morbidity by delaying LPT delivery.¹² Morbidity in LPT neonates decreases as gestational age increases, suggesting that delaying LPT delivery might improve neonatal outcomes even if a LPT birth cannot be prevented.^{2,7}

Our data suggest that the degree of agreement among providers in the management of complicated LPT pregnancies is related to the ability to generate clear and easily applicable evidence-based guidelines. The American College of Obstetricians and Gynecologists (ACOG) and The American Academy of Pediatrics (AAP) recommend delivery of pregnancies complicated by chorioamnionitis at any gestational age.²⁴ In our study, almost 100% of respondents would proceed with delivery in this scenario. Guidelines for the management of hypertensive conditions provide a threshold of gestational age for delivery. It is recommended that pregnancies complicated by mild preeclampsia be managed expectantly until term, while delivery in the setting of severe preeclampsia is recommended at any gestational age.^{24,25} The approach to management of preeclampsia at LPT gestations appears to be consistent across specialties. The majority of our respondents follow recommendations for management of mild preeclampsia; however, 1 out of 6 respondents would proceed with delivery. This variation might result from differences in interpretation of severity of preeclampsia or differences in how physicians balance the risk-benefit of continuing the pregnancy or delivering an LPT newborn. Variation in interpretation of disease severity, if it emerges from a lack of common disease definitions, can itself be a target for improving the quality of obstetrical care. Even though 29% of respondents would expectantly manage an LPT pregnancy complicated by severe preeclampsia, the vast majority of these respondents indicated in their comments a low threshold for proceeding with delivery. As for mild preeclampsia, there might be variability in interpretation of criteria for disease severity.

We found significant variation in the management of PPROM, FGR, and placenta previa. ACOG/AAP guidelines recommend delivery when PPROM occurs at or after 34 weeks' gestation.²⁴ Overall 31% of respondents would delay delivery under these circumstances. MFM physicians appeared more consistently to practice according to ACOG/AAP guidelines. This variation highlights the lack of evidence for best practice in the setting of PPROM at LPT gestations. Recommendations are based mostly on studies done prior to the time when latency antibiotics became the standard of care for PPROM.²⁶ A recent Cochrane review summarized data from 7 RCTs and did not find a difference in outcomes between planned early delivery before 37 weeks and expectant management.²⁶ For pregnancies complicated by FGR, delivery is not recommended in the setting of normal fetal testing.¹¹ In our study, the majority of providers would expectantly manage the pregnancy, but 20% of respondents would proceed with delivery. Variation was also noted by specialty, with fewer MFM physicians opting for delivery. ACOG/AAP guidelines for management of pregnancies complicated by placenta previa are less specific as is reflected in the variability in management preferences found in our study. Timing of delivery for LPT pregnancies

complicated by placenta previa is guided primarily by expert opinion.^{11,27} More recent guidelines recommend delivery at 36 – 37 weeks' gestation for pregnancies complicated by placenta previa.²⁵ It appears that for scenarios with the greatest variation in management (PPROM, FGR, and placenta previa) provider specialty plays a significant role. MFM physicians appear to have a lower threshold for delivery of LPT pregnancies complicated by PPRM and placenta previa compared to OB/GYN and FM physicians, and more conservatively manage pregnancies complicated by FGR. MFM physicians are more likely to practice in urban or tertiary academic centers with higher levels of obstetric and newborn services, and care almost exclusively for high-risk pregnancies, both of these factors are likely to influence practice.

Strengths of this study include the use of standardized clinical vignettes to identify practice variation. Clinical vignettes-based studies have been found to provide a valid measure of quality when compared to more standard methods such as chart abstraction and use of standardized patients.^{28–30} Clinical vignettes are meant to elicit what providers would do in a given clinical situation, not to test knowledge on current guidelines or recent evidence.²⁹ A significant advantage of clinical vignettes is that they provide a method of case-mix adjustment, are inexpensive, and less time consuming than other research methods.^{28,29} We recruited participants from hospital settings providing different levels of care, rural and urban settings, and from all specialties routinely involved in obstetrical care and delivery decision-making for LPT pregnancies. Our results reflect the practices of respondents who are physicians currently providing or until recently providing obstetrical care.

Our study is limited by a low response rate, particularly among FM physicians. On the other hand, we received responses from over half of the state's active MFM physicians.

Conclusions derived from our results are more applicable to OB/GYN and MFM physicians, who are approximately 85% of active providers of obstetrical care in the state, than they are to FM physicians. Survey responses were anonymous and thus we were unable to compare characteristics of respondents and non-respondents. Given that respondents knew they were being evaluated, inferences about provider practices, based on our results, tell us what physicians say they would do and not necessarily what they actually do. Previous research in clinical vignette methodology, however, has shown strong validity when compared to chart abstraction. These types of validation studies have not been performed in the obstetrical literature,^{28,30} and vignette methodology does not help differentiate appropriate versus inappropriate variation.²⁹ Interpersonal variation in interpretation of both clinical vignettes and disease severity could also contribute to our results.

In conclusion, we identified reported practice variation in the obstetrical management of LPT pregnancies. This variation is a source of potentially modifiable LPT births, particularly in pregnancies complicated by placenta previa, FGR, and PPRM. Future research to improve the quality of obstetrical care and decrease preventable LPT births should generate evidence on best practices for these conditions. It is also necessary to gain a stronger understanding of which factors contributing to practice variation (e.g. practice setting, specialty, level of care) are most amenable to intervention. As new evidence is generated, the community of obstetrical providers must give thought to appropriate and effective dissemination strategies to guarantee the implementation of best practices.

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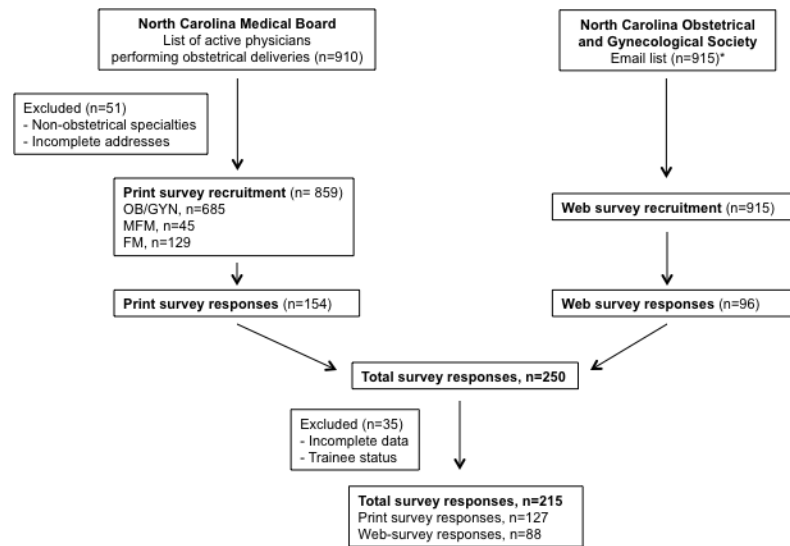


Figure 1.

Study flow diagram

*we did not have ability to exclude non-obstetrical specialists prior to sending email recruitment message

A 33 y/o G1 P0 healthy woman arrives at your hospital at 36 2/7th weeks' gestation with moderate vaginal bleeding. She is not contracting. She is known to have a placenta previa and has been admitted previously for vaginal bleeding at 32 weeks. An obstetric ultrasound confirms a complete placenta previa. She is hemodynamically stable. Fetal surveillance testing is reassuring and the bleeding stops shortly after arrival to the hospital. What is your next step in management?

- Delivery via cesarean section at your hospital
- Transfer to a higher level facility for cesarean delivery
- Monitor as an inpatient (or transfer to a higher level facility) and schedule a cesarean delivery to be performed at 39 weeks (as long as there is no further bleeding or spontaneous labor)
- Monitor as an inpatient (or transfer to a higher level facility) and schedule a cesarean delivery to be performed at 37 weeks (as long as there is no further bleeding or spontaneous labor)
- Perform amniocentesis for fetal lung maturity testing, followed by delivery if lung maturity is confirmed

Comments on your choice?

Figure 2.
Sample vignette – Placenta previa

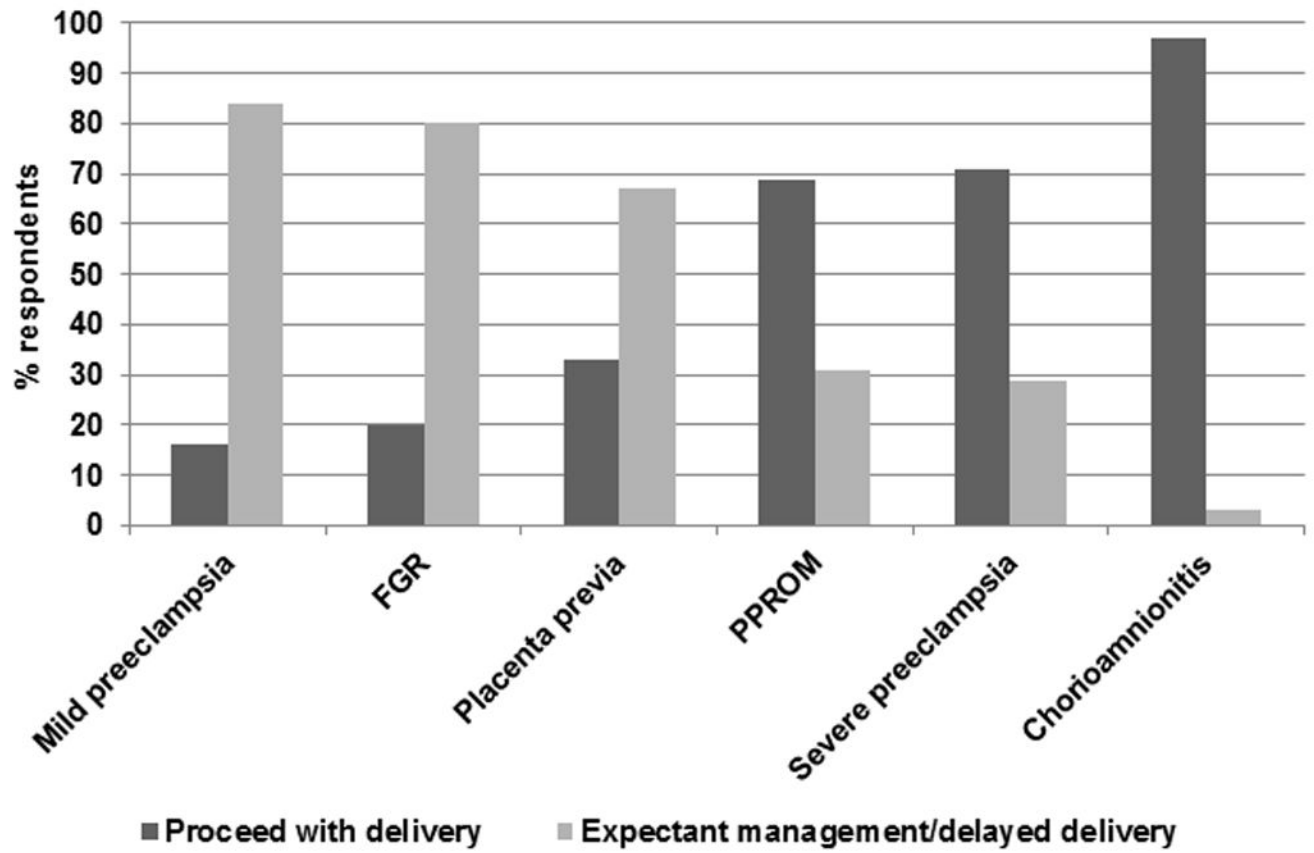


Figure 3.
All responses by clinical vignettes (n=215)

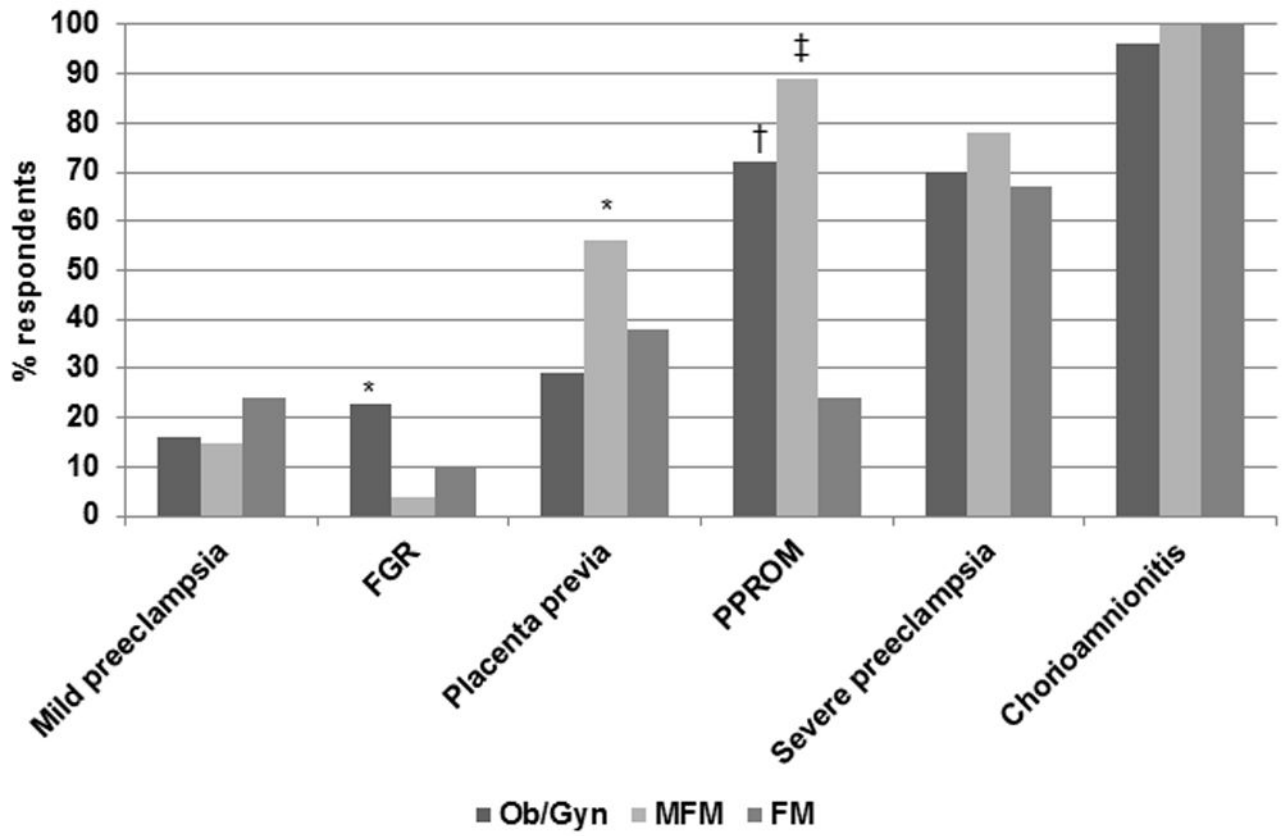


Figure 4.
 Responded “Proceed with delivery”, by specialty
 *p<0.05 Ob/Gyn vs. MFM †p<0.05 Ob/Gyn vs. FM ‡p<0.05 MFM vs. FM

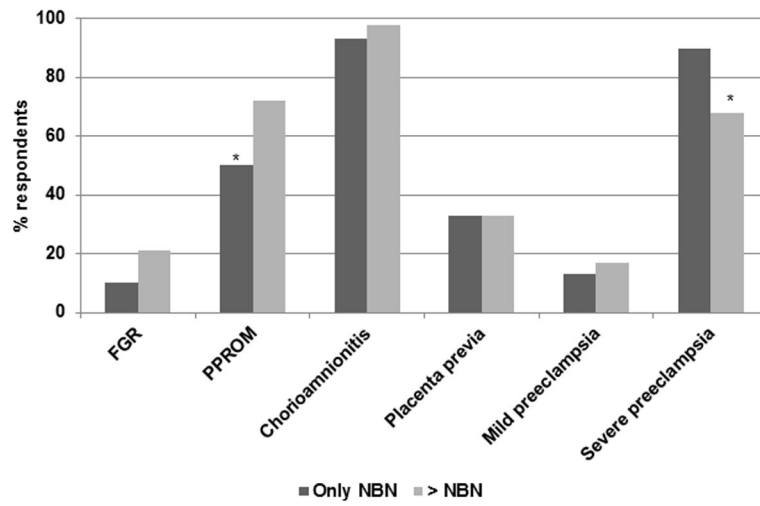


Figure 5.
 Responded “Proceed with delivery”, by level of newborn care
 *p=0.02

Table 1

Respondent demographics by specialty (n=215)

Variables	OB/GYN n=167	MFM n=27	FM n=21	Total n=215
Years in practice (mean +/- SD)	18.7 +/- 8.5	16.8 +/- 7.1	18.8 +/- 9.2	18.5 +/- 8.4
Currently performing obstetrical deliveries, n (%)	164 (98)	20 (74)	18 (86)	202 (94)
If not, years since stopped delivering (mean +/- SD)	6.0 +/- 5.0	4.6 +/- 3.0	2.7 +/- 2.1	4.5 +/- 3.3
Number of hospitals where respondents practice (mean +/- SD)	1.3 +/- 1.0	1.7 +/- 1.3	1.3 +/- 1.0	1.4 +/- 1.0
Hospital type, n (%)				
Sole community	31 (19)	1 (4)	5 (24)	37 (17)
Rural	38 (23)	1 (4)	6 (29)	45 (21)
Urban	68 (41)	6 (22)	4 (19)	78 (36)
Tertiary	43 (26)	20 (74)	8 (38)	71 (33)
Neonatal services, n (%)				
Only NBN	23 (14)	1 (4)	6 (29)	30 (14)
> NBN	144 (86)	26 (96)	15 (71)	185 (86)

> NBN: special care nursery, intensive care nursery, and/or neonatal intensive care nursery

NBN: newborn nursery

OB/GYN: Obstetrics/Gynecology

MFM: Maternal-Fetal Medicine

FM: Family Medicine

Note: some respondents chose more than one hospital type