International Journal of Obstetric Anesthesia (2019) 37, 57–67
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https://doi.org/10.1016/j.ijoa.2018.08.007

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ORIGINAL ARTICLE

Interprofessional provider attitudes toward the initiation of epidural analgesia in the laboring patient: are we all on the same page?

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ABSTRACT
Background: The timing of initiation of neuraxial labor analgesia should ultimately depend on patient preference although obstetricians, anesthesiologists and nurses may influence decision-making. We hypothesized that provider groups would have similar attitudes toward the timing of epidural placement, but some identifiable differences could be used to improve understanding and communication among providers.
Methods: Anesthesiologists, nurses and obstetricians completed a survey assessing their knowledge and attitudes on the timing of epidural placement in specified clinical circumstances.
Results: Anesthesiologists (100%) and nurses (86.2%) reported being more familiar with epidural management than obstetricians (43.3%, $P<0.01$). The willingness of providers to advocate epidural placement based on the magnitude of cervical dilation was similar, although at 10 cm dilatation obstetricians (73.3%) were significantly more likely to advocate neuraxial block compared to both nurses (27.6%, $P<0.01$) and anesthesiologists (36.7%, $P<0.01$). The impact of patient factors and clinical circumstances on the timing of neuraxial block placement showed significant differences among provider groups in five of 24 areas assessed, including patient desire for an epidural, primigravid patients without membrane rupture, oxytocin infusion initiated, labor epidural in a previous pregnancy, and a difficult airway.
Conclusions: There were differences between providers in factors that may impact the timing of epidural placement and in their self-perceived familiarity with epidural management. These present an opportunity for furthering interprofessional education and collaboration.

Keywords: Labor analgesia; Epidural analgesia; Interprofessional attitudes

Introduction

Neuraxial labor analgesia is commonly requested, with rates in the United States of 66–82%.[1,2] Analysis of open-ended patient survey responses reflects the importance of effective and timely neuraxial labor analgesia to many parturients.[3] The most recent practice guidelines by the American Society of Anesthesiologists (ASA), American College of Obstetricians and Gynecologists (ACOG), and other published reports support offering neuraxial analgesia early in labor, independent of cervical dilation, and that maternal request alone is a sufficient indication for initiating labor analgesia.[4–11] It is uncertain if these guidelines are being followed in clinical practice, or if historical biases that epidural placement should be delayed, due to concerns about prolongation of labor or increased cesarean delivery rates, still exist.

Assuming no contraindications are present, labor epidural analgesia should ultimately depend on patient preference, although provider attitudes and biases may also influence the patient's decision-making. Given the severity of labor pain[12] and the time taken for a patient to become comfortable after epidural initiation,[13] interprofessional co-operation and timely communication are paramount.[14] Interdisciplinary attitudes toward the timing of epidural placement would ideally be congruent, however it is uncertain if different providers prioritize different factors when counseling patients. For example, obstetricians may give greater consideration

Accepted August 2018
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to interventions that they perform, such as amniotomy or oxytocin initiation,[15] and may advise labor epidural placement prior to amniotomy. Anesthesiologists may be more aware of patients with a potentially difficult airway and be more likely to advocate for early epidural placement,[4] while nurses may give greater priority to a patient's desire to ambulate early in labor when offering patients advice about the timing of epidural placement.

There is little information about the attitudes of different provider groups towards the timing of epidural placement. We surveyed providers on how patient factors or circumstances may affect their decision-making, and hypothesized that provider groups would have generally similar attitudes about the timing of epidural placement, but that there would be differences identified that could be used to improve understanding, communication and focus multidisciplinary education efforts in providing patient-centered care.

Methods

The study was approved by the Ohio State University Institutional Review Board (#2016E0251). Data were obtained from a written survey (Appendix) administered to anesthesia providers who work on the labor and delivery (L and D) unit at least once per month, and to residents postgraduate year (PGY)-3 and above, L and D nurses, and obstetricians (PGY-1 and above, fellows, and attending obstetricians). A convenience sample of 30 providers per group was chosen because it represented a maximum number that could be recruited based on the size of our institution. Trainees were included, since otherwise the sample size would have been very small, and our belief that the practice patterns of resident and attending physicians would be similar enough to justify their inclusion.

The survey first asked demographic information about age, years in practice, number of days per month working on the L and D unit, and self-perceived familiarity with epidural analgesia management (1–5 scale). "Familiarity" was defined as management within that provider group's scope of practice. Self-reported familiarity with the management of labor epidural analgesia was assessed on a Likert scale (1 = very uncomfortable, 5 = very comfortable; Fig. 1). In our institution the primary neuraxial technique for laboring patients is an initial bolus of 0.125% bupivacaine and fentanyl 2 μg/mL (10 mL in divided doses) followed by a continuous maintenance infusion of 0.0625% bupivacaine and fentanyl 2 μg/mL with patient-controlled epidural analgesia (6 mL, 15 min lockout).

The participant was asked to assess their likelihood of advocating epidural placement (on a 1–5 scale), other factors notwithstanding, for a laboring patient whose cervix was was <4 cm dilated, >4 cm but less than fully dilated, or fully dilated.

The survey then asked participants to rate the importance of how 24 patient-specific factors would influence their decision to advocate for initiation of epidural placement in a laboring patient with a cervix <4 cm

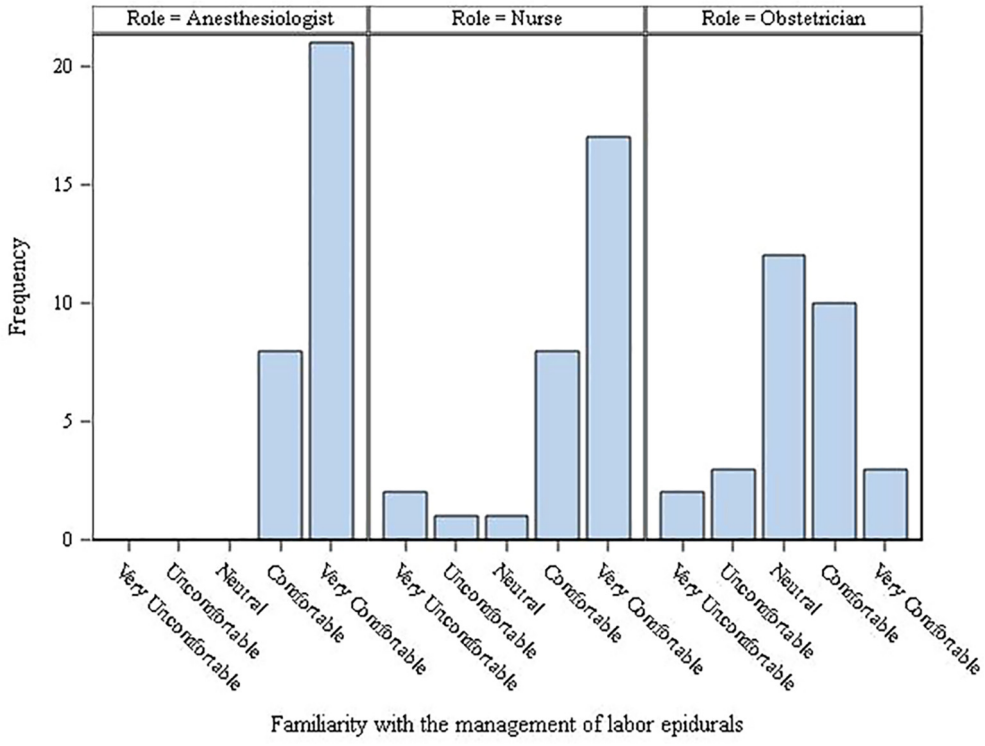

Fig. 1 Provider familiarity with labor epidurals

Table 1 Provider demographics

Role	Variable	N	Mean
Anesthesiologist	Age	29	34.21
	Years in practice	30	7.52
	Days per month	30	3.42
Nurse	Age	27	38.00
	Years in practice	30	13.38
	Days per month	28	10.98
Obstetrician	Age	30	33.03
	Years in practice	30	6.28
	Days per month	30	12.35

dilated. The answers available were "less likely", "no impact", and "more likely". These factors were chosen by a consensus of the author group, which included an obstetrician and obstetric anaesthesiologists.

For all sections of the survey participants were instructed that "advocating" should be interpreted as recommending initiation of epidural labor analgesia for a particular patient, given the information available and within that particular provider's scope of practice. The primary outcome was the difference in proportions of responses among the three provider groups, in the responses to the 24 patient-specific factor survey items.

A sample size of 90 participants constituted this study cohort. Descriptive statistics were used to summarize demographic characteristics and survey responses, stratified by healthcare-role group (anesthesiologist, nurse or obstetrician). Demographic data were compared among groups using either a Chi-square test or a one-way analysis of variance, where appropriate. For the likelihood of or comfort with epidural placement based on questions related to cervical dilation, responses were categorized into three groups ('less likely/uncomfortable', 'no impact/neutral', and 'more likely/comfortable'). These data, along with those of the 24 patient-specific factor items, were described with proportions and were compared among health-care role groups by Fisher's exact test. When the overall three-group comparison was significant, pairwise comparisons were evaluated at an adjusted significance level of $0.05/2 = 0.025$, to account for the multiple comparisons of the three groups. If participants omitted an answer the items were excluded from analysis. All analyses were performed using SAS/STAT software, version 9.4 of the SAS system for Windows (SAS Institute, Inc., Cary, NC).

Results

Provider demographic assessment showed no significant differences between the mean age of the anesthesiologists and obstetricians or anesthesiologists and nurses (Table 1). The nurse cohort reported more years in practice than both the anesthesiologists (13.38 vs 7.52, $P < 0.01$) and the obstetricians (13.38 vs 6.28, $P < 0.01$). Both the obstetricians and nurses reported working more days per month on the L and D unit than their anesthesia counterparts (12.35 vs 4.72 days, $P < 0.01$; and 10.98 vs 4.72 days, $P < 0.01$, respectively). Anesthesiologists and nurses reported being more familiar with epidural management than obstetricians (100%, 86.2%, and 43.3%, respectively, $P < 0.0001$, Table 2). There was no significant difference between anesthesiologists and nurses with respect to familiarity in epidural management.

The providers were surveyed on the impact that the patient's cervical dilatation, in the absence of other information, might have on the timing of neuraxial labor analgesia in a hypothetical patient (Table 2). To retain consistency with the other survey responses,

Table 2 Provider comfort and likelihood of advocating for epidural placement based on patient's cervical dilatation

Cervical Dilation	Total Responses n	Anesthesiologist n (%)	Obstetrician n (%)	Nurse n (%)	*P*-value
Familiarity					
Unfamiliar	8	0 (0.0)	5 (16.7)	3 (10.3)	<.0001
Neutral	13	0 (0.0)	12 (40.0)	1 (3.5)	
Familiar	67	29 (100.0)	13 (43.3)	25 (86.2)	
<4 cm					
Less likely	20	7 (23.3)	5 (16.7)	8 (27.6)	0.5610
No impact	43	17 (56.7)	14 (46.7)	12 (41.4)	
More likely	26	6 (20.0)	11 (36.7)	9 (31.0)	
>4 cm					
Less likely	5	2 (6.7)	2 (6.7)	1 (3.5)	0.2499
No impact	18	10 (33.3)	4 (13.3)	4 (13.8)	
More likely	66	18 (60.0)	24 (80.0)	24 (82.8)	
10 cm					
Less likely	28	7 (23.3)	6 (20.0)	15 (51.7)	0.0005
No impact	20	12 (40.0)	2 (6.7)	6 (20.7)	
More likely	41	11 (36.7)	22 (73.3)	8 (27.6)	

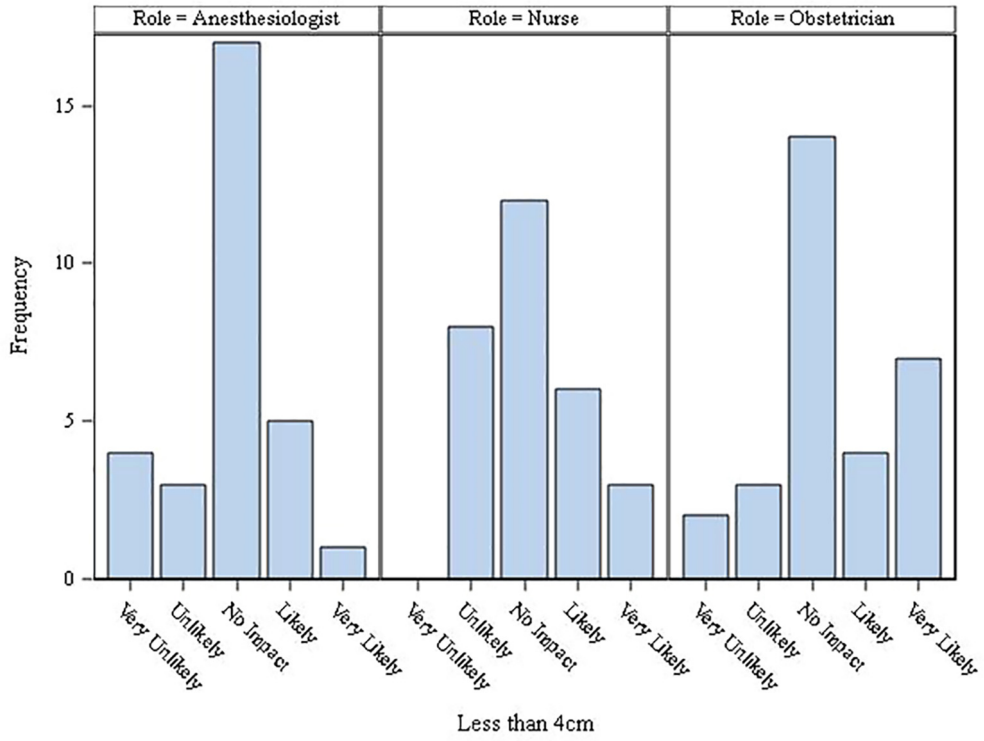

Fig. 2 Provider likelihood of advocating epidural placement if the patient's cervical dilatation is less than 4 cm

responses of 1 and 2 on the Likert scale were combined and scored as "less likely", 3 was scored as "no impact", and 4 and 5 were combined and scored as "more likely" for statistical analysis. There were no significant differences among the three groups in their willingness to advocate epidural placement in a laboring parturient <4 or >4 cm dilated (Table 2, Figs. 2 and 3). Given a laboring patient at 10 cm cervical dilatation however, obstetricians were significantly more likely to advocate epidural placement (73.3%) compared to both nurses (27.6%, $P < 0.01$) and anesthesiologists (36.7%, $P < 0.01$) (Table 2, Fig. 4).

For the remaining survey questions the participants were asked to describe their willingness to advocate epidural placement in a laboring parturient <4 cm dilated, using "less likely", "more likely", or "no impact", given an additional piece of patient-specific information (Table 3). Five of the 24 questions showed significant differences in attitudes among the three groups. For the patient who wants epidural analgesia (question (Q)1), pairwise comparison revealed that anesthesiologists (93.3%) were more likely to advocate epidural analgesia than nurses (65.5%, $P < 0.02$) and obstetricians (63.3%, $P < 0.01$) (Fig. 5). For women receiving an oxytocin infusion (Q3), anesthesiologists (56.7%) were more likely than the obstetricians (23.3%, $P < 0.02$) to advocate epidural analgesia (Fig. 6). For primigravid women with unruptured membranes (Q13, Fig. 7), nurses (36.7%) were less likely to advocate epidural analgesia than obstetricians (6.9%, $P < 0.04$). For patients with a history of a difficult or an anticipated difficult airway (Q18) anesthesiologists (86.7%) were more likely than both nurses (53.3%, $P < 0.01$) and obstetricians (65.5%, $P = 0.01$) to advocate epidural placement (Fig. 8). Obstetricians were also more likely than nurses to advocate epidural placement given this information ($P = 0.02$).

A similar relationship was found among the three provider groups for patients who were described as having previously labored successfully with epidural analgesia (Q23). Anesthesiologists (43.3%) were more likely than both nurses (6.7%, $P < 0.01$) and obstetricians (23.3%, $P < 0.01$) to advocate placement of an epidural, while obstetricians were more likely than nurses ($P < 0.02$) (Fig. 9). For all other questions regarding a laboring patient with a cervix <4 cm dilated, there were no differences between groups (Table 3).

Discussion

All three provider groups showed similar attitudes towards the timing of epidural placement, but demonstrated some differences, which were consistent with our hypothesis, based on patient-specific conditions. Not surprisingly anesthesiologists reported being more comfortable than obstetricians in the management of labor epidurals, a finding shared with the nurses. In our sample, the nurses reported greater time in practice

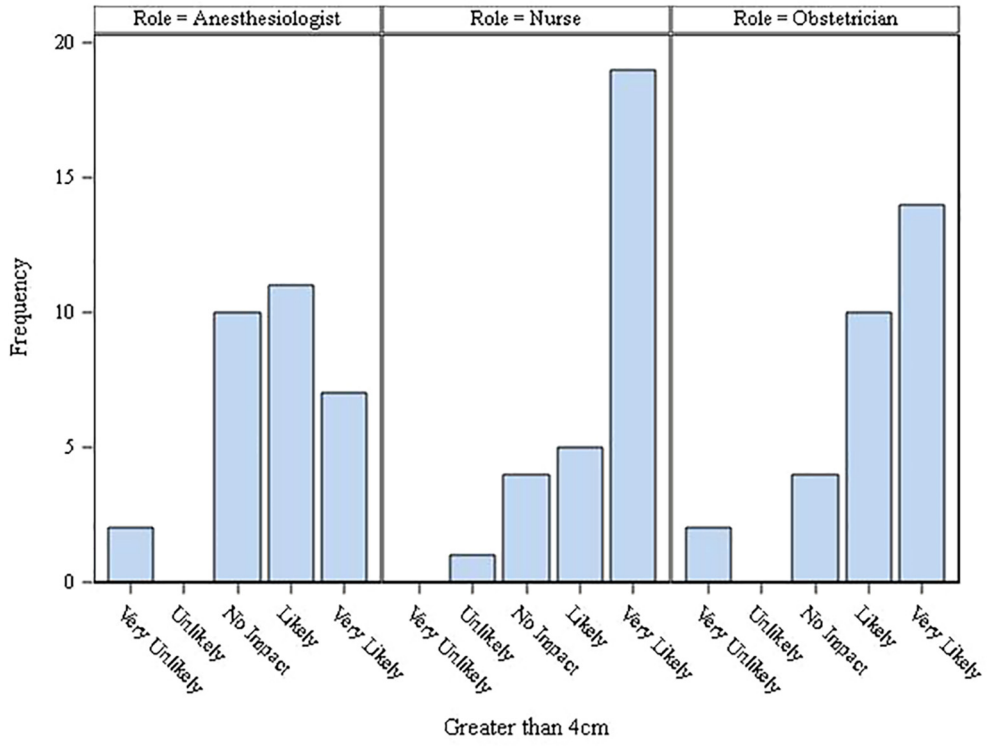

Fig. 3 Provider likelihood of advocating epidural placement if the patient's cervical dilatation is greater than 4 cm

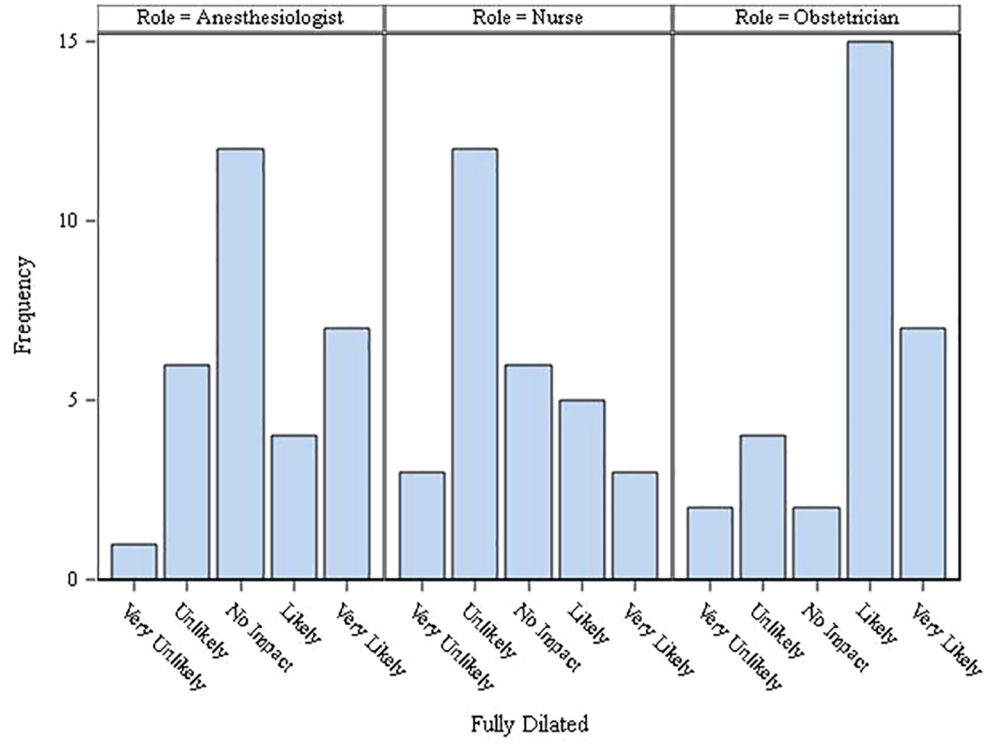

Fig. 4 Provider likelihood of advocating epidural placement if the patient's cervix is fully dilated

than both the anesthesiologists and obstetricians, which may have contributed to this greater level of confidence. Likewise, nurses are more often present at the bedside than obstetricians during consent, placement and man-

Table 3 Provider likelihood of advocating for epidural placement given patient-specific factors

Questions	Total Responses n	Anesthesiologist n (%)	Obstetrician n (%)	Nurse n (%)	*P*-value
Q1	*Patient desires an epidural*				0.0034
Less likely	3	1 (3.3)	0 (0.0)	2(6.9)	
No impact	20	1 (3.3)	11 (36.7)	8 (27.6)	
More likely	66	28 (93.3)	19 (63.3)	19 (65.5)	
Q2	*Patient does not desire an epidural*				0.6915
Less likely	83	29 (96.7)	27 (90.0)	27 (90.0)	
No impact	7	1 (3.3)	3 (10.0)	3 (10.0)	
More likely	0	0 (0.0)	0 (0.0)	0 (0.0)	
Q3	*Oxytocin infusion has been started*				0.0326
Less likely	0	0 (0.0)	0 (0.0)	0 (0.0)	
No impact	54	13 (43.3)	23 (76.7)	18 (62.1)	
More likely	35	17 (56.7)	7 (23.3)	11 (37.9)	
Q4	*Oxytocin infusion has not been started*				0.3265
Less likely	17	7 (23.3)	3 (10.0)	7 (24.1)	
No impact	24	23 (76.7)	27 (90.0)	22 (75.9)	
More likely	0	0 (0.0)	0 (0.0)	0 (0.0)	
Q5	*Patient is primigravid*				0.0619
Less likely	17	5 (16.7)	3 (10.0)	9 (30.0)	
No impact	58	22 (73.3)	23 (76.7)	13 (43.3)	
More likely	15	3 (10.0)	4 (13.3)	8 (26.7)	
Q6	*Patient is multigravid*				0.1552
Less likely	5	1 (3.3)	1 (3.3)	3 (10.0)	
No impact	51	15 (50.0)	22 (73.3)	14 (46.7)	
More likely	34	14 (46.7)	7 (23.3)	13 (43.3)	
Q7	*Prolonged labor expected*				0.1951
Less likely	15	3 (10.0)	4 (13.3)	8 (26.7)	
No impact	39	16 (53.3)	15 (50.0)	8 (26.7)	
More likely	36	11 (36.7)	11 (36.7)	14 (46.7)	
Q8	*Patient is primigravid and induced with oxytocin*				0.1844
Less likely	7	1 (3.3)	2 (6.9)	4 (13.8)	
No impact	48	14 (46.7)	20 (69.0)	14 (48.3)	
More likely	33	15 (50.0)	7 (24.1)	11 (37.9)	
Q9	*Patient is primigravid in spontaneous labor*				0.7121
Less likely	3	2 (6.7)	0 (0.0)	1 (3.3)	
No impact	60	21 (70.0)	20 (69.0)	19 (63.3)	
More likely	26	7 (23.3)	9 (31.0)	10 (33.3)	
Q10	*Patient is multigravid and induced with oxytocin*				0.5334
Less likely	1	0 (0.0)	0 (0.0)	1 (3.3)	
No impact	47	15 (50.0)	18 (62.1)	14 (46.7)	
More likely	41	15 (50.0)	11 (37.9)	15 (50.0)	
Q11	*Patient is multigravid in spontaneous labor*				0.3378
Less likely	8	2 (6.7)	1 (3.5)	5 (16.7)	
No impact	45	15 (50.0)	18 (62.1)	12 (40.0)	
More likely	36	13 (43.3)	10 (34.5)	13 (43.3)	
Q12	*Patient is primigravid and membranes are ruptured*				0.5516
Less likely	1	0 (0.0)	0 (0.0)	1 (3.3)	
No impact	54	16 (53.3)	19 (65.5)	19 (63.3)	
More likely	34	14 (46.7)	10 (34.5)	10 (33.3)	
Q13	*Patient is primigravid and membranes are not ruptured*				0.0049
Less likely	22	9 (30.0)	2 (6.9)	11 (36.7)	
No impact	63	21 (70.0)	23 (79.3)	19 (63.3)	
More likely	4	0 (0.0)	4 (13.8)	0 (0.0)	
Q14	*Patient is multigravid and membranes are ruptured*				0.2198
Less likely	3	0 (0.0)	1 (3.5)	2 (6.9)	
No impact	43	16 (53.3)	17 (58.6)	10 (34.5)	
More likely	42	14 (46.7)	11 (37.9)	17 (58.6)	

(*continued on next page*)

Table 3 (*continued*)

Questions	Total Responses n	Anesthesiologist n (%)	Obstetrician n (%)	Nurse n (%)	*P*-value
Q15	*Patient is multigravid and membranes are not ruptured*				0.2415
Less likely	9	2 (6.7)	1 (3.6)	6 (20.7)	
No impact	67	24 (80.0)	22 (78.6)	21 (72.4)	
More likely	11	4 (13.3)	5 (17.9)	2 (6.9)	
Q16	*Patient had prior caesarean*				0.9215
Less likely	2	0 (0.0)	1 (3.5)	1 (3.3)	
No impact	12	4 (13.3)	3 (10.3)	5 (16.7)	
More likely	75	26 (86.7)	25 (86.2)	24 (80.0)	
Q17	*Patient is morbidly obese*				0.1262
Less likely	1	0 (0.0)	0 (0.0)	1 (3.3)	
No impact	44	12 (40.0)	13 (44.8)	19 (63.3)	
More likely	44	18 (60.0)	16 (55.2)	10 (33.3)	
Q18	*Patient has history of or anticipated difficult airway*				0.0150
Less likely	2	1 (3.3)	0 (0.0)	1 (3.3)	
No impact	26	3 (10.0)	10 (34.5)	13 (43.3)	
More likely	61	26 (86.7)	19 (65.5)	16 (53.3)	
Q19	*Patient has pre-eclampsia*				0.1064
Less likely	6	5 (16.7)	0 (0.0)	1 (3.3)	
No impact	45	12 (40.0)	15 (51.7)	18 (60.0)	
More likely	38	13 (43.3)	14 (48.3)	11 (36.7)	
Q20	*Patient is currently comfortable*				0.6377
Less likely	55	19 (63.3)	16 (55.2)	20 (66.7)	
No impact	31	9 (30.0)	12 (41.4)	10 (33.3)	
More likely	3	2 (6.7)	1 (3.5)	0 (0.0)	
Q21	*Patient is currently uncomfortable*				0.7267
Less likely	0	0 (0.0)	0 (0.0)	0 (0.0)	
No impact	19	6 (20.0)	5 (17.2)	8 (26.7)	
More likely	70	24 (80.0)	24 (82.8)	22 (73.3)	
Q22	*Patient has previously labored without epidural*				0.5903
Less likely	37	13 (43.3)	10 (33.3)	14 (46.7)	
No impact	52	16 (53.3)	20 (66.7)	16 (53.3)	
More likely	1	1 (3.3)	0 (0.0)	0 (0.0)	
Q23	*Patient has previously labored with epidural*				0.0044
Less likely	3	1 (3.3)	0 (0.0)	2 (6.7)	
No impact	65	16 (53.3)	23 (76.7)	26 (86.7)	
More likely	22	13 (43.3)	7 (23.3)	2 (6.7)	
Q24	*Patient has twin gestation*				0.2083
Less likely	1	0 (0.0)	1 (3.3)	0 (0.0)	
No impact	16	3 (10.0)	5 (16.7)	8 (27.6)	
More likely	72	27 (90.0)	24 (80.0)	21 (72.4)	

agement of neuraxial labor analgesia. An anesthesiologist's willingness to advocate for epidural analgesia was increased by the patient's wishes for it, the status of an oxytocin infusion, anticipation of a difficult airway, and whether the patient had previously used labor epidural analgesia. In contrast, the presence of unruptured membranes in the primigravid patient led to nursing reluctance to advocate for epidural analgesia when compared to their medical colleagues. The reason is uncertain, although there is evidence that amniotomy may increase the rate of labor and therefore labor-associated pain.[16–18] Perhaps, prior to amniotomy, nurses anticipate less pain and give greater priority to allowing the patient to ambulate.

There was little difference in attitude among the groups about epidural placement in relation to cervical dilatation, including for patients in early labor. This is reassuring, as it suggests that nurses, obstetricians, and anesthesiologists are comfortable with the practice of early epidural placement if the patient wishes, a practice supported by evidence that early epidurals are not associated with untoward effects such as an increased incidence of cesarean delivery.[4–11] If there are historical biases against early epidural placement, they were not evident in this survey. For those patients described as being fully dilated, obstetricians reported being more likely than both other provider groups to advocate for epidural placement. It is possible that the obstetricians consider

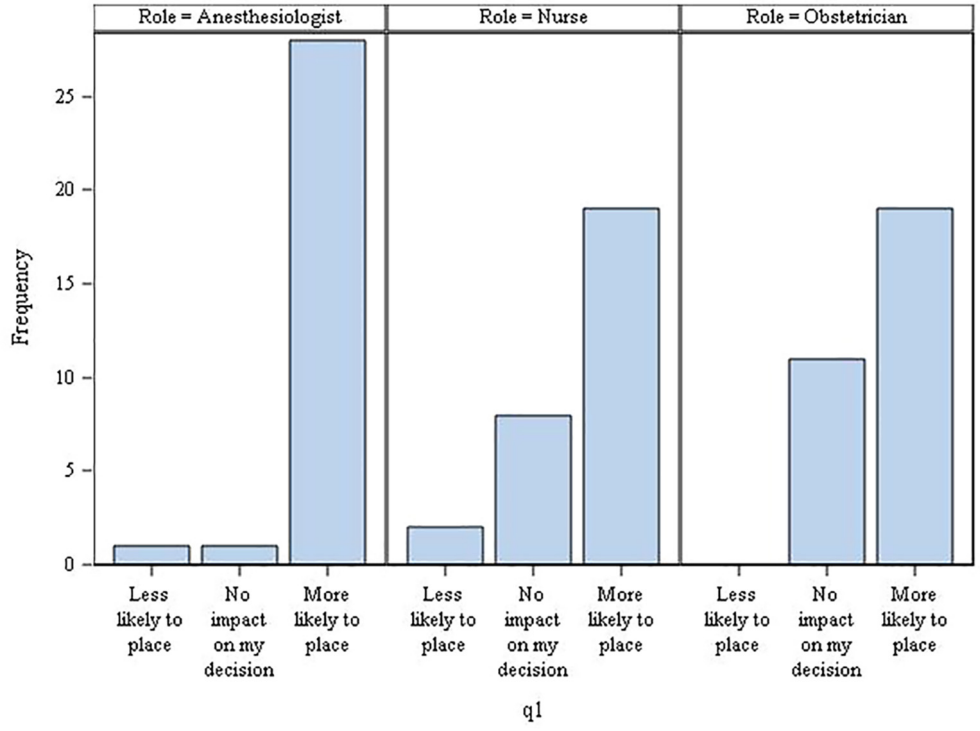

Fig. 5 Responses by Provider to Question 1 (Q1): Patient desires epidural analgesia

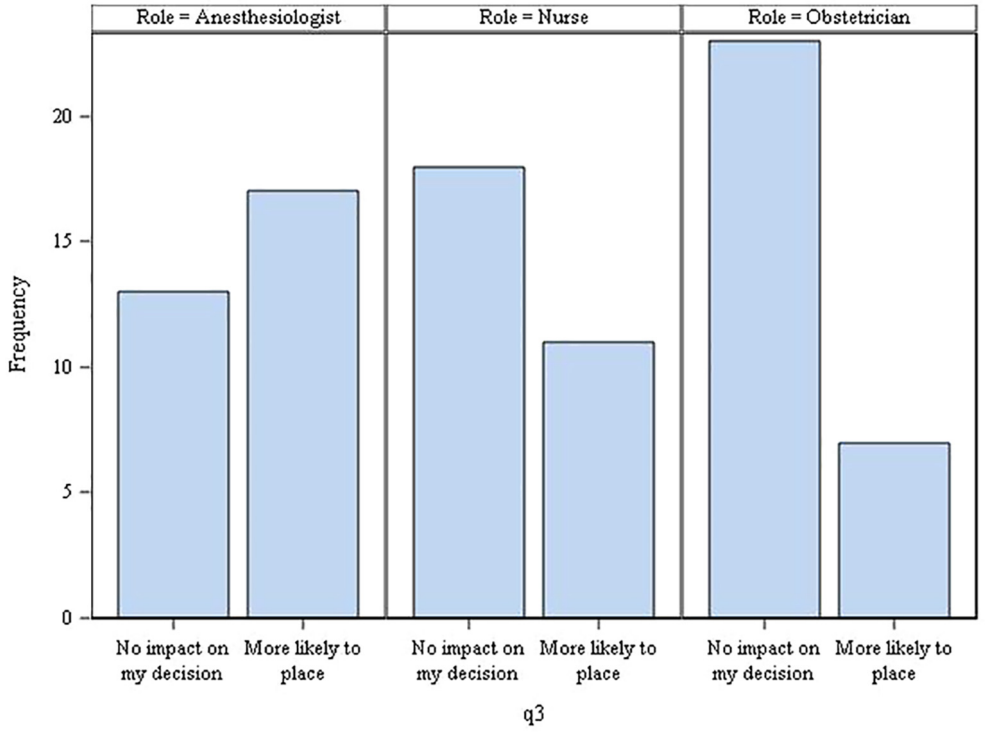

Fig. 6 Responses by Provider to Question 3 (Q3): Oxytocin infusion has been initiated

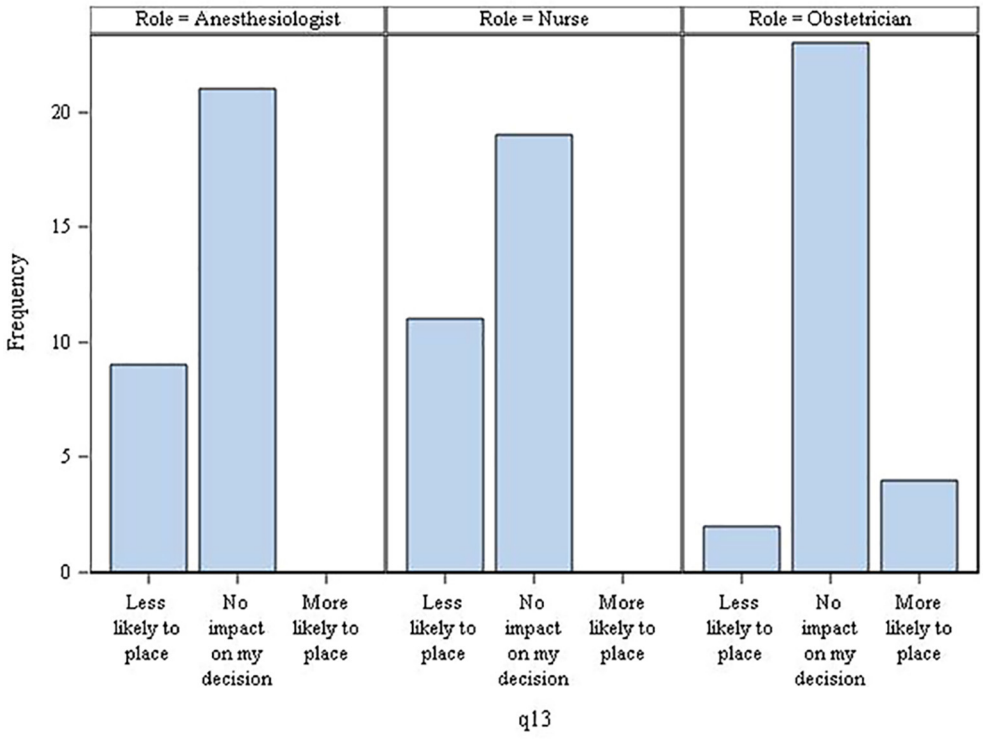

Fig. 7 Responses by Provider to Question 13 (Q13): Primigravid patient with unruptured membranes

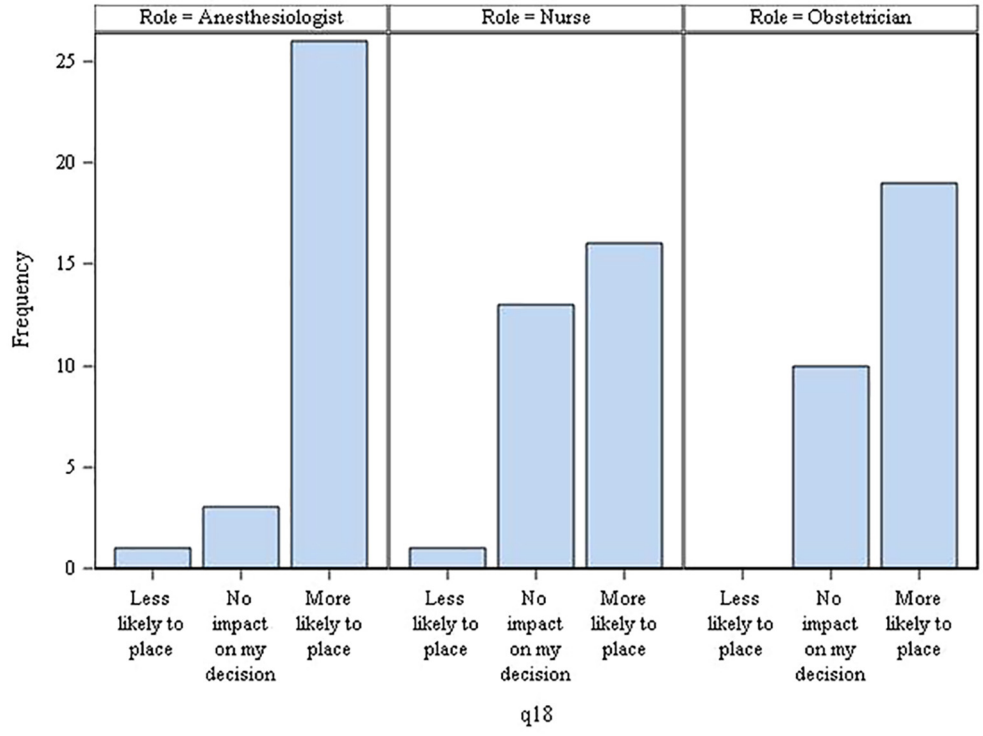

Fig. 8 Responses by Provider to Question 18 (Q18): History of or anticipated difficult patient airway

that patients may labor for a while at maximum cervical dilatation and so may benefit from neuraxial analgesia, while nurses and anesthesiologists may have interpreted this question as indicating that delivery was imminent.

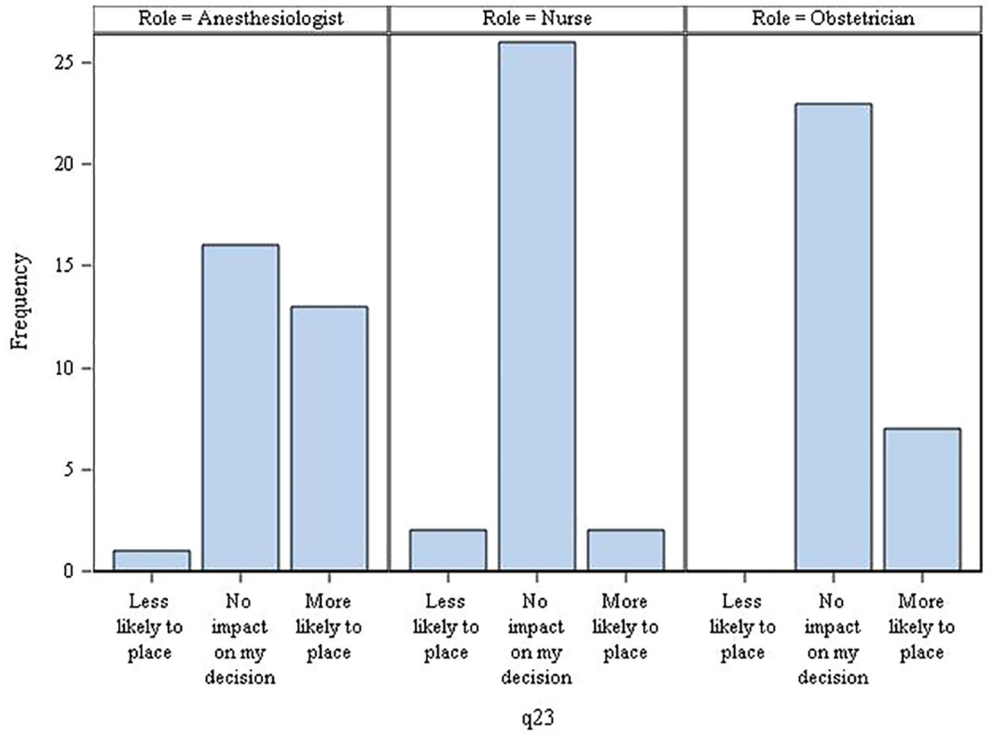

Fig. 9 Responses by Provider to Question 23 (Q23): Patient who has previously labored with epidural analgesia

It is a limitation of the survey that it did not allow free responses, through which participants may have clarified their thought process, and it is therefore possible that each provider group interpreted the questions differently due to their different roles in patient care. This may have influenced the results in a systematic way. This survey demonstrated that attitudes on the timing of epidural placement are not totally consistent for patient-specific factors, emphasizing the need for interprofessional co-operation. For example, anesthesiologists advocated early epidural placement if a difficult airway was anticipated, and it is important that nurses and obstetricians are aware of and understand the rationale for this attitude. We acknowledge that this survey represents the attitudes of providers at a single center alone and recognize that some practices and attitudes are institution-specific, so the results may not be generalizable to other institutions. Another limitation is that "patient advocacy" is a subjective term that has been shown to have several interpretations.[19,20]

In conclusion, surveying obstetric patient provider groups about attitudes toward the timing of neuraxial labor analgesia demonstrated some important differences that can be used to focus efforts in interprofessional education and communication in the future.

Declarations of interest

None.

References

1. D'Angelo R, Smiley RM, Riley ET, Segal S. Serious complications related to obstetric anesthesia: the serious complication repository project of the Society for Obstetric Anesthesia and Perinatology. *Anesthesiology* 2014;**120**:1505–12.
2. Traynor AJ, Aragon M, Ghosh D, et al. Obstetric Anesthesia Workforce survey: a 30-year update. *Anesth Analg* 2016;**122**:1939–46.
3. Attanasio L, Kozhimannil KB, Jou J, McPherson ME, Camann W. Women's experiences with neuraxial labor analgesia in the listening to mothers II survey: a content analysis of open-ended responses. *Anesth Analg* 2015;**121**:974–80.
4. Practice Guidelines for Obstetric Anesthesia. An updated report by the American Society of Anesthesiologists Task Force on Obstetric Anesthesia and the Society for Obstetric Anesthesia and Perinatology. *Anesthesiology* 2016;**124**:270–300.
5. Committee on Practice Bulletins-Obstetrics. Practice Bulletin No. 177: Obstetric Analgesia and Anesthesia. *Obstet Gynecol* 2017;**129**: e73–89.
6. Sng BL, Leong WL, Zeng Y, et al. Early versus late initiation of epidural analgesia for labour. *Cochrane Database Syst Rev* 2014;**10** CD007238.
7. Wong CA, Scavone BM, Peaceman AM, et al. The risk of cesarean delivery with neuraxial analgesia given early versus late in labor. *N Engl J Med* 2005;**352**:655–65.
8. Wong CA, McCarthy RJ, Sullivan JT, Scavone BM, Gerber SE, Yaghmour EA. Early compared with late neuraxial analgesia in nulliparous labor induction: a randomized controlled trial. *Obstet Gynecol* 2009;**113**:1066–74.
9. Wang F, Shen X, Guo X, Peng Y, Gu X. Labor Analgesia Examining Group. Epidural analgesia in the latent phase of labor and the risk of cesarean delivery: a five-year randomized controlled trial. *Anesthesiology* 2009;**111**:871–80.
10. Wassen MM, Zuijlen J, Roumen FJ, Smits LJ, Marcus MA, Nijhuis JG. Early versus late epidural analgesia and risk of

instrumental delivery in nulliparous women: a systematic review. *BJOG* 2011;**118**:655–61.
11. Wang TT, Sun S, Huang SQ. Effects of epidural labor analgesia with low concentrations of local anesthetics on obstetric outcomes: a systematic review and meta-analysis of randomized controlled trials. *Anesth Analg* 2017;**124**:1571–80.
12. Brownridge P. The nature and consequences of childbirth pain. *Eur J Obstet Gynecol Reprod Biol* 1995;**59**(Suppl. S9–S15).
13. Barker HM, Simmons SW, Hiscock RJ, Cyna AM, McDonald S. Time to get comfortable with a labour epidural. *Anaesth Intensive Care* 2014;**42**:73–7.
14. Lyndon A, Zlatnik MG, Wachter RM. Effective physician-nurse communication: a patient safety essential for labor and delivery. *Am J Obstet Gynecol* 2011;**205**:91–6.
15. Petersen A, Poetter U, Michelsen C, Gross MM. The sequence of intrapartum interventions: a descriptive approach to the cascade of interventions. *Arch Gynecol Obstet* 2013;**288**:245–54.
16. Gross MM, Fromke C, Hecker H. The timing of amniotomy, oxytocin, and neuraxial analgesia and its association with labor duration and mode of birth. *Arch Gynecol Obstet* 2014;**289**:41–8.
17. Wei S, Wo BL, Qi HP, Xu H, Luo ZC, Roy C, Fraser WD. Early amniotomy and early oxytocin for prevention of, or therapy for, delay in first stage spontaneous labour compared with routine care. *Cochrane Database Syst Rev* 2013;**8**:CD006794.
18. Conell-Price J, Evans JB, Hong D, Shafer S, Flood P. The development and validation of a dynamic model to account for the progress of labor in the assessment of pain. *Anesth Analg* 2008;**106**:1509–15.
19. Munday J, Kynoch K, Hines S. Nurses' experiences of advocacy in the perioperative department: a systematic review. *JBI Database System Rev Implement Rep* 2015;**13**:146–89.
20. Vaartio H, Leino-Kilpi H, Salantera S, Suominen T. Nursing advocacy: how is it defined by patients and nurses, what does it involve and how is it experienced? *Scand J Caring Sci* 2006;**20**:282–92.

Appendix A. Supplementary data

Supplementary data associated with this article can be found, in the online version, at https://doi.org/10.1016/j.ijoa.2018.08.007.