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ORIGINAL ARTICLE

Obstetric anesthesia units in Israel: a national questionnaire-based survey

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ABSTRACT

Background: This survey was performed to assess the organization and practice of obstetric anesthesia units in Israel.

Methods: A written questionnaire was mailed at the end of December 2005 to all Israeli anesthesia departments providing labor and delivery services in 2005 ($n = 25$).

Results: A response rate of 100% accounted for 125,340 deliveries. All labor and delivery suites had on-site anesthesia department services. Data are presented as mean (range) or frequency. Eleven hospitals performed 2500–4999 deliveries/year, 6 hospitals 5000–7499 deliveries/year, and 4 hospitals 7500–9999 deliveries/year. The overall cesarean delivery rate was 20% (0–27). Anesthesia for cesarean delivery (elective and emergency combined) was provided by: general anesthesia 15% (0.5–50), epidural 14.5% (0–99.5), spinal 68% (0–98), or combined spinal–epidural technique 0% (0–30). There was an operating room within or immediately adjacent to the labor ward in 16/25 units, including 10/11 units with >5000 deliveries/year. Labor analgesia was provided by epidural techniques in 50% (4–93) and nitrous oxide in 0.5% (0–90) of deliveries. A total of 11 units had 24 h dedicated anesthesiologist coverage, including all units >7500 deliveries but only 3/8 (38%) with 5000–7500 deliveries. Two of the 4 units with >7500 deliveries had no faculty member with formal training in obstetric anesthesia. Written protocols were available for labor analgesia (17/25), post-partum hemorrhage (12/25), aspiration prophylaxis (15/25) and maternal resuscitation (8/25).

Conclusion: In this national appraisal of Israeli obstetric anesthesia services, a notable lack of written protocols, wide variations in staffing, and few specifically trained obstetric anesthesia personnel were observed.

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Keywords: Obstetric anesthesia service; Labor analgesia; Cesarean anesthesia; Israel

Introduction

National anesthesia organizations in several countries have developed frameworks for local obstetric anesthesia services.^{1,2} These documents provide standards for resident and post-graduate training in obstetric anesthesia,² guidelines for specific obstetric anesthesia practices^{1,2} and mechanisms to assess guideline implementation.³ In the UK, a statement delineates acceptable levels of obstetric anesthesia care, such as staffing levels in the labor unit, the timeliness of labor analgesia, and the need to separate elective versus unscheduled anesthesia workloads on the labor unit.² A UK national obstetric

anesthesia database was initiated to assess the provision of obstetric anesthesia and the incidence of associated complications.²

Obstetric anesthesia services in Israel have not been previously described. As such, the Israel Association of Obstetric Anesthesia initiated a national survey of local obstetric anesthesia units. The design and conduct of this survey was intended as an initial step towards the adoption of local guidelines for the provision of obstetric anesthesia and the introduction of a national obstetric anesthesia database.

Methods

A questionnaire was sent to the 25 hospitals within the jurisdiction of the Israeli Ministry of Health in Israel that provide labor and delivery services. The questionnaire⁴ contained groups of questions relating to: (1) size of unit and equipment, including dedicated patient controlled epidural analgesia (PCEA) devices; (2) staffing

Accepted April 2010

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for the provision of obstetric anesthesia services; (3) organization of the obstetric anesthesia service; (4) analgesia for labor; (5) anesthesia for cesarean delivery; (6) training of anesthesia residents; and (7) the use of proto-

cols for routine and emergency obstetric anesthesia practice.

Questionnaires were in paper format and requested free text responses. They were mailed to the director

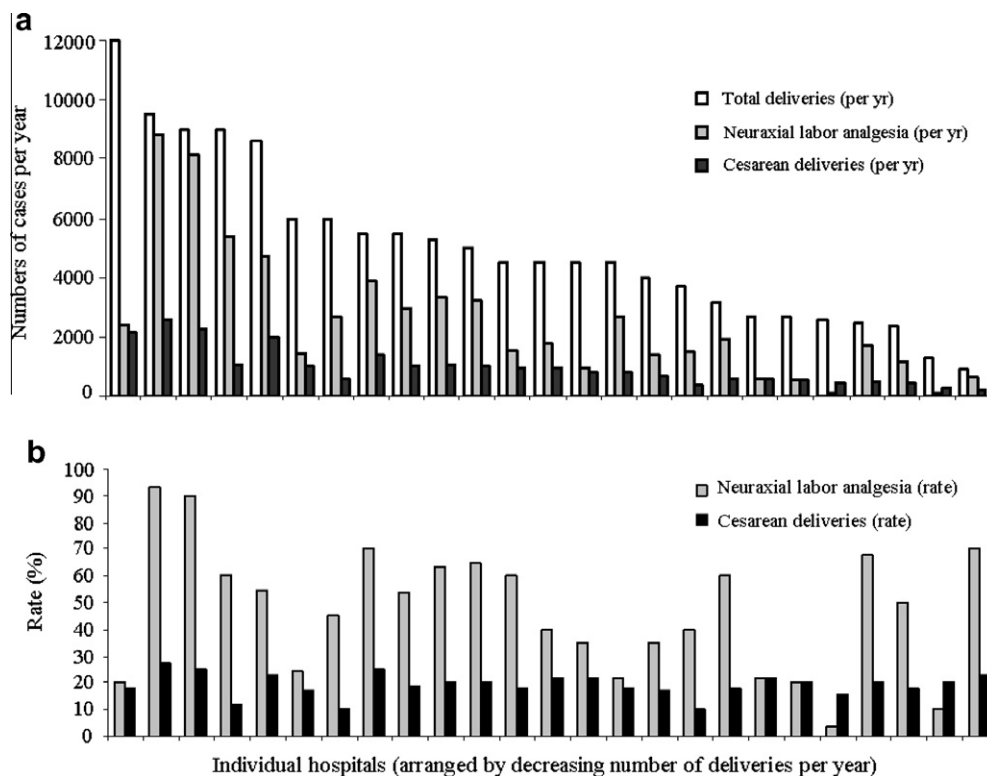


Fig. 1 The 25 labor and delivery units in Israel showing (a) number of deliveries, number of epidurals/spinals for labor analgesia and number of cesarean deliveries; and (b) rate of epidurals/spinals for labor analgesia and cesarean delivery rate.

Table 1 Staffing and the organization of obstetric anesthesia services

	Number of deliveries					Pooled data (n = 25)
	0–2499 (n = 3)	2500–4999 (n = 11)	5000–7499 (n = 6)	7500–9999 (n = 4)	10 000–12 499 (n = 1)	
Dedicated labor ward anesthetist						
24 h	0	3	3	4	1	11
Day shift only	0	2	1	0	0	3
None	3	6	2	0	0	11
Epidural response time (min)	20 (5–30) [13–25]	15 (0–40) [10–20]	10 (5–30) [10–18]	15 (10–30) [14–19]	10	15 (0–40) [10–20]
No. of PCEA pumps/hospital	3 (0–4) [1.5–3.5]	3 (0–10) [0.5–5.5]	5.5 (2–8) [4–7]	8.5 (7–10) [8–9]	0	4 (0–10) [2–7]
OR adjacent to labor ward	1	5	5	4	1	16
QA data						
Anesthesia data	2	7	5	2	1	17
Anesthesia complications	1	3	3	1	1	9

Data are median (range) [IQR] or frequency.

of the department of anesthesia or to a nominated director of the obstetric anesthesia unit or service. The questionnaire was not anonymous. Questionnaires were mailed at the end of December 2005 with a follow-up telephone reminder after one month and again after an additional month if required. The survey requested data relating to obstetric anesthesia services provided between January and December 2005.

Units were categorized according to size of maternity service (deliveries/year) in multiples of 2500 (from 0–2500 to >12 500 deliveries/year). For each unit, a calculation was made of the cesarean delivery and epidural analgesia rate.

The epidural rate was compared between hospitals based on the anesthesia staffing in the labor ward. Units were categorized according to whether there was an anesthesiologist dedicated to the labor ward: (1) 24 hours per day, seven days per week; (2) day shifts only (on weekdays); or (3) no shifts. The epidural rate was also compared between hospitals based on the predominant ethnic or religious demographic of the local population. Units were queried and categorized as predominantly having: (1) an ultra-orthodox Jewish population, (2) a Bedouin or Arab population, or (3) a heterogeneous population.

An additional follow-up survey of total deliveries, rate of cesarean delivery, and use of labor epidural analgesia was performed for the 2007 calendar year.

Quantitative variables are presented as mean (range) or mean \pm standard deviation and were compared between groups using the independent samples t-test. Categorical data are presented as percentage and were compared between the study groups using the chi-square test or Fisher's exact test. The correlation between two variables was compared using Pearson's correlation coefficient where appropriate (variables are continuous and normally distributed, the two variables were independent and the relationship between them was linear). All statistical tests were two sided and a P value of ≤ 0.05 was considered statistically significant. Statistical analysis was performed using SPSS 14.0 (SPSS Inc. Chicago, Illinois).

Results

The response rate was 100% for the 25 labor and delivery suites contacted in Israel operating in 2005. Two centers required more than 2 reminders; data collection was completed by April 2006 (5 months after initial request).

The total number of deliveries in Israel during 2005 was 125340. There was a wide variation in the number of deliveries, percentage of cesarean deliveries, and use of labor epidural analgesia in the different hospitals (Fig. 1). Eleven (44%) hospitals performed 2500–4999 deliveries, 6 (24%) performed 5000–7499 deliveries,

and 4 (16%) performed 7500–9999 deliveries. Three (12%) hospitals performed less than 2500 deliveries, and 1 (4%) hospital performed more than 12 500 deliveries (Table 1). These data were comparable to the 2007 data for each hospital (Fig. 2), where an average of 4500 deliveries (1000–12 000) occurred.

Dedicated 24-h anesthesiologist coverage was present in 11/25 units (44%), with all units with greater than 7500 deliveries having such coverage. In units with 5000–7500 deliveries, only 3/8 (38%) units had such

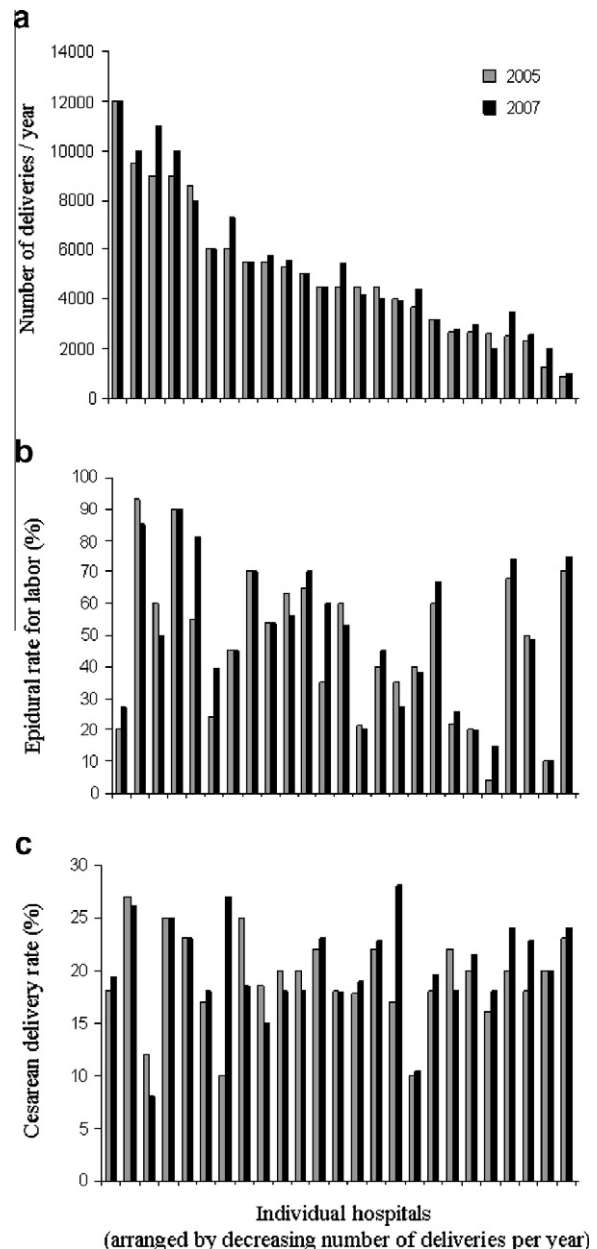


Fig. 2 Data for the 2005 survey compared with the 2007 survey for individual hospitals showing (a) numbers of deliveries, (b) the rate of epidurals/spinals for labor analgesia; and (c) the cesarean delivery rate. There were no significant differences between the samples.

Table 2 Techniques used for labor analgesia

	Number of deliveries					
	0–2499 (n = 3)	2500–4999 (n = 11)	5000–7499 (n = 6)	7500–9999 (n = 4)	10 000–12 499 (n = 1)	Pooled data (n = 25)
Epidural	50 (10–70) [30–60]	35 (4–68) [22–50]	58.5 (24–70) [47–65]	75 (55–93) [59–91]	20	50 (4–93) [24–63]
Intravenous opioid	25 (20–30) [23–28]	30 (0–63) [10–50]	30 (2–55) [16–44]	10 (2–50) [6–30]	75	30 (0–75) [10–50]
Entonox	0 (0–15) [0–8]	0 (0–90) [0–30]	5 (0–15) [1–15]	0 (0–20) [0–5]	1	0.5 (0–90) [0–15]
TENS	0 (0–0)	0 (0–4) [0–0]	0 (0–0)	0 (0–0)	0	0 (0–40) [0–0]
Other	0 (0–5) [0–3]	3 (0–70) [0–20]	1 (0–2) [0.5–1.5]	0 (0–0)	0	0 (0–70) [0–4]

Data are median (range) [IQR] or frequency.

coverage. There were 8 (3–13) labor rooms in each hospital. All units had computerized data collecting systems; however, only 9 units used this system to record complications. Twenty labor units used interdisciplinary meetings to discuss the management of complicated patients.

Neuraxial labor analgesia was offered in all 25 centers (Table 2). The use of epidural analgesia was higher in units with 24 h dedicated anesthesia coverage (Fig. 3). Hospitals with a predominantly Arab or Bedouin population ($n = 4$; mean deliveries 5475 ± 4780) reported lower use of neuraxial techniques for labor, when compared with hospitals with either a heterogenous population ($n = 18$; mean deliveries 4735 ± 2366) or with a large ultra-Orthodox Jewish population ($n = 3$; mean deliveries 6067 ± 2695) (Fig. 4). None of the hospitals

reported that the anesthesiologists routinely met parturients before labor. In 2007, the epidural rate ranged from 15% to 93% (median 50%).

The cesarean delivery rate differed widely between hospitals (Table 3). Post-hoc analysis revealed poor correlation between the number of cesarean deliveries and the labor epidural rate (Pearson's correlation $r = 0.26$, $P = 0.15$). However, a correlation between increasing epidural analgesia use and decreasing rate of general anesthesia for cesarean delivery was observed (Pearson's correlation $r = -0.40$, $P = 0.027$) (Fig. 5). In 2007, the mean national cesarean delivery rate was 19.6% (8–27%).

Anesthesia residency programs existed in 21/25 (84%) of the hospitals (Table 4). Among these, fourteen hospitals (56%) claimed to have at least one faculty member with specialist training in obstetric anesthesia. Notably, only 2/5 units with more than 7500 deliveries claimed to have a faculty member with specialist training in

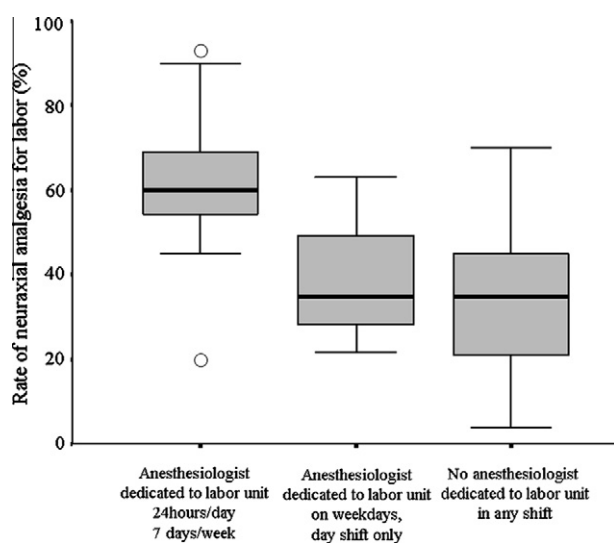


Fig. 3 Box and whiskers plot describing the association of a dedicated anesthesiologist present in the labor unit on the rate of neuraxial analgesia for labor.

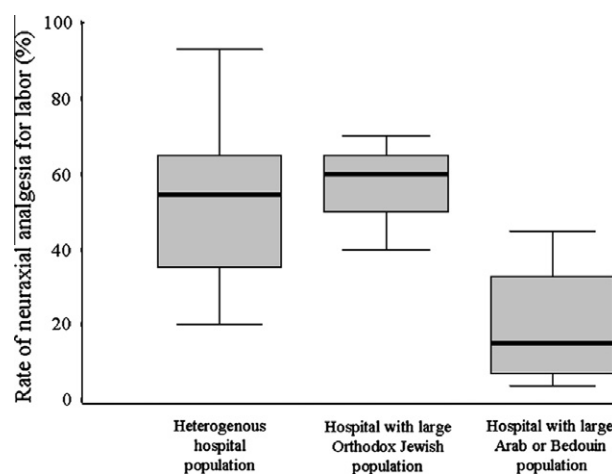


Fig. 4 Box and whiskers plot describing the association of different population types with the rate of neuraxial analgesia for labor.

Table 3 Cesarean delivery rate and anesthetic technique

	Number of deliveries					Pooled data (n = 25)
	0–2499 (n = 3)	2500–4999 (n = 11)	5000–7499 (n = 6)	7500–9999 (n = 4)	10 000–12 499 (n = 1)	
Cesarean delivery rate (%)	20 (18–23) [19–22]	18 (10–22) [17–21]	19 (10–25) [17–20]	24 (12–27) [20–26]	18	20 (10–27) [18–22]
GA (%)	5 (1–50) [3–28]	15 (0.5–47) [11–20]	13 (1–20) [9–16]	7.5 (1–15) [4–11]	45	15 (0.5–50) [6–19]
Epidural (%)	8 (0–20) [4–14]	9.7 (1–99.5) [5–18]	24.5 (1–51) [14–39]	25 (10–32) [18–31]	10	14.5 (0–99.5) [8–24]
Spinal (%)	50 (5–70) [28–60]	73 (0–85) [46–80]	54 (30–98) [36–74]	67.5 (55–85) [63–74]	45	68 (0–98) [40–76]
CSE (%)	0 (0–9) [0–5]	0 (0–30) [0–0]	5 (0–20) [1–11]	1 (0–2) [1–1.5]	0	0 (0–30) [0–5]

No differentiation between elective and emergency cesarean delivery; Data are percentages presented as median (range) [IQR] or frequency.

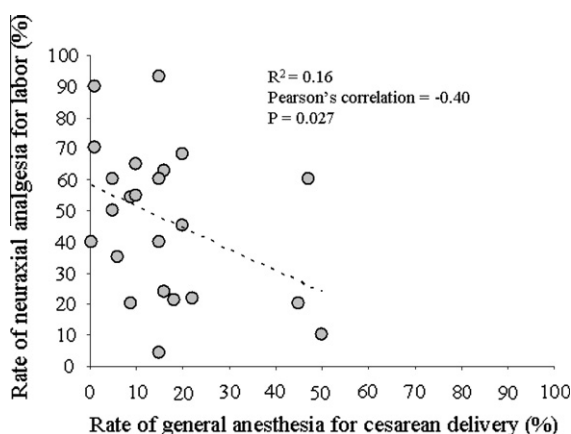


Fig. 5 Scatter plot describing the correlation between epidural analgesia for labor and the use of general anesthesia for cesarean delivery.

obstetric anesthesia. The use of protocols varied between hospitals (Table 5).

Discussion

These data represent the first organized, national assessment of obstetric anesthesia services in Israel. We found that standards for obstetric anesthesia care varied widely between different hospitals and were unrelated to the number of deliveries. Differences were seen both in organization of service (anesthesia staffing resources, the design of obstetric anesthesia services) and the services offered. Amongst these services, the most marked difference was seen in the rate of neuraxial analgesia for labor.

The current survey demonstrates that almost half of Israeli hospitals provided 24 h dedicated anesthesia services, whereas in the United States, only 28% provided such coverage.⁵ However, within Israel anesthesia staffing patterns varied widely and did not necessarily reflect the number of deliveries, especially among the eight hospitals with between 5000 and 7500 deliveries. In 4/8 of these hospitals, no anesthesiologists were dedicated to the labor ward at any time, and routine and emergent obstetric anesthesia care had to compete with emergency

Table 4 Training in obstetric anesthesia

	Number of deliveries					Pooled data (n = 25)
	0–2499 (n = 3)	2500–4999 (n = 11)	5000–7499 (n = 6)	7500–9999 (n = 4)	10 000–12 499 (n = 1)	
At least one faculty with specialist obstetric anesthesia training	2	5	5	1	1	14
Resident rotation in obstetric anesthesia	0	1	5	3	1	10
Duration of resident rotation (months)	0	3 (1–6)	3 (1–6)	3 (1–3)	3	3 (1–6) [3–4]
Time until unsupervised epidural by resident (months)	24 (6–30) [12–24]	24 (12–30) [18–27]	21(12–30) [17–26]	18 (6–24) [12–21]	24	24 (6–30) [12–24]
Local joint anesthesia and obstetric meetings	2	2	1	1	0	6

Data are percentages presented as median (range) [IQR] or frequency.

Table 5 Written local protocols for routine and emergency obstetric anesthesia practices

	Number of deliveries					Pooled data (n = 25)
	0–2499 (n = 3)	2500–4999 (n = 11)	5000–7499 (n = 6)	7500–9999 (n = 4)	10 000–12 499 (n = 1)	
Labor analgesia	2	7	5	2	1	17
Postpartum hemorrhage	0	5	5	1	1	12
Aspiration prophylaxis	2	8	4	0	1	15
Maternal resuscitation	1	2	3	1	1	8

Data are percentages presented as median (range) [IQR] or frequency.

surgery in the operating room on a daily basis. Guidelines from the UK suggest that elective and emergency work in the labor ward should be separated to prevent delays in provision of labor analgesia.² Demands for anesthesia services are not necessarily accompanied by an increase in manpower.^{5–7}

Based on the Human Development Index reported by the United Nations in 2009, which is a measure of public health spending as a proportion of gross domestic product, Israel is listed in the category of “very high human development” and ranked in 27th position (immediately below the UK, Germany, Singapore, Hong Kong, Greece and South Korea in 21st to 26th positions respectively).⁸ In comparing obstetric anesthesia services within Israel with other developed countries, the overall use of labor epidural analgesia is higher.^{3,9,10} A 1999 German survey reported a labor epidural analgesia rate less than 10%, with 10% of institutions not offering labor epidural analgesia.¹¹ Some European countries have reported high rates of labor epidural analgesia use, including 65% in Flanders,¹² and 61.6% in France,¹³ with higher rates in teaching hospitals. In Canada, although the overall labor epidural analgesia rate was 38%, 14 large hospitals had an epidural rate of 60% or higher.¹⁴

All delivery centers in Israel offered labor epidural analgesia services, which contrasts to some hospitals in the United States that do not.¹⁰ A correlation between the rate of labor epidural use and the number of annual deliveries was observed in the United States and Canada,^{10,14} however, other factors appear more influential in Israeli hospitals. The largest Israeli hospital had dedicated 24-h anesthesia cover but only a 20% rate of labor epidural analgesia. The reasons for this pattern are unclear; however, traditional ultra-orthodox Jewish¹⁵ and Arab/Bedouin communities¹⁶ have strong societal beliefs on population growth, maternal age at first pregnancy and on total number of pregnancies per woman. Of interest, the Arab and Bedouin populations are less likely to request labor epidural analgesia,¹⁷ despite the availability of such services. The use of labor epidural analgesia is subject to media, social and cultural influences.¹⁸

There are several limitations to this study. The questionnaire did not ask or validate the data sources pro-

vided in the responses. A third of the centers (8/25, 32%) did not collect obstetric anesthesia data from their service, so the basis for the responses from each individual unit is unclear. Furthermore, “specialist training” was not defined for the purposes of the survey, and we are not aware of the fourteen “specialist” obstetric anesthesiologists in Israel. In addition, the absence of obstetric anesthesia protocols makes it difficult to compare units, and makes the results of our survey more reliant on the responses from the single respondent from each unit; it is possible that practices vary greatly within the same unit. The results of this survey provide a strong argument for developing national guidelines, which would be expected to improve obstetric outcomes, improve skills and decrease workplace stress.¹⁹ Finally, our total number of deliveries differs from those reported by the Israel Health Ministry and the Israel Society of Maternal Fetal Medicine for the same period (143 913 live births and 141 104 deliveries respectively). However, these numbers include deliveries from East Jerusalem, which were not assessed in the current survey.

Israel is currently facing a workforce crisis in anesthesia, and this situation is expected to worsen.⁷ In these circumstances, anesthesia services outside the operating room that are not perceived to be life-saving may disproportionately lose resources and manpower.⁷ Increased workload-to-staffing ratios reduce safety and make it difficult to accommodate short-term increases in workload demand. Anesthesiologists have a duty to foster a culture of safety that should not tolerate cutting corners to cope with inadequate resources²⁰ particularly when providing for the comfort and safety of pregnant women and their babies.

In summary, this national appraisal of Israeli obstetric anesthesia services found high reported rates of labor epidural analgesia use, but a notable lack of written protocols, wide variations in staffing, and few specifically trained obstetric anesthesia personnel.

Acknowledgement

This survey was conducted with the assistance of members of the Israel Association of Obstetric Anesthesia.

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Appendix A. Supplementary data

Supplementary data associated with this article can be found, in the online version, at [doi:10.1016/j.ijoa.2010.04.009](http://dx.doi.org/10.1016/j.ijoa.2010.04.009).