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ORIGINAL ARTICLE

# The impact of a teaching program on obstetric anesthesia practices in Croatia

D. Kopic,<sup>a</sup> M. Sedensky,<sup>b</sup> M. Owen<sup>c</sup><sup>a</sup> University Hospital, Split, Croatia<sup>b</sup> University Hospitals of Cleveland, Cleveland, Ohio, USA<sup>c</sup> Wake Forest University Medical Center, Winston-Salem, North Carolina, USA

## ABSTRACT

**Background:** Many countries fail to use regional techniques for either labor analgesia or obstetric anesthesia. Kybele, an international outreach group, seeks to improve obstetric anesthesia practices worldwide. Its educational program in Croatia was evaluated by studying the change in use of regional anesthetic techniques in obstetrics after a Kybele visit.

**Methods:** An international Kybele team spent two weeks in an educational program in Croatia in September 2005. Croatian anesthesiologists evaluated its benefit via a questionnaire two months after the program. In addition, hospitals that hosted a Kybele member compiled data on rates of regional blockade for cesarean section and labor analgesia before and after the Kybele visit.

**Results:** All Croatian anesthesiologists rated the overall experience as excellent or good. Eight out of nine hospitals contributed data to evaluate the program's impact on obstetric anesthesia practice. The average rate of use of regional anesthesia for cesarean section increased across the eight hospitals ( $P < 0.001$ ) after Kybele; some institutions used neuraxial blockade for the majority of cesarean sections following the Kybele educational program. The average rate of epidural analgesia for labor also increased among the eight hospitals after the Kybele visit ( $P < 0.02$ ), although absolute rates were still modest (maximum rate = 5%).

**Conclusion:** In Croatia, a two-week educational program in obstetric anesthesia increased the use of regional anesthesia and analgesia for labor and delivery in the year that followed the program. Multiple factors limit availability of analgesia for childbirth in Croatia.

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**Keywords:** Obstetric anesthesiology; International outreach; Epidural use; Training evaluation

## Introduction

Croatia, a central eastern European country of approximately four million people, has maternal and neonatal mortality rates similar to those of western Europe.<sup>1</sup> However, despite experience with regional techniques for a variety of operative cases, regional anesthesia is historically not a routine feature of obstetric care. In fact, outside the university setting, regional anesthesia was used in less than 7% of cesarean sections before 2005.<sup>2</sup> At the same time, epidural analgesia for labor was used in less than 1% of births other than in university hospitals.<sup>3</sup> In general, parturients experienced deliv-

ery without the support of their family and without pain relief. In contrast, labor analgesia is an accepted and widely used practice in countries like the United States, with neuraxial techniques the preferred method for cesarean delivery.<sup>4</sup>

Kybele is an international non-profit organization dedicated to improving childbirth conditions worldwide through medical education partnerships (<http://www.kybeleworldwide.org>). It strives to produce improvements in maternal and neonatal care that can be maintained by local physicians, and with minimal cost. Kybele developed a two-week educational program for Croatia that focused on teaching regional anesthetic techniques. The plan was to emphasize training of Croatian physicians by an international team of experts using the existing Croatian infrastructure. Although bedside training was emphasized, classroom teaching was also part of the educational plan. In addition, data were collected to evaluate whether changes persisted after the two-week visit.

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Correspondence to: Margaret Sedensky, University Hospitals of Cleveland, 11100 Euclid Avenue, Cleveland, Ohio 44106-5007, USA.

E-mail addresses: [margaret.sedensky@uhhospitals.org](mailto:margaret.sedensky@uhhospitals.org), [sedenm@u.washington.edu](mailto:sedenm@u.washington.edu)

## Methods

### Visit structure

All educational planning, including involvement of hospitals within Croatia, assignment of Kybele members to different host institutions, as well as organizing the first symposium on obstetric anesthesiology in Croatia, was carried out as a team effort between Kybele and a Croatian anesthesiologist. Host institutions were identified by their willingness and ability to sponsor a visitor, and by a perceived opportunity for change within that institution. Nine hospitals hosted Kybele members, with generally 1–2 Kybele members per hospital; these nine hospitals represented all geographic regions of the country (Fig. 1). Host institutions covered all in-country expenses for their guest, including accommodation and transportation. Kybele members paid for their own plane fare to Croatia and stayed for two weeks in the country. The visit began with a two-day nationwide symposium in obstetric anesthesia, followed by dispersal of Kybele members to their host institution for a week of bedside teaching.

### Kybele team

The team that arrived in Croatia in September 2005 included 12 anesthesiologists, an internist and a midwife. They represented academic teaching hospitals from the United States, Canada, England, Scotland, Belgium and Australia. Each team member had particular expertise in obstetric anesthesiology or obstetric medicine. Kybele members had been given their assigned host's contact information six weeks before the visit, as well as data about that hospital's practice of obstetric anesthesiology.

### Evaluation

A questionnaire was mailed to 45 Croatian anesthesiologists two months after the Kybele team left Croatia. It attempted to evaluate the overall satisfaction of the host physicians with their Kybele visitor. In addition, each participating institution was asked to provide data concerning use of regional anesthesia and analgesia from October 1, 2004 to September 30, 2005. Similar data were collected for the period of October 1, 2005 to



**Fig. 1** A map of Croatia. Star indicates a city in which a hospital hosted a Kybele physician. In Zagreb, two different hospitals each hosted a Kybele anesthesiologist.

September 30, 2006. Total numbers of deliveries, types of analgesia for vaginal deliveries (VD), frequency of cesarean section (CS) and types of anesthesia for CS were analyzed. The rates of use of regional techniques for labor analgesia and for CS were calculated for each hospital, and then were used to calculate a mean and standard deviation for all hospitals as a group. The pre- and post-visit means were used for comparison using a Student's *t* test. In addition, 5 years of data on the use of regional anesthesia for labor and for CS were collected from one hospital.

## Results

### Conference and hospital teaching

The first international conference on obstetric anesthesiology in Croatia was held in Bol. Kybele members and Croatian physicians delivered lectures over a two-day period. It was attended by 67 anesthesiologists from Croatia as well as seven anesthesiologists from neighboring countries. Attendees were predominantly department heads from clinical centers and anesthesiologists involved with obstetrics.

Following the conference, Kybele team members engaged in bedside teaching at their host institution. Cooperation and sharing of experiences were emphasized, as was practical management of problems arising with use of regional anesthesia.

On average, ten physicians per institution interacted with the Kybele team member during the visit. Kybele members also gave formal lectures to clinicians at the host hospital if requested to do so.

### Questionnaire

A survey of host satisfaction with the Kybele visitor produced the first data obtained after the Kybele visit. The response rate to the questionnaire was 100% (Table 1). Of these, 53% reported that they knew exactly what they wanted and expected from their visitor. In addition 65% of respondents reported continued contact with the Kybele team member, 82% would support another visit, and 88% would highly recommend the program to other institutions. The assessment of overall program

**Table 1** Survey answers

Visitor characteristics	Completely agree	Somewhat agree	Neutral	Somewhat disagree	Completely disagree
Flexible and adapted to local need	88%	6%	6%	0	0
Knowledge of obstetric anesthesia	100%	0	0	0	0
Practical and made helpful suggestions	94%	6%	0	0	0
Helped design research projects	59%	6%	17%	12%	6%
Met host expectations	71%	23%	6%	0	0

**Table 2** Overall evaluation of Kylebe visit

	Excellent	Good	Fair	Poor	Terrible
Lectures	76%	24%	0	0	0
Bedside teaching	76%	12%	12%	0	0
Overall experience with visiting anesthesiologist	88%	12%	0	0	0

quality, lectures and bedside teaching is provided in Table 2.

### Change in use of regional anesthetic techniques

The change in use of regional anesthesia/analgesia techniques for the 12 months following the Kybele visit comprised the second phase of data collection. One hospital did not submit data for this phase of the evaluation, but eight of the nine hospitals provided comprehensive data on the use of these techniques before and after the visit of the Kybele team. The total number of deliveries at these eight hospitals in the 12 months pre Kybele was 14 671, while 14 502 deliveries were performed in the subsequent 12 months. Total number of deliveries in Croatia for 2005 was 42 492.<sup>5</sup> The numbers of labor epidurals and regional blocks for CS are summarized in Table 3.

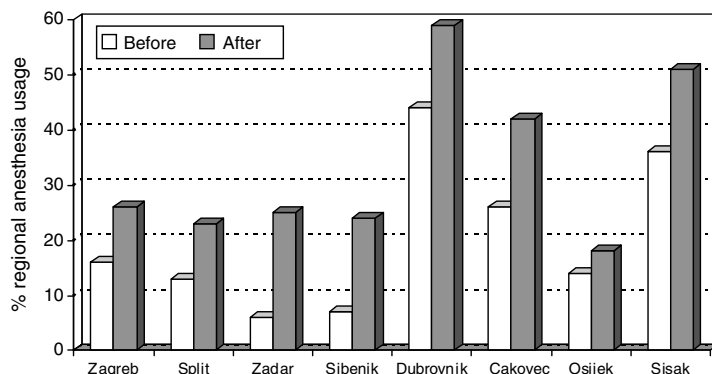
Rates of use of regional anesthesia for CS increased after the Kybele visit, ranging from 18–59% (Fig. 2). The rate increased in each hospital. The average rate of regional technique for CS among the eight hospitals was 20% before Kybele, and 34% after ( $P < 0.001$ ). The rate of use of labor epidurals for analgesia also increased in six of the hospitals after the Kybele visit, with post-Kybele rates ranging from 3 to 5% (Fig. 3). The average rate of use of epidural analgesia among responding institutions was 1.2% before Kybele, and 2.3% after ( $P < 0.02$ ). Data from Split Hospital, where the Kybele programme was hosted, from 2002–2006 are shown in Table 4. In 2003 a Croatian anesthesiologist from Split Hospital contacted Kybele, which then sponsored a visit by that physician to a Kybele member's home institution. Following this visit the rate of regional anesthesia for CS increased from zero to roughly a third of all such deliveries by 2006. In addition the use of epidural analgesia in labor increased from 0 to 5% of all vaginal deliveries over the same time period (Table 4).

**Table 3** Survey of obstetric anesthesia practices before and after Kybele visit

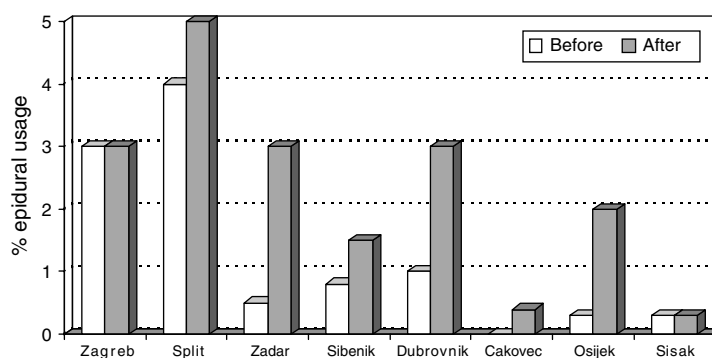
Hospital	Period	Deliveries	Vaginal delivery	Epidural analgesia	CS	GA	RA
Zagreb	Pre Kybele	2293	1829 (80)	55 (3)	464 (20)	391 (84)	73 (16)
	Post Kybele	2288	1724 (75)	46 (3)	564 (25)	418 (74)	146 (26)
Split	Pre Kybele	4377	3743 (86)	145 (4)	634 (14)	551 (87)	83 (13)
	Post Kybele	4079	3498 (86)	180 (5)	581 (14)	447 (77)	134 (23)
Zadar	Pre Kybele	1679	1508 (90)	8 (0.5)	171 (10)	161 (94)	10 (06)
	Post Kybele	1632	1457 (89)	42 (3)	175 (11)	132 (75)	43 (25)
Šibenik	Pre Kybele	593	509 (86)	4 (0.8)	84 (14)	78 (93)	6 (07)
	Post Kybele	670	590 (88)	9 (1.5)	80 (12)	61 (76)	19 (24)
Dubrovnik	Pre Kybele	931	797 (86)	8 (1)	134 (14)	75 (56)	59 (44)
	Post Kybele	1024	876 (86)	28 (3)	148 (14)	60 (42)	88 (58)
Čakovec	Pre Kybele	1222	1025 (84)	0 (0)	197 (16)	146 (74)	51 (26)
	Post Kybele	1231	1019 (83)	5 (0.5)	212 (17)	124 (58)	88 (42)
Osijek	Pre Kybele	2353	1915 (81)	6 (0.3)	438 (19)	377 (86)	61 (14)
	Post Kybele	2329	1824 (78)	37 (2)	505 (22)	412 (82)	93 (18)
Sisak	Pre Kybele	1223	1027 (84)	3 (0.3)	196 (16)	125 (64)	71 (36)
	Post Kybele	1249	1041 (83)	3 (0.3)	208 (17)	101 (49)	107 (51)

Data are numbers (%).

CS: cesarean section, GA: general anesthesia, RA: regional anesthesia.



**Fig. 2** Rates of regional analgesia use for cesarean section in the 12 months before and after the Kybele visit.



**Fig. 3** Rates of epidural analgesia in labor in the 12 months before and after the Kybele visit.

## Discussion

Although many medical teaching programs are active in international outreach efforts, it is often difficult to assess if any permanent changes are made by such groups.<sup>6-8</sup> Difficulties in communication, formulating

benchmarks, collecting data and establishing long-term follow-up contribute to the inability to judge results. Croatia provided an opportunity to assess whether change in obstetric anesthesia practice followed an intense two-week educational program. Croatia's generally sophisticated medical infrastructure allowed

**Table 4** Data on obstetric anesthesia practice at University Hospital Split 2002-06

Year	2002	2003	2004	2005	2006
Total deliveries	4006	3918	4267	4310	4324
Vaginal deliveries	3476	3283	3660	3683	3709
Labor epidurals (%)	0 (0)	10 (0.3)	41 (1)	154 (4)	194 (5)
CS	530	635	607	627	615
GA for CS	530	604	566	459	427
RA for CS (%)	0 (0)	31 (5)	41 (7)	168 (27)	188 (31)

CS: cesarean section, GA: general anesthesia, RA: regional anesthesia.

accurate record keeping of obstetric anesthesia practice. Clear cut changes in the use of regional anesthesia provided concrete outcome measurements. In addition, Croatian anesthesiologists are proficient in regional anesthetic techniques, yet historically have relatively little experience in using these techniques on pregnant women. In this sense Croatian physicians appeared optimally poised to benefit from a Kybele teaching program, since Kybele seeks to effect changes by training leaders within the country's existing infrastructure. Kybele's goal is to instruct in a way that maximizes the potential for newly introduced practices to become routine within the host country.

Croatia's size afforded the opportunity to visit hospitals responsible for roughly one third of the nation's deliveries. Since 67 anesthesiologists attended the international obstetric anesthesia symposium, and roughly 90–100 physicians, mainly anesthesiologists, had contact with the Kybele team, a large percentage of the country's 620 anesthesiologists made contact with a Kybele member.<sup>9</sup>

Averaged across the eight hospitals for which we have data, the use of labor analgesia increased significantly after the Kybele visit. However, overall use of epidurals for labor analgesia remains limited. Pain-free delivery has historically been a low priority in a country emerging from a period of tremendous political turmoil. Currently, in Croatia, analgesia is provided primarily as time and supplies permit. This reflects critical shortages of manpower and other resources within the country. In most hospitals there is no dedicated obstetric anesthesia team available to care for the laboring patient. Equipment and supplies to provide epidural labor analgesia can be lacking, with some hospitals receiving a small allotment of epidural kits per month, unlinked to patient demand. Ultimately, the costs to the infrastructure may be the rate-limiting step to providing labor analgesia in Croatia. Besides incurring costs to the institution, providing labor analgesia can become extremely burdensome to the individual provider. The anesthesiologist, who may have minimal experience with providing epidural analgesia, must face the possibility of side effects or complications without significant collegial support.

When examined within the context of epidural use worldwide, Croatia's rates are similar to those published within in the last dozen years for Hungary and

Germany.<sup>10–13</sup> Although these rates are somewhat dated, they reflect limited use of epidural analgesia in some areas of Europe. Reasons for the low rates are varied, although manpower and historical norms are recurrent themes. Religious beliefs that childbirth must be accompanied by pain may also contribute to traditional reluctance to deliver labor analgesia. In addition, fear of epidural analgesia on the part of patients and midwives has been cited as a factor.<sup>13</sup> In Split Hospital, in which Kybele has been the most closely involved for the longest period of time, use of epidurals for labor analgesia appears to be steadily increasing, despite these obstacles. Increasing patient requests for analgesia, as well as strong commitment on the part of those seeking to improve the situation, are important factors in changing practice.

Regional anesthesia for CS increased strikingly across the group of eight hospitals that responded to our survey, with rates much higher than those of epidural analgesia for labor. This may reflect the use of both spinal and epidural for CS. Spinal anesthesia is familiar to most Croatian anesthesiologists for many surgical procedures, and may more easily be applied to an operative case like CS. Although it has been shown that spinal anesthesia for CS appears safer than general anesthesia in a developing African country,<sup>14</sup> there are as yet no data available for Croatia regarding the relative safety of neuraxial compared to general anesthesia for CS.

We do not have data concerning rates of either epidural analgesia for labor or regional anesthesia for CS in hospitals in Croatia that did not participate in the Kybele program. It is possible that use of neuraxial blockade is increasing across the region independent of the Kybele visit, as seen in Norway in two surveys conducted in the last decade.<sup>15,16</sup> We think this unlikely, since in the one hospital in Split for which we have more than one year of pre-Kybele data, rates of epidural usage were constant and less than 10% of the post-Kybele rate.

As a paradigm for effecting long-term change, Kybele incurs costs for the host country. Kybele members volunteer their time and arrange their own travel to the host country. A one-off cost to the host country involves primarily the price of sponsoring a volunteer's accommodation and transportation within the country. More significantly, enduring change requires that the host country can absorb the ongoing costs of new practices.

In our study for example, cost appears to be a major factor limiting rates of epidural analgesia.

The questionnaire indicated that the overall satisfaction of the host institutions with their visitor was high, although nearly one half of participants did not know what to expect of the visit. Practical clinical teaching, as opposed to design of research protocols, seemed the major interaction of the visitors with their hosts. In addition, many intangible benefits for both host and guest physicians have been reported, generally described in terms of ambassadorship and collegial goodwill. Numerous letters of appreciation from Croatian patients have also been sent to Kybele.

Almost two thirds of participants were maintaining contact between host and visiting doctor two months after the visit, which is promising for ongoing progress in care of the parturient in Croatia. At the time of writing, at least five Kybele doctors have returned for follow-up visits to Croatia, and three Croatian physicians and one nurse anesthetist have visited at a Kybele member's home institution. Long-term follow-up is now needed to assess ongoing accomplishments of Croatian physicians following a Kybele educational program. Based on the findings reported here, additional Kybele programs are being tailored for other medical partnerships, both in Eastern Europe and in Africa.

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