An audit of acute pain service in Central, Saudi Arabia

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ABSTRACT

Objective: A retrospective analysis of acute pain service (APS) was performed to look at the epidural and patient-controlled analgesia (PCA) with respect to their indications, duration and quality of pain control, dosage regimen and common side effects.

Methods: This study was conducted in the Armed Forces Hospital, Riyadh, Kingdom of Saudi Arabia. All APS monitoring forms, from the year 1994 to 2003 were collected. Every tenth PCA and epidural form was then randomly taken out and reviewed. From each sample form information concerning operation, analgesic modality (epidural or PCA), its duration, side effects and non-steroidal anti-inflammatory drug (NSAID) use was collected. Postoperative pain and sedation were monitored as 0=none, 1=mild, 2=moderate and 3=severe. For the first 24 hour of APS period, information was also gathered concerning duration of each pain score, highest pain score, sedation score and lowest respiratory rate. Informations of PCA (incremental dose, lock-out interval, back ground infusion, number of hours PCA not activated and total morphine consumed) and epidural infusion (concentration of mixture of local anesthetic with opioid and its volume consumed during first 24 hours) were also collected.

Results: A total of 10002 patients aged 16-74 years received APS; one third of them receiving epidural and two thirds receiving PCA. Eighty-five percent of patients received APS after cesarean section and 7.8% received APS after abdominal hysterectomy. Acute pain service served 77% of total APS patients for 24-48 hours. The average duration of APS was 44.2 hours. For the first 24 hours, PCA and epidural was compared for severity and duration of pain. A pain score of zero was found for a longer period (average 19.6 hours) with epidural whilst; a pain score of 1 and 2 was observed for a longer period (average 11.4 and 4.0) with PCA. The mean highest pain score was 0.7 for epidural and 1.7 for PCA. Patients having no postoperative pain included 35.7% of the epidural analgesia group and 0.5% of the PCA group. The highest sedation score of one was found more often in the epidural group and a score of 2 was found more often in the PCA group. No case was documented where the respiratory rate was <12/minute. Most (51%) PCA patients were prescribed an incremental dose of 1.5mg of morphine with a lock-out interval of 10 minutes. Basal morphine infusion was used in 96% of PCA patients. Patient-controlled analgesia was not activated for the mean period of 13.2 hours in the first 24 hours postoperative period. Average total amount of morphine consumed by patients was 76.8 mg during the average total duration of 42.9 hours of PCA. Amongst patients who received epidural analgesia, 93.6% received the mixture of fentanyl (4 microgram/ml) and Bupivacaine (0.03%). On average, 194 mls of epidural infusion was used in the first 24 postoperative hours. Overall, 35% of patients received NSAIDs along with APS and 12.6% of patients developed complications during APS. Complications were recorded in 25.6% of epidural patients and 4.4% of PCA patients. The most common complication was pruritis.

Conclusion: In the past decade, APS has provided a safe and efficient service to over 10 thousand postoperative obstetric and gynecology patients. Epidural analgesia as compared to PCA provided superior analgesia but caused more frequent minor side effects. More resources are required to provide good quality APS to all eligible postoperative patients for the desirable period.

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In 1990, awareness among medical professionals concerning poor quality of acute postoperative pain management was highlighted by a joint statement from The Royal College of Surgeons of England and the College of Anesthetists;[1] who also published the guidelines for the management of severe acute pain. Two years later, the Department of Health, United States of America, published guidelines for acute pain management.[2] These recommendations emphasized the need for an acute pain service (APS) together with an audit and quality assurance. Soon afterwards in 1992, APS was established in the Armed Forces Hospital, Riyadh, Kingdom of Saudi Arabia (KSA) and the importance of audit was also recognized at the time.

We present here the audit of our 10-years experience of APS. The main purpose of this study is to analyze the APS service from the year 1994 to 2003 to look at (a) the number of patients yearly receiving patient-controlled analgesia (PCA) and epidural service, (b) the frequency of PCA and epidurals for various obstetric and gynecological operations, (c) the frequency of non-steroidal anti-inflammatory drugs (NSAIDs) used, (d) the average duration of postoperative analgesia during the first 24 hours postoperative period, (e) the frequency of different dosage regimens of PCA and epidural infusion, (f) the average amount of APS drug used by patients, and (g) common side-effects.

The APS is provided by a team of anesthetists and ward nurses to control acute postoperative pain in patients. Due to its logistical reasons and lack of resources, APS has been limited for postoperative obstetrics and gynecology patients only in one building of the hospital. Acute pain service offers 2 main techniques for the control of postoperative pain: (a) intravenous PCA and (b) epidural infusion. Anesthetists discussed these techniques to all patients during their pre-operative visit. All patients underwent general anesthesia received boluses of morphine in the post anesthesia care unit until their pain was mild or moderate. Regional anesthesia was established pre-operatively for those patients who agreed to epidural analgesia (with or without general anesthesia). Patient-controlled analgesia or epidural infusion was commenced in the post anesthesia care unit and maintained for 1-4 postoperative days. During this period, the patient was covered by the APS team and was frequently monitored by the ward nurse for both desirable (analgesic) and undesirable effects. In alert patients, pain, sedation and respiratory rate were monitored every hour. A simple verbal rating scale was used to monitor postoperative pain and then translated into a pain score. The patient was also monitored for blood pressure, heart rate, postoperative nausea and vomiting, pruritis, and temperature. All these variables are recorded on APS standard order forms (***Appendix 1**). Patient complaints and activities (such as breast feeding, mobilization and so forth) and mechanical problems with PCA/epidural machine were also recorded on this form. Side-effects were treated according to the protocol. The patient was seen on a daily basis by an APS doctor, who looks at the APS form and take note of desirable and undesirable effects, discusses these with the patient and nurse, and if required alters the PCA or epidural dosage. After the routine ward round, if the patient's analgesia is not adequate, if side-effects are serious, or if the APS machine is malfunctioning, the ward nurse can contact the APS doctor who is available 24 hours a day throughout the week. The APS service is routinely stopped and replaced with enteral analgesics on the third postoperative day. A copy of the APS form is collected by the doctor and stored in the department of anesthesia office.

Methods. This study was conducted in the Armed Forces Hospital, Riyadh, KSA. All APS monitoring forms, from the year 1994 to 2003 were collected and, arranged and counted for the month, year and service given to the patient; namely either PCA or epidural. Then APS forms were collected monthly and separated for PCA and epidural analgesia. Sample forms were collected through systematic randomization. Every tenth PCA and epidural form was then taken out. The forms where APS was terminated in <24 hours postoperative period were not included in the study. From each sample form, a number of variables were entered on the computerized (Epi-info) form. (***Appendix 2**).

After initiating the APS service, type of surgery was categorized as cesarean section, abdominal hysterectomy, vaginal hysterectomy, vaginal repair, laparotomy, and pelvic floor repair. The type of main analgesic modality was used whether PCA or epidural, its duration, and whether NSAIDs were used. Postoperative pain and sedation were monitored as 0=none, 1=mild, 2=moderate and 3=severe. For the first 24 hours of APS period, information was also gathered concerning duration of each pain score, highest pain score (which lasted for > 3 hours) and lowest respiratory rate. Complications of APS such as nausea and vomiting, pruritis, dizziness, hypotension, paraesthesia, muscle weakness, shortness of breath, headache and technical problems, which appeared during the total duration of APS were also recorded.

For patients receiving only intravenous PCA, the following informations were collected: PCA dose - which one of the following 4 morphine dosages was used? (i) Incremental dose of 1 mg and lock-out

*The full text including Appendixes 1 and 2 are available in PDF format on Saudi Medical Journal website (www.smj.org.sa)

interval of 6 minutes, (ii) incremental dose of 1 mg and lock-out interval of 10 minutes, (iii) incremental dose of 1.5 mg and lock-out interval of 6 minutes, (iv) incremental dose of 1.5 mg and lock-out interval of 10 minutes. The total amount of morphine in milligrams used by the patient during the whole duration of APS service, whether PCA was set along with the background infusion of morphine, and the number of hours during which PCA was not activated by the patient was also noted.

For patients using epidural, the following information was collected: epidural infusion drugs - which one of the 2 mixtures was chosen? (i) fentanyl 4 mcg/ml with bupivacaine of 0.03%, (ii) fentanyl 4 mcg/ml with bupivacaine of 0.06%. The total volume of epidural mixture (in milliliters) that patients received during the first 24 hours was also noted.

The result was expressed as a percentage and where a comparison was made; chi-square test, student t-test and fisher exact test were used with $p<0.05$ being considered significant.

Results. All females were between 16-74 years old. A total of 10002 patient received APS, one third of them received epidural and two thirds received PCA (**Table 1**). From these patients, 1000 forms were randomly collected but 160 were rejected (because either APS was terminated in <24 hours or APS was given for post non-obstetric/gynecologic operations, or data entry in the form were poor such as unreadable or missing). Type of operations and APS were shown in **Table 2**. Eighty-five percent of patients received APS after cesarean section and 7.8% received APS after abdominal hysterectomy. Acute pain service served 77% of total APS patients for 24-48 hours. The mean (SD) duration of APS alone was 44.2% (16.2) (both epidural and PCA), PCA alone was 43% (14.6) and epidural alone was 46.2% (14.3). Acute pain service continued for more than 72 hours in 0.9% patients with epidural and 0.5% with PCA. Pain analysis for its severity and duration was made only for first 24 hours postoperative period. Mean (SD) duration (hours) for which patient had pain score 0, 1 and 2 is shown in **Table 3**. Pain score of 0 was found for longer period (mean 19.6 hours) with epidural while pain score of 1 and 2 was observed for longer period (mean 11.4 and 4.0 hours) with PCA. There were 113/316 patients who received epidural analgesia, and 3/524 who received PCA had highest pain score zero. There were 2 patients who received epidural analgesia, and 72 who received PCA had highest pain score 3. Mean (SD) highest pain score in first 24 hours postoperative period was 0.7 (0.67) in patients received epidural and 1.7 (0.66) in patients received PCA. In relation to epidural and PCA, majority (82%) of patients had highest sedation score (HSS) of one. Highest sedation score of one was found more often in epidural and 2 was found more often in PCA. No patient in this study had HSS >2.

Mean (SD) lowest respiratory rate in first 24 hours postoperative period was 18.5 (0.9) in patients received epidural and 18.6 (1.0) in PCA. There was no case where respiratory rate was <12/minute. Most (51%) PCA were set on incremental dose of 1.5 mg of morphine with lock-out interval of 10 minutes. Incremental dose per lock-out interval was set as 1.5/6 in 19.2%, 1.0/6 in 16.4% and 1.0/10 in 13.3% patients. Basal morphine infusion was used in 96% of PCA patients. Patient-controlled analgesia was not activated for the mean (SD) period of 13.2 (4.9) hours in first 24 hours postoperative period. Mean (SD) total amount of morphine consumed by patients was 76.8 (56.8) mg during the mean (SD) total duration of 42.9 (16.6) hours of PCA. Among patients who received epidural analgesia, 93.6% received the mixture of Fentanyl (4 microgram/ml) and Bupivacaine (0.03%). The rest, (6.3%) received mixture of Fentanyl (3 microgram/ml) and Bupivacaine (0.06%). Mean (SD) 194 mls (48.5) of epidural infusion was used in first 24 postoperative hours. Overall, 35% of patients received NSAIDs along with APS, 38% of epidural and 33% of PCA received NSAIDs. Complications developed with epidural and PCA is shown in **Table 4**. Overall, 12.6% of patients developed complications during APS. In 25.6% of epidural and 4.4% of PCA, complications were recorded. Most common complication was pruritis.

Table 1 - Number of patients received epidural and patient-controlled analgesia (PCA) by the year 1994-2003.

Type of anesthesia	Year										Total
	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	
Epidural	338	238	300	238	253	306	335	380	310	238	**2936**
PCA	441	536	714	725	730	714	718	814	960	714	**7066**

Table 2 - Frequency distribution of patients by type of acute pain service (APS) and operation (N=840).

Operation	Type of APS					
	Epidural		PCA		Total	
	n	(%)	n	(%)	n	(%)
CS	254	(30.2)	450	(53.6)	704	(84)
CS*	2	(0.2)	8	(0.9)	10	(1.1)
TAH	27	(3.2)	39	(4.6)	66	(7.8)
Laparatomy	10	(1.2)	7	(0.8)	17	(2)
Vaginal hyst	10	(1.2)	2	(0.2)	12	(1.4)
Vaginal repair	6	(0.7)	7	(0.8)	13	(1.5)
PFR	7	(0.8)	11	(1.3)	18	(2.1)

CS - cesarean section, CS* - cesarean section under spinal anesthesia, TAH - total abdominal hysterectomy, PFR - pelvic floor repair, PCA - patient-controlled analgesia

Table 3 - Average duration (hours) of pain score 0, 1 and 2 by type of acute pain service during first 24 hours postoperative period.

Pain score	Duration mean ± SD		*p* value
	Epidural	PCA	
0	19.6 ± 4.1	8.4 ± 4.5	0.0001
1	3.2 ± 2.9	11.4 ± 3.7	0.0001
2	0.9 ± 1.6	4.0 ± 2.9	0.0001

PCA - patient-controlled analgesia

Discussion. Optimal postoperative pain controlled is considered as an essential component of good patient care. Despite the evidence that APS does result in improved quality of patient care,[3] most of the hospitals in Europe are without organized APS. A 17-nation survey of APS in Europe revealed that only one third of the hospitals had organized APS.[4] A survey of Australian hospitals showed that fewer than half the teaching hospitals and <10% of non-teaching hospitals had a formal APS.[5] Acute pain service commonly employs advanced analgesia techniques such as PCA and epidural analgesia. In a survey of Australian hospitals, more than 90% of responding hospitals applied these techniques, most commonly on surgical wards.[5] Clinical audits on APS have been published, but the period for which these audits were performed was for ≤5 years.[6-10] Our audit represents 10-years experience of APS for postoperative obstetric and gynecology patients. From the year 1994 to 2003, over 10 thousand patients received APS, one third of them receiving epidural and two-thirds receiving PCA. Not all patients, in whom moderate to severe postoperative pain was expected to last for more than 24 hours, received APS. The main reasons were likely to be the patient's refusal to have PCA or epidural analgesia, presence of contraindications to these techniques or unavailability of an APS device. In our hospital, during the last 10 years, there had been a progressive rise in the number of patients who received APS which has been proportional to the rise of total obstetric and gynecology operations (**Figure 1**). The APS doctor had also been involved in providing increasing numbers of epidural analgesia for labor pains and other obstetric and gynecological emergencies. The increasing workload has had a negative effect on the teaching and training of nurses and doctors. Better funding

Table 4 - Complications by type of acute pain service (APS).

Complications	APS (N=840)		Type of APS Epidural (N=316)		Patient-controlled analgesia (N=524)		*p* value
	n	(%)	n	(%)	n	(%)	
Itching	(42)	(5)	30	(9.5)	12	(2.3)	0.00004
Dizziness	(19)	(2.2)	17	(5.3)	2	(0.4)	0.00002
Postoperative nausea and vomiting	(16)	(1.9)	14	(4.4)	2	(0.4)	0.00003
Hypotension	(6)	(0.7)	5	(1.6)	1	(0.2)	0.03
Technical	(9)	(1.0)	4	(1.2)	5	(1)	0.5
Paraesthesia	(5)	(0.6)	5	(1.6)		0	-
Muscle's weakness	(2)	(0.2)	2	(0.6)		0	-
Shortness of breath	(4)	(0.4)	2	(0.6)	2	(0.4)	0.5
Headache	(3)	(0.3)	2	(0.6)	1	(0.2)	0.5
Total	**106**	**(12.6)**	**81**	**(25.6)**	**25**	**(4.8)**	**0.00004**

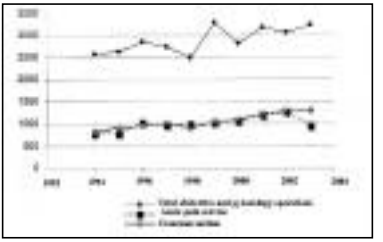

Figure 1 - Total obstetric and gynecology operations, cesarean sections and acute pain service from 1994 to 2003.

would improve the important component of APS such as staffing, training, equipment, auditing and research.

The first 48 postoperative hours are considered the most painful and patients are also encouraged to mobilize during this period. Acute pain service helps in providing adequate analgesia during mobilization, but after few days, its tubing and devices (PCA or epidural machines) may hinder postoperative rehabilitation. The APS duration should be determined according to the patient's condition and with regard to any complications. Sawada et al[11] study a 2-days duration and it was considered adequate, which looked at relief of post-abdominal hysterectomy pain by continuous epidural infusion. Patient's request, dislodgement of epidural catheter or side-effects may cause the early termination of APS. On average, our patients received APS for approximately 2 days and only 22% patients received it for more than 48 hours. In a study of over 6000 surgical patients, the average APS (epidural and PCA) period was 5 days.[10] With a limited number of PCA or epidural infusion machines, it was not possible to continue APS in some patients for longer period even though it was desirable. Priority was given to new postoperative patients and machines were therefore made available from those who had already received APS for ≥2-days.

Pain is a subjective phenomenon necessarily expressed by the patient and, when monitored, is recorded by the nurse. Although pain monitoring is widely used by APS, it may not always truly reflect the pain perceived by the patient. This difference could arise due to patient or nurse factors. Variations in pain expression and pain tolerance have been observed across different racial, religious and ethnic groups.[12,13] Patients tend to expect some postoperative pain. In addition, patients react to pain according to the significance it has to them and how they have learned to respond to it. Following the operation, they may consider mild to moderate pain as a normal phenomenon and therefore deny and tolerate the pain. They may not activate the PCA device and report less pain to the nurse than they actually perceive. Monitoring and recording of the pain by the nurse is another factor which may not reflect the true picture. Acute pain service knowledge, training and experience are important factors in pain documentation. A study by Briggs and Dean[14] indicated that individual assessment of pain was poorly documented and that nurses' records of patients' postoperative pain experience differed from patients' reports. The Australian National Health and Medical Research Centre have identified patients' difficulties in communicating their need for analgesia.[15] Such communication problems in our hospital may be exacerbated by the language and cultural differences between patients, who are mostly Arabs, and nurses who are mostly from the Philippines. Carr and Thomas[16] have observed that nurses were less concerned with monitoring patients' pain once continuous form of therapy such as epidural infusion and PCA were commenced despite the need for continuous assessment. Burstal et al[6] in their study anticipated that up to 20% of patients will not receive adequate analgesia for the first 48 hours postoperatively. They suggested that this high failure rate could be halved if accidental dislodgement of epidural catheters could be eliminated. Our study did not include those patients where APS was terminated within first 24 hours. This study not only looked at the severity of pain but also its duration. During the first 24 hour postoperative period both PCA and epidural provided good analgesia (scored as "no" or "mild pain") for an average of 20 hours. In relation to both severity and duration of postoperative pain, epidural analgesia, in our study, provided superior analgesia to PCA. Previous studies have also observed better pain relief with epidural opioid rather than PCA with intravenous morphine.[17,18] No postoperative pain was felt in 13.4% of our patients who received epidural analgesia as compared to 0.3%, who received PCA. Niemi and Brevik[19] also reported no pain at rest after major surgery with an epidural mixture of bupivacaine, fentanyl, and epinephrine. Mild to moderate pain was recorded more often in patients who received PCA as compared to those who received epidural analgesia. The utilization of PCA depends on the perception of pain and the activation of the PCA device by the patient; therefore, reports of mild to moderate pain were expected in patients using PCA.

Dosage for PCA and epidural analgesia. (i) Patient-controlled analgesia - our APS used 4 different combinations of incremental dose and lock-out interval, with the most common (51% of PCA) having a dose of 1.5 mg of morphine with a

lock-out interval of 10 minutes. Owen et al[20] compared demand doses of 0.5, 1.0, 2.0 mg of morphine, and determined that the optimal incremental dose was close to 1.0 mg.[20] A larger incremental dose of 2.0 mg of morphine, in the same study by Owen et al,[20] resulted in an unacceptably high incidence of side-effects. When the incremental dose was set too low, it appeared that patient lost faith in self-administration form of therapy.[21] Most of the data on on-demand dosage is derived from the population mean, and individualization of therapy is required. In the majority of our patients (96%), a basal infusion of morphine of 1.0 mg per hour was also used. Some studies have shown that basal infusion with PCA leads to improved pain relief, particularly on movement, and greater patient satisfaction than with PCA alone.[22,23] Alternatively, a number of studies have shown that basal infusion may be harmful and does not contribute to analgesia.[24,25] At present, we do not routinely prescribe basal infusion with PCA; this is used only in selected cases and stopped after 24 hours. On average, during more than half of the first 24 postoperative period, PCA was not activated by patients. Patients may have failed to use PCA either because of lack of expertise in using the PCA device or from not requiring the incremental dose. Basal infusion of morphine and diclofenac administration has probably helped to achieve good postoperative analgesia and led to less PCA activation. A study in the Saudi population, where PCA was used after cesarean section, reported an average usage of 50 mg of morphine in the first 24 hour postoperative period.[26] Our study showed that for an average duration of 43 hours of PCA, patients consumed an average of 76.8 mg of morphine with PCA. Sinatra et al[27] reported relatively higher morphine usage than in our study. This may be due to differences in the population studied or due to the opioid-sparing effect of NSAIDs.

(ii) Epidural - opioid mediated epidural analgesia when supplemented by local anesthetic of low concentration provides excellent analgesia with a minimum risk of muscles weakness, proprioceptive dysfunction and postural hypotension. It therefore encourages early mobilization. Due to both pharmacokinetic and pharmacodynamic reasons, a mixture of fentanyl (2-4 µg/ml) and low concentration (0.06-125%) of bupivacaine is widely used. Cohen et al[28] in 1992 reported satisfactory post-cesarean section analgesia with an epidural infusion of fentanyl (2 µg/ml) with 0.03% of bupivacaine. In the same year, we started epidural infusion using a mixture of fentanyl (4 µg/ml) with a low concentration (0.03%) of bupivacaine. Our monthly audit of APS work (unpublished work) at that time also revealed the adequacy of this mixture for postoperative obstetric and gynecologic pain. As part of a multimodal approach to provide postoperative analgesia, one third of our patients also received NSAID whose opioid-sparing effect is well known.[29] The presence of contra-indications to NSAIDs or ignorance by the doctor could lead to patients failing to benefit from this drug.

Side-effects. In this study, the common side-effects of PCA and epidural analgesia were monitored; being reported by the patient and recorded by the nurse. The overall incidence of common side-effects in our study was 12.6%. However, this probably under estimated the incidence of overall side-effects. Milder forms such as itching, drowsiness, and nausea may not have been complained by the patient. Some patients might have accepted drowsiness and nausea as a normal postoperative phenomenon. Nurses may have ignored the milder complaints from patients, or they may have taken an appropriate action but forgot to write in the APS form. In our study, patients who received epidural analgesia reported significantly more (25%) undesirable effects than those who received PCA (4.7%). This difference may have arisen as patients might not have activated PCA when they learned that activation was responsible for unpleasant effects. Therefore, they tolerated some degree of pain and avoided the unpleasant side-effects. The overall reported incidence of opioid-related side-effects with PCA did not appear to differ significantly from traditional intramuscular dosing.[30] Thomas and Owen[31] reported incidence of nausea (27%), pruritis (20%), and dizziness (13%) with PCA-administered hydromorphone. The incidence of side-effects due to epidural analgesia varies with the lipid solubility of the opioid and the concentration of local anesthetic used. Stronger concentrations of local anesthetic are more likely to cause hypotension, motor block or sensory loss in the dermatomal distribution. Morphine, rather than fentanyl given epidurally, cause more nausea, vomiting and drowsiness.[32] A prospective study of over one thousand postoperative patients who received patient controlled epidural analgesia with mixture of fentanyl (4 µg/ml) with bupivacaine (0.05%), reported an incidence of pruritis of 16.7% and postoperative nausea and vomiting (PONV) of 14.8%.[33] This was higher than in our study. In our study, patients receiving epidural analgesia had a few complained of paraesthesia (1.6%) and muscle weakness (0.6%); and hypotension was recorded in only 0.6%. In a previous studies, where bupivacaine >0.03% was used for postoperative epidural infusion, higher incidences of complications were reported.[33-35] The actual incidence of technical problems were higher than that noted (<2%) in our study, probably due to under documentation of these problems. A common problem was dislodgement of the epidural catheter, which may have resulted in early discontinuation of epidural infusion. The

reported incidence of dislodgement of epidural catheter varies from 1.6-13%,[35,36] and this can be reduced by good fixation of epidural catheter. Other problems were occlusion and machine malfunction which can be reduced by improved education of staff. In this study, the lowest respiratory rate recorded was 12 per minutes. However, respiratory rate appears to be an unreliable indicator of impending respiratory compromise.[20,37] The routine monitoring of both sedation and respiratory rate identified impending problems before they became serious. In this study, patients with PCA were significantly more sedated than those who received epidural analgesia, probably because of differences in route and type of opioid used in the 2 analgesia techniques. The majority of patients with PCA also received basal morphine infusion. The sedation score can also be effected by factors such as concomitant use of other sedatives, age of the patient, observational bias by the nurse, frequent monitoring of patients, and differences in study population.[26,38]

Acute pain service has established itself as an integral part of the obstetric and gynecology service. However, much work remains to be carried out. Communication and educational improvement for the patient, nurse and doctor would help a better utilization of PCA and epidural analgesia, more accurate documentation, and early identification and treatment of complications.

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