ORIGINAL ARTICLE

First Year's Experience with an Acute Pain Service – University Hospital Kuala Lumpur

R Vijayan, FRCA
A E Delilkan, FRCA
Department of Anaesthesiology, Faculty of Medicine, University of Malaya, Lembah Pantai, 59100 Kuala Lumpur

Summary

An Acute Pain Service (APS) was started in University Hospital, Kuala Lumpur by the Department of Anaesthesiology in October 1992 for more effective control of postoperative pain. The main modalities of treatment included patient controlled analgesia (PCA) using morphine or pethidine with PCA devises, epidural opiate analgesia (EOA) using tramadol or fentanyl / bupivacaine mixture and subcutaneous administration of morphine or pethidine. Five hundred and fifty-one patients were managed in the first year, with an overall patient satisfaction score of 83%. The majority (98.5%) of them were after abdominal or major orthopaedic surgery. Eighty per cent of patients scored < 3 on the verbal numeric pain scale, where 0 is no pain and 10 is the worst imaginable pain, on the first postoperative day. Nausea and vomiting was an unpleasant side effect in 20% of patients.

Key Words: Acute pain service, Patient controlled analgesia, Epidural opiate analgesia

Introduction

Several studies in the past have consistently demonstrated that nearly 50% of patients experience moderate to severe pain in the postoperative period[1,2,3]. Chronic pain has received more attention in the past than acute pain management. Our own survey conducted in January 1992 showed that 37% of the 183 patients surveyed experienced moderate to severe pain in the first twenty four following surgery[4].

Barriers to the effective treatment of acute pain include inadequate knowledge and experience, particularly concerning the wide inter-patient variability in analgesic requirements[5] and the need to individualise treatment regimens. There is also an overconcern about the risk of development of side effects and addiction among both medical and nursing staff which leads to gross under utilisation of narcotics[6]. In addition, the task of pain management is usually delegated to junior staff and patients are seldom reassessed once the initial orders are written.

There has been, however, an increasing awareness that acute pain, in particular postoperative pain, can be more effectively controlled. Besides the humanitarian aspects, adequate analgesia has been shown to reduce morbidity in high risk surgical patients[7,8]. In 1988 Ready *et al*[9] described the development of an "anaesthesiology based postoperative pain management service" which has provided an impetus for setting up such services all over the world. It has also provided a new and exciting opportunity for anaesthesiologists to get involved in patient care outside the operating theatres[10].

Historically the function of the anaesthesiologist was to eliminate or obtund the pain experienced by patients during surgery. Therefore they are probably the logical choice to provide "pain relief services". They are familiar with the pharmacology of analgesics, are aware of the short and long term effects of drugs given intraoperatively, are knowledgeable about pain pathways and skilled in

providing multiple forms of pain control. There has been extensive development of such anaesthesiology based services in the U.S.A. and Australia in the last five years and a large number of patients have benefited from them. It was felt that this was an opportune time to start an organised service in University Hospital, Kuala Lumpur particularly since our own survey indicated a need for it.

The Acute Pain Service (APS) was set up by the Department of Anaesthesiology in October 1992. This paper describes our experience in setting up this service and our clinical experience with patient management from Oct '92 - Oct '93.

Initial Organisation/Daily Activities of the APS

The Director of the hospital approved the service when presented with a "Working paper" on the service. Meetings were held with Nursing Administration as patients will require monitoring in the wards. The Pharmacy Unit was informed about the projected increase in the use of potent opioids and its role in providing pre-filled syringes of drugs for the service was discussed. Individual surgeons were approached to inform them about the introduction of the service and to obtain their general consent to manage postoperative analgesia in their patients. Protocols and forms were drawn up for the various techniques. The medical records department printed the forms (Appendix A 1 - 5) and these were presented to the Medical Advisory Committee for approval.

Education

Talks were held for ward nurses regarding the benefits of adequate postoperative analgesia, techniques that will be used, monitoring of patients and the management of side effects and emergencies. These talks were repeated at intervals to update and include new nursing staff. Details of the analgesic techniques were discussed in the Department of Anaesthesiology along with the activities of the APS and the doctors were encouraged to become familiar with the use of the PCA pumps.

The service was started with two PCA devices and two more were acquired during the course of the year. It was initially confined to the two gynaecological wards for a period of three months. This allowed the Acute Pain Service to get feedback from staff and patients, iron out any problems that may arise before extending the service to the other surgical wards.

Techniques used

1. **Patient Controlled Analgesia** with morphine or pethidine. (PCA bolus of 1 mg of morphine/10 mg of pethidine and a lock out interval of 6 - 10 minutes for patients less than 65 years. 0.5 mg of morphine/5 mg of pethidine in patients more than 65 years)

2. **Epidural Opiate Analgesia** with either bolus doses of tramadol (50 - 100 mg in 10 ml of normal saline/50mg of pethidine in 10 ml of normal saline; continuous infusion of tramadol (100 mg in 50 ml of normal saline at 5 - 8 ml/hour); continuous infusion of fentanyl 2ug/ml and 0.1% bupivacaine at 5 - 10 ml/hr.)

3. Regular administration of potent analgesics (Morphine 2 - 10 mg/pethidine 30 - 75 mg) via an indwelling **subcutaneously** placed cannula.

4. The use of **regional techniques** like nerve plexus blocks using continuous infusions of 0.25% bupivacaine – 6 - 10 ml/hour).

Patients who would benefit from the Acute Pain Service were identified by the anaesthetist in charge of individual lists or the APS medical officer and the relevant analgesic technique offered to the patient. Explanations were given to the patient about the use of the PCA devices. "A patient guide to PCA" was prepared in English and Bahasa Melayu to help patients understand the appropriate use of the PCA pump. Analgesia was started in the O.T. Recovery Room. Patients were made comfortable and the relevant Analgesic Forms were filled up by the Medical Officer (APS). All patients were monitored in the ward using the APS "Nursing Record" form which included Pain Scores (Verbal Numeric scale – where "0" is "No pain" and "10" is the "Worst Imaginable Pain"), Sedation Scores (see Table I), Respiratory Rate and incidence of side effects like nausea/vomiting, pruritus, respiratory depression and urinary retention. (See Appendix)

Pain Rounds were made every morning by the consultant and medical officer on rotation to the Acute Pain Service. Patients' degree of comfort and level of satisfaction was noted. Decisions made regarding the length of time the analgesic technique needed to be continued, any alterations in the dosage on drugs and management of any side effects.

Table I
Sedation score

Sedation score	Level of drowsiness
1	Alert
2	Drowsy, ease to arouse
3	Very drowsy, difficult to arouse
S	Sleeping. Awakes to call

Every opportunity was taken to teach the ward nursing staff regarding the techniques of monitoring , in particular monitoring of pain scores. In addition , the medical officer made an evening round of all his patients to adjust dosage if necessary. A decision was made to discontinue the particular analgesic technique when a patient was comfortable, no longer in a lot of pain or the analgesic requirements were minimal. Wherever possible patients were switched to oral analgesics for the next couple of days. The "SUMMARY FORMS" (Appendix lE) were duly completed and filed.

Patient Evaluation

Patients were asked to evaluate the quality of pain relief by choosing one from four alternatives. 1) Excellent 2) Good 3) Fair 4) Unsatisfactory. All information was stored in a database using the DBase III programme. The software programme EPI5 was used for analyses of the data. A survey was conducted at the end of three months among the ward staff in the form of a questionnaire (Appendix B) to gauge the response of the staff to the Acute Pain Service and the various analgesic techniques.

Results

In the first 12 months of service (October 1992 - September 1993), 551 patients were managed by the APS. All but eight were in the postoperative period following surgery. Of these eight patients, two had acute pain due to cancer and the others following trauma and fracture ribs. Having started in the two gynaecological wards, the service was extended within six months to the other surgical and orthopaedic wards.

Patient Data: Patient data with regard to age, weight and sex are given in Table II. There were more women than men. Figure 1 gives the distribution of the APS among the different surgical disciplines. Patients with acute pain not associated with surgery accounted for only 1.5%. Patients who had minor surgery , particularly peripheral surgery, ophthalmic and ear,nose and throat surgery were not recruited by the service. i.e most of the patients managed by the service were

Table II
Patient data

Data	Mean ± S.D. (Range)
Age (yr)	44.7 ± 15.7 (14 - 92)
Weight (kg)	56.7 ± 13.9 (25 - 108)
Sex (Male : Female)	152 : 399
Race C : M : I : O	302 : 122 : 120 : 7

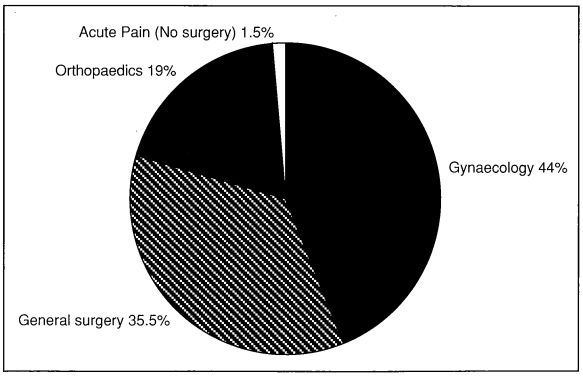

Fig. 1: Distribution of acute pain services

Table III
Different techniques and drugs used

	Morphine	Pethidine	Tramadol	Buprenorphine	Fentanyl/ Bupivacaine	Bupivacaine	Total
PCA	185 (89%)	19 (11%)					208
EOA		35 (19%)	116 (62%)	22 (12%)	12 (7%)		187
SC	66 (45%)	81 (55%)					148
IT	5 (100%)						5
PB						3 (100%)	3

PCA – Patient controlled analgesia
EOA – Epidural opiate analgesia
SC – Subcutaneous analgesia
IT – Intrathecal analgesia
PB – Plexus blockade

those expected to experience moderate to severe pain following surgery. Initially it started off only with patients for elective surgery and gradually extended to patients undergoing emergency surgery.

Techniques: Table III gives details of the different analgesic modalities used and various drugs that were used for these techniques. The mean (range) duration that PCA was used was 29 hours (3 - 113 hours) and the mean (range) duration that the epidural catheter was left in-situ for analgesia was 25 hours (6 - 96) hours.

The amount of opioid used by patients in the first twenty fours of PCA used ranged from 4 mg - 83 mg for morphine and 30 mg - 530 mg for pethidine. The number of top ups/patient for tramadol epidural analgesia ranged from 1 to 8 with a mode of 2; for pethidine epidural analgesia from 1 to 8 with a mode of 3; for buprenorphine from 1 to 6 with a mode of 3. It was difficult to estimate the mean interval between top ups with a reasonable degree of accuracy as there tended to be a variable delay in topping up of the epidural analgesia.

Patient satisfaction/Pain scores. Patient satisfaction scores are given in Table IV. Thirteen patients were not able to give us a score and have not been counted in the table. 83% of patients said that their pain control was either excellent or good. Average pain scores were computed taking both the scores charted by the nurses and the doctors score during the daily rounds and are given over four patient days (Table V). Day 1 being the first 24 hours for the patient. Eighty per cent of patients reported a pain score of 3 and below for all modalities on the verbal numeric rating scale used.

Side effects: The incidence of side effects noted is given in Table VI. Twenty per cent (107) of the patients complained of nausea/vomiting with half of

Table IV
Patient satisfaction score

Technique	1	2	3	4
PCA	64	116	18	6
EOA	29	110	33	11
SC	14	104	24	19
IT	–	4	1	–
PB	1	2	–	–
Total (%)	108 (20)	336 (63)	76 (14)	18 (3)

1 = Excellent; 2 = Good; 3 = Fair; 4 = Unsatisfactory

Table V
Average pain scores

Pain Scores	Day 1	Day 2	Day 3	Day 4
0 - 3	80%	94%	98%	100%
4 - 5	15%	5%	1.5%	-
> 6	5%	1%	0.5%	-
Mean + S.D.	2.5 ± 1.5	2.3 ± 1.2	1.8 ± 1.1	1.0 ± 0.5
No of patients	551	382	86	16

Table VI
Incidence of side effects

Side Effects	PCA	EOA	SC	Total	%
Nausea/vomiting	55	29	23	107	20
Pruritus	23	-	1	24	4
Excessive drowsiness	4	2	1	7	1
Respiratory depression	-	2	-	2#	0.3
Urinary retention	7	3	3	13*	6

 # 1 - 70/F - ICU
1 - 55/F - RR
** 13/200 Not Catheterized*

them requiring the administration of an antiemetic. Pruritus was a problem in 4% of patients. Respiratory depression was seen in only two patients (0.3%) given epidural pethidine.

Other problems: Other sources of discomfort besides pain was noted (Table VII). Backache appeared to be worse than the pain at the operated site in 41 (7.5%) patients, mainly in women. The service encountered some problems with unsuitable techniques for individual patients and with the logistics of running the service after office hours (Table VIII).

Technical problems with the pumps/tubing was encountered in eight patients all of them using the Bard PCA I device. There was pump failure on 5 occasions as the batteries gave out in the middle of the night. The catheter line was occluded in two patients and there was failure of the pump on one occasion as the doctor failed to start up the pump.

The survey conducted at the end of three months showed that 95% of the nursing staff were in favour of continuing with the different techniques. They preferred PCA to Epidural Opiate Analgesia as they had to call the "duty" anaesthesiologist on call to top-up the epidural catheter. Although the change of

Table VII
Other sources of discomfort

Other sources of discomfort	No. of patients
Backache	41
Nasogastric tube	12
Intravenous line	26
Pain at Epidural site	6
Insomnia	4

syringes in the PCA pumps were also done by doctors, the number of times that this was needed was less than the top-ups. The commonest comment made was " the hospital should buy more PCA pumps".

Table VIII
Problems with techniques/acute pain service

Patients did not understand P.C.A.	8
Epidural catheter slipped out	15
Problem with P.C.A. pump/tubing	6
Prolonged Sensory/motor block (Fentanyl/Bupivacaine epidural infusion)	1
Problem with contacting Anaesthetist/ Anaesthetist busy	10
Total	40 (7%)

Discussion

Introducing and implementing any new service such as the Acute Pain Service to a large multi-disciplinary University Hospital requires planning and attention to detail. It requires the assistance and cooperation of many hospital departments[11] right from the earliest stages of planning.

Economics: The initial capital costs of setting up the service may seem high and offering PCA to patients may appear, at first, to be a lot more expensive than the traditional intramuscular analgesia. However, nursing costs are often overlooked or underestimated[12]. In a survey Ready (1991)[13] showed that PCA reduces analgesia – related nursing duties in areas such as checking of analgesic prescriptions, drug sign-outs as well as administration and physician calls and that there was a significant decrease in nursing time requirements from 117 to 84 minutes per patient per day. Another survey showed that PCA might even be dramatically less expensive than conventional administration of opioids when costs of drugs, pharmacy and nursing time were taken into account for the two techniques[14].

Discussions with the Pharmacy Unit from the very outset resulted in close cooperation between the APS and the Unit. Drugs like Inj. Naloxone and Inj. Tramadol are now routinely stocked in the wards. From February 1994 Pharmacy is supplying the Acute Pain Service with pre-filled syringes of drugs that are needed for PCA and epidural analgesia. These are prepared under laminar flow conditions ensuring that sterility is maintained and reduces the chances of operator error in dilution of drugs. Two different sizes of syringes are used for the two techniques to avoid confusion.

Patient Controlled Analgesia: The unpredictable results of intermittent I.M. injections is well recognised. There is a five-fold interpatient and two-fold intrapatient range in peak serum pethidine concentration when injected I.M. every four hours[15]. In addition the time between patient's need for analgesia and the achievement of this effect from I.M. injection is often unnecessarily long due to communication and retrieval delays. On the other hand, the majority of patients using a PCA infusion pump have stable plasma morphine concentrations between twenty and eighty-two ng/ml, with no peaks and troughs resulting in alternating periods of sedation and pain as with receiving intermittent I.M. injections[16]. The idea of patient controlled analgesia[17,18] has been around since the early 70's. It took more than a decade since the early PCA devices were used[19] for "computer age" technology with microprocessor operated pump systems to be used in everyday practice. Studies comparing the efficiency of traditional I.M. to PCA administration of analgesics concur in underscoring not only the wide acceptance of the technique by patients and nursing staff but also the superior quality of pain relief[20]. Even with PCA infusions there is a wide range in analgesic requirements with no relationship in dose required to patient size[21]. The range in our patients being from 4 mg to 83 mg in the first twenty fours after surgery with patient satisfaction being high at 87%. With this technique, therefore, a patient can administer a dose which is optimal for individual pain relief.

PCA was more popular with the ward nursing staff than the other techniques. There was initial scepticism which is often found when any new idea is introduced in the wards. This was rapidly replaced with enthusiasm for the technique when they found that patients were more comfortable with PCA compared

to the traditional intermittent "PRN" injections. This was seen in a brief survey that was conducted at the end of three months.

Epidural opiate analgesia: Epidural administration of opioids represents a major contribution to current postoperative techniques for pain management. Morphine can be considered to be the standard agent against which all other epidural agents are judged[22]. It is extremely hydrophilic and it is this physicochemical property that largely explains its prolonged duration of action. It has been associated, however, with troublesome side effects such as pruritus, nausea and vomiting and late respiratory depression[23]. Ready *et al*[24] have shown that epidural morphine is safe in the general wards, but this was possible only after extensive nurse education and the routine epidural use of morphine outside of high dependency units remains controversial.

The APS decided not to use morphine routinely for several reasons. We had no experience with epidural morphine, titration of morphine dose is required for adequate analgesia and this did not fit in with the standard orders that we wanted to start the service with. In addition, we were unsure about the level of ward monitoring available particularly in the initial phase of implementation of the service.

Tramadol, a weak synthetic opioid was used in the majority of patients when epidural analgesia was required as we had a fair amount of experience with it. There has been considerable interest in this drug recently as it has been shown to have in addition to its central opioid activity some non-opioid analgesic effects on the noradrenergic and serotinergic descending modulating pathways[25]. Our previous study[26] showed that the epidural administration of tramadol 100 mg effectively provided analgesia from 6 - 24 hours following abdominal gynaecological surgery and no respiratory depression was noted on serial arterial blood gas estimations. Tramadol could therefore be safely administered in the wards and repeat boluses given without worrying about respiratory depression. Pethidine and buprenorphine were also used initially for epidural analgesia for a small number of patients. The frequency of top ups was greater with pethidine and there was a general impression that it causes more sedation than tramadol due to its initial vascular uptake from the epidural space and it is currently not being used for epidural analgesia.

Reports of late respiratory depression have shown that this is more likely to occur in the elderly patient, when parenteral opioids are given in addition to epidural opioids[27]. To prevent this occurrence all the ward nursing staff were made aware that "**No additional narcotic or sedative should be administered except those prescribed by the Acute Pain Service**" and this is reinforced on every APS Form (see Appendix). This is an important point to ensure patient safety with any postoperative analgesic technique.

Fentanyl/bupivacaine mixture was infused continuously through the epidural space in a small number of patients (7%). These patients were admitted to the HDU for their medical problems and not primarily for epidural analgesia. The addition of a dilute bupivacaine 0.1% (local anaesthetic) to low dose Fentanyl potentiates the action of the opioid[28] and reduces the side effects inherent in both drugs. Yeager *et al*[8] demonstrated that there is an overall decrease in morbidity and mortality in high risk patients undergoing major abdominal surgery when postoperative analgesia is provided by epidural opiates and local anaesthetics rather than parenteral opioids alone. With increasing confidence in our general ward monitoring, we are just beginning to send patients to the general wards on this regime.

Subcutaneous administration of opioid does away with painful intramuscular injections and has proven to be popular with both nurses and patients. It has become possible to introduce some flexibility to analgesic regimes and after some initial reluctance, the ward nurses felt comfortable with this technique. Continuous plexus anaesthesia with infusions of local anaesthetic solutions has provided excellent analgesia in our three patients who were infused for a maximum of 36 hours. Recent reports[29,30] has shown that local anaesthetic solutions can be infused into axillary and femoral nerve sheaths for up to 72 hours with no evidence of local anaesthetic toxicity or neural damage.

Protocols and Guidelines need to be clear, precise and logical. It is important to have "standard orders" for

analgesia and patient monitoring to provide uniformity and avoid confusion as patients are nursed in ten different wards. In our experience the assessment of pain as a quantitative measure i.e. pain scores have been the most difficult concept to teach. Despite the guidelines given on each nursing record form, most nurses found it difficult to quantify pain. The commonest problem was in not assessing pain on movement which is the real test of good analgesia. However, the concept that patient's pain, just like their blood pressure or temperature needs to be regularly assessed, recorded and relieved, if necessary, is gradually gaining ground among the nursing staff although we are a long way off from the ideal.

Rapid turnover of nursing staff and new staff nurses joining the wards meant that more frequent talks were needed over the year. This can be time consuming and repetitive for the APS team. The inclusion of a nurse coordinator on the team is essential for continued nurse education and for upgrading of the service. The APS soon realised that there had been no provision in the nursing school syllabus for any lectures on the "Mechanisms of pain" or on "Acute Pain Management". With the burgeoning interest in pain management that we have seen in recent years, it seems incredible that our nurses are still graduating with "old" concepts particularly with regard to potent analgesics. The APS persuaded the nursing school curriculum board to include lectures on "Pain Management". Regular lectures on "Recent concepts of acute pain management" are also given to the Year IV medical students who are posted to the Anaesthesiology unit in rotation.

Patient Satisfaction: An 83% level (Table IV) of patient satisfaction compares quite well with the first year's experience of The Acute Pain Service in Adelaide, Australia[11] and is an improvement from Jan. 1992 when our previous survey[4] showed that 32% of patients were unhappy with their pain relief. This figure of 32% would in fact have been higher in our previous survey if we had included only those patients who had undergone major surgery. Twenty-four patients (13%) were unhappy with PCA. Among them were eight patients who could not understand the technique. It was probably a failure in communication with inadequate explanation of the technique indicating that it was an unsuitable technique in these eight patients. The other 16 patients did not like it for reasons such as severe nausea or giddiness with every bolus. This could be due to the PCA dose being too high for that patient and although pain relief is obtained, patients associated pain relief with intolerable symptoms and were dissatisfied.

The majority of those patients who were dissatisfied were in the epidural group (44/183) (Table IV). One of the reasons (in 10/187 patients) was that epidural top-up boluses had to be administered by doctors and there were occasional inevitable delays in attending to patients request for analgesia as the doctors "on call" were busy in O.T. Tramadol, being a opiate, also exhibits some variability in patient requirements and some patients require more frequent top-ups than others. This was not very satisfactory both from the patient, ward staff and doctors point of view. Once syringe pumps became available (August '93), the APS has been using tramadol as continuous infusions from 10 - 16 mg/hour and this has resulted in more satisfactory analgesia. The epidural catheter slipping out or getting blocked was another reason (Table VIII) and underscores the requirement of technical expertise and greater supervision by medical staff for this technique.

The average pain scores show that only a small percentage of patients scored > 6 (moderate - severe pain) (5% on Day 1). This again shows a vast improvement in our hospital. Our previous survey showed that 37% of patients scored > 6 at the end of Day 1. There were other sources of discomfort noted besides pain. It was interesting to note that 41 patients, mostly women, complained of severe backache and these patients were all in the PCA group. It was felt that this could be due to the sagging spring beds in the hospital.

Nausea and vomiting was one of the main side effects and had an overall incidence of about 20% in our patients, similar to the Australian experience[11]. The true incidence due to analgesic drugs alone is difficult to determine because of surgical factors but has been reported to be between 17 - 34%[31] for epidural opioids. Our previous experience with epidural tramadol was 25%[12]. Metoclopramide 10 mg-IM is now routinely prescribed to be administered, as

required. Pruritus was troublesome only with morphine administration (mainly PCA) and was quickly resolved with the change of opioid to pethidine. There was no pruritus either with epidural tramadol or fentanyl. Excessive drowsiness was seen in only seven patients, four of them on PCA. All of them occurred in the first month of the service when basal infusions were used with the PCA bolus. Inclusion of basal infusions has been associated with excessive sedation and respiratory depression with no added benefit in terms of pain control[32] and the APS has discontinued using a background infusion routinely.

Potentially severe complications without sequelae were seen in two patients (0.3%) who developed respiratory depression after epidural pethidine administration. This compares favourably with other reports[11,33]. Both patients became very drowsy and developed respiratory rates of less than 12/min within 10 minutes of epidural pethidine administration, one in the recovery room and the other in the HDU. Both responded promptly to Naloxone. The early respiratory depression noted in both these cases was due to early vascular uptake from the epidural space and not the classical late respiratory depression seen with the rostral spread of the opioid in the cerebrospinal fluid. This underscores the importance of adequate monitoring following the epidural administration of opioids and the clear guidelines that need to be given to nursing staff to deal with such emergencies. Excessive sedation has also been shown by Ready *et al*[9] to be a valuable early sign of impending respiratory depression and the reason that sedation scores for patient monitoring is important. Hypotension was not a problem in any of our patients as the concentration of local anaesthetic infusions used was only 0.1%. With increasing experience the APS feels confident of sending patients back to the general wards in the near future with epidural fentanyl/bupivacaine. Three hundred and fifty-one (65%) patients had indwelling catheters as part of their management, hence it was difficult to get the true incidence of urinary retention with these analgesic techniques.

Conclusion

The development of an Acute Pain Service requires financial commitment by the hospital administration. It also requires substantial commitment and organization by the department of Anaesthesiology in order to provide postoperative pain relief effectively and safely[30]. Our first year's experience has shown that with adequate training/supervision and the standardisation of protocols and guidelines, the University Hospital has taken the first step towards optimum and safe relief of acute postoperative pain. The APS hopes to include the management of post-operative pain in children in the not too distant future.

Acknowledgement

The provision of an Acute Pain Service requires the assistance of many hospital departments. We would like to acknowledge the encouragement of the Director of University Hospital, Dato' Dr. Samsuddin, members of the Pharmacy unit, Ms Josephine Chew for her help in keying in the data, and all the doctors in the Anaesthesiology unit who helped take care of our patients.

References

1. Marks RM, Sachar EJ. Undertreatment of medical inpatients with narcotic analgesics. Ann Intern Med 1973;78 : 172-81.

2. Owen H, Mcmillan V, Rogowski D. Postoperative pain therapy: A Survey of patients expectations and their experiences. Pain 1990;41 : 303-7.

3. Donovan BD. Patient attitudes to postoperative pain relief. Anaesth Intens Care 1983;11 : 125-9.

4. Vijayan R, Tay KH, Tan LB, Loganathan. Survey of postoperative pain relief in University Hospital, Kuala Lumpur. SMJ (in press)

5. Austin KL, Stapleton JV, Mather LE. Relationship between blood concentrations and analgesic response. Anesthesiology 1980;53 : 460-6.

6. Weiss OF, Sriwatanakul K, Alloza JL, Weintraub M, Lasagna L. Attitudes of patients, housestaff and nurses towards postoperative analgesic care. Anesth Analg 1983;62 : 70-4.

7. Rawal N, Sjostrand U, Christoffersson E *et al.* Comparison of intramuscular and epidural morphine for postoperative analgesia in the grossly obese: influence on postoperative ambulation and pulmonary function. Anesth Analg 1984;63 : 583-92.

8. Yeager MP, Glass DD, Neff RK, Brinck-Johnsen T. Epidural anesthesia and analgesia in high-risk surgical patients. Anesthesiology 1987;66 : 729-36.

9. Ready LB, Oden R, Chadwick HS *et al.* Development of an anesthesiology-based postoperative pain management service. Anesthesiology 1988; 68: 100-6.

10. Saidman LJ. The Anaesthesiologist outside the operating room: A new and exciting opportunity. Editorial views. Anaesthesiology 1988; Vol 68: No 1.

11. Macintyre PE, Runciman WB, Webb RK. An Acute pain service in an Australian teaching hospital: the first year. Med J Aust 1990;153 : 417-21.

12. Schug SA, Large RG. Economic considerations in Pain Management. Pharmaco Economics 1993;3(4) : 260-7.

13. Ready LB. Acute and postoperative pain services (Economic considerations). Pain Digest 1991;1 : 17-21.

14. Jackson D. A study of pain management : Patient controlled analgesia versus intramuscular analgesia. Michigan Journal of Intravenous Nursing 1989;12 : 42-51.

15. Austin KL, Stapleton JV, Mather LE. Multiple intramuscular injections: A major source of variability in analgesic response to meperidine. Pain 1980;8 : 46-62.

16. Graves DA, Arrigo JM, Foste TS *et al.* Relationship between plasma morphine concentrations and pharmacologic effects in postoperative patients using patient controlled analgesia. Clin Pharmacol Ther 1985;4 : 41-7.

17. Forrest WH Jr, Smethurst PWR, Kienitz ME. Self administration of intravenous analgesics. Anaesthesiology 1970;33 : 363-5.

18. Sechzer PH. Studies in pain with the analgesic-demand system. Anesth Analg 1971;50 : 1-10.

19. Keeri-Szanto M, Heaman S. Postoperative demand analgesia. Surg Gynecol Obstet 1972;134 : 647-51.

20. Albert JM, Talbot TM. Patient-controlled analgesia vs. conventional intramuscular analgesia following colon surgery. Dis Colon Rect 1988;31 : 18-19.

21. Bennett R, Batenhorst R, Graves DA *et al.* Variation in postoperative analgesic requirements in the morbidly obese following gastric bypass surgery. Pharmacotherapy 1982;2 : 50-2.

22. Rawal N, Sjostrand UH, Dahlstorm B. Postoperative pain relief by epidural morphine. Anaesth and Analg 1981;60 : 726-31.

23. Knill RL, Clement JL, Thompson WR. Epidural morphine causes delayed and prolonged ventilatory depression. Can Anaesth Soc J 1981;28 : 537-43.

24. Ready LB, Loper KA, Nessly M, Wild L. Postoperative epidural morphine is safe on surgical wards. Anaesthesiology 1991;75 : 452-6.

25. Raffa RB, Friderichs E, Reimann W, Shank RP, Codd EE *et al.* Opioid and nonopioid components independently contribute to the mechanism of action of tramadol, an "atypical" opioid analgesic. Journal of Pharmacology and Experimental Therapeutics 1992;260 : 275-85.

26. Delilkan AE, Vijayan R. Epidural Tramadol for postoperative pain relief. Anaesthesia 1993;48 : 328-31.

27. Etches RC, Sandler AN, Daley MD. Respiratory depression and spinal opioids. Can J Anaesth 1989;36 : 165-9.

28. Akerman B, Arwestrome, Post C. Local Anaesthetics potentiate Spinal Morphine analgesia. Anaesth Analg 1988;67 : 943-8.

29. Lynch J, Trojan S, Arhelger S, Krings-Ernst I. Intermittent femoral nerve blockade for anterior cruciate ligament repair . Use of a catheter technique in 208 patients. Acta Anaesthesiol. Belg 1991;42 : 207-12.

30. Schug SA, Torrie JJ. Safety assessment of postoperative pain management by an acute pain service. Pain 1993; 55 : 387-91.

31. Rawal N, Arner S, Gustafsson LL, Allvin R. Present state of extradural and intrathecal opioid analgesia in Sweden. A Nationwide follow-up survey. Br J Anaesth 1987;59 : 791-9.

32. Owen H, Szekely SM, Plummer JL, Cushine JM, Mather LE. Variables of patient controlled analgesia. 2. Concurrent infusion. Anaesthesia 1989;44 : 11-13.

33. Wheatley RG, Madej TH, Jachson IJB, Hunter D. The First Year's Experience of an acute pain service. Br J Anaesth 1991;67 : 353-9.

APPENDIX A-1

ACUTE PAIN SERVICE (APS) – ANALGESIA ORDERS (PCA) **HOSPITAL UNIVERSITI, K.L.**

Weight _____ ASA _____
Surgery _____ Pre-operative opioid Y/N
Intra-operative opioid _____
Regional Y/N _____

PATIENT CONTROLLED ANALGESIA (P.C.A.)

1. ☐ Morphine (1 mg/ml.) / (0.5 mg/ml.) _____ mg. in 30/60 ml. of normal saline
2. ☐ Pethidine (10 mg/ml.) / (5.0 mg/ml) _____ mg. in 30/60 ml. of normal saline
3. ☐ Others ( ) / _____ mg. in 30/60 ml. of normal saline

Time PCA commenced _____

	Date	Time	Bolus (mg)	Basal Rate (mg/hr)	PCA Dose (mg)	Lock Out (min)	4/1 Hr Limit (mg)	Signature
1								
2								
3								
4								

PCA set up by _____

Pump settings to be altered only by the Acute Pain Service.

Record observations in the ward : hourly for 4 hours, 2 hourly for 6 hours, then 4 hourly.

IF RESPIRATORY RATE IS LESS THAN 10/MIN. OR THE PATIENT IS DIFFICULT TO ROUSE – STOP INFUSION – CALL THE APS/ANAESTHETIST IMMEDIATELY. **PAGER NO:** _____

Date and time PCA discontinued _____

COMMENTS:

NO SUPPLEMENTAL NARCOTICS OR SEDATIVES EXCEPT AS ORDERED BY THE ACUTE PAIN SERVICE

ACUTE PAIN SERVICE *(APS)*

ANALGESIA ORDERS

PATIENT CONTROLLED ANALGESIA

R.N.
Name
Age
Sex
Race
Ward

RP 126.2b

URP/040593

APPENDIX A-2

ACUTE PAIN SERVICE (APS) – ANALGESIA ORDERS (EA) **HOSPITAL UNIVERSITI, K.L.**

Weight _____ kg.
Surgery _____

ASA _____
Pre-operative opioid Y/N
Intra-operative opioid _____
Epidural _____

EPIDURAL ANALGESIA – (EA)

1. Buprenorphine 15 mcg/ml. _____ mcg. in 10 ml. of normal saline.
2. Pethidine 5 mg/ml. _____ mg in 10 ml. of normal saline.
3. Tramadol 10 mg/ml. _____ mg in 10 ml. of normal saline.

Time Epidural Analgesia commenced _____

Date								
Time								
Bolus (mg.)								
Signature								

Epidural analgesia set up by _____

Record observations in the ward : hourly for 4 hours after a top-up.
4 hourly after that.

IF RESPIRATORY RATE IS LESS THAN 10/MIN. OR THE PATIENT IS DIFFICULT TO ROUSE – CALL THE ANAESTHETIST IMMEDIATELY. **PAGER NO:** _____

Date and time epidural analgesia discontinued _____

COMMENTS:

NO SUPPLEMENTAL NARCOTICS OR SEDATIVES EXCEPT AS ORDERED BY THE ACUTE PAIN SERVICE

ACUTE PAIN SERVICE *(APS)*

ANALGESIA ORDERS

(EPIDURAL ANALGESIA)

R.N.
Name
Age
Sex
Race
Ward

RP 126.2a

URP/040593

APPENDIX A-3

ACUTE PAIN SERVICE (APS) – SUBCUTANEOUS ANALGESIA HOSPITAL UNIVERSITI, K.L.

Weight _____ kg.
Surgery _____

ASA _____
Pre-operative opioid Y/N
Intra-operative opioid _____
Epidural _____

SUBCUTANEOUS ANALGESIA

1. Morphine _____ 10 mg/ml.
2. Pethidine _____ 50 mg/ml.
3. Others _____

Time analgesia commenced _____

Date								
Time								
Bolus (mg.)								
Signature								

DO NOT FLUSH THE CATHETER

Subcutaneous analgesia set up by _____

Record observations in the ward : hourly for 4 hours, 2 hourly for 6 hours, then 4 hourly

IF RESPIRATORY RATE IS LESS THAN 10/MIN. OR THE PATIENT IS DIFFICULT TO ROUSE – CALL THE ANAESTHETIST IMMEDIATELY. **PAGER NO:** _____

Date and time subcutaneous analgesia discontinued _____

NO SUPPLEMENTAL NARCOTICS OR SEDATIVES EXCEPT AS ORDERED BY THE ACUTE PAIN SERVICE

ACUTE PAIN SERVICE

(APS)

SUBCUTANEOUS ANALGESIA

R.N.
Name
Age
Sex
Race
Ward

RP 126.4

URP/040593

APPENDIX A-4

ACUTE PAIN SERVICE (APS) – NURSING RECORD **HOSPITAL UNIVERSITI, K.L.**

☐ PCA ☐ EPIDURAL ANALGESIA ☐ SUBCUTANEOUS												
Date												
Time												
Pain Score												
Sedation Score												
Total Dose												
Respiratory Rate												
Nausea/Vomiting												
Pruritus												
Urinary Retention												
Initials												

Pain Intensity Estimate

0 – No pain
1-3 – Mild pain
Slight discomfort
Moves without help
4-6 – Medium discomfort
Pain on movement
7-9 – Severe pain
Strained expression
Needs assistance
10 – Very severe
Constant distress
Writhing

Sedation

1 – Alert
2 – Drowsy
3 – Very Drowsy
S – Sleeping

Nausea/vomiting

1 – None
2 – Mild
3 – Moderate
4 – Severe

Pruritus

1 – None
2 – Mild
3 – Moderate
4 – Severe

Urinary Retention

1 – None
2 – Hesitancy
3 – Needs catheter
4 – CBD

IF RESPIRATORY RATE IS LESS THAN 10/MIN. OR THE PATIENT IS DIFFICULT TO ROUSE – STOP INFUSION – CALL THE APS/ANAESTHETIST IMMEDIATELY. **PAGER NO:** _____

NOTE: *Naloxone should be available in the ward.*

NO SUPPLEMENTAL NARCOTICS OR SEDATIVES EXCEPT AS ORDERED BY THE ANAESTHETIST.

ACUTE PAIN SERVICE

(APS)

NURSING RECORD

R.N.
Name
Age
Sex
Race
Ward

RP 126.1

URP/040593

APPENDIX A-5

ACUTE PAIN SERVICE (APS) – SUMMARY **HOSPITAL UNIVERSITI, K.L.**

Weight _____ kg. ASA 1. 2. 3. 4. 5.

Surgery _____ Duration _____

Incision _____

Opioids: Premedication Y/N Intraoperative IV/Epidural Morph/Pethi/Fent/Bupre

L.A./Intraop.: 1. Epidural L/T/C 2. Brachial/Lumbosacral/Femoral

ANALGESIA: 1. PCA ABBOTT/BARD 2. EOA 3. FIELD BLOCK
4. PLEXUS BLOCK 5. SUBCUTANEOUS

DRUG USED: 1. Morphine 2. Pethidine 3. Buprenorphine
4. Fentanyl 5. Tramadol

Day	1	2	3	4
Pain Score : Average				
Sedation Score : Average				
Total amount of analgesia used : mg				
Parameter changed Y/N				

Which parameter 1. Basal 2. PCA dose 3. Epidural rate 4. Drug

Side effects:

1. Excessive drowsiness Y/N	a. Naloxone	b. Reduced dose	c. Stopped PCA/EOA
2. Pruritus Y/N	a. Pririton Oral/IM	b. Naloxone	c. Promethazine
3. Nausea/vomiting Y/N	a. Metaclopramide	b. Promethaxine	c. Others
4. Respiratory Depr. Y/N	a. Naloxone	b. Intubation	c. Observation
5. Urinary retention Y/N/Cath.			

Overall satisfaction: a. Excellent b. Good c. Fair d. Unsatisfactory

Other sources of discomfort: a. Backache b. NG tube c. IV line
d. Insomnia e. Others f. None

Supplemental/Subsequent Analgesia: a. NSAID - Oral b. NSAID - Parenteral c. Codine
d. Tramadol e. Others f. None

Problems: a. Thrombophlebitis b. Cellulitis c. Infection/Epidural
d. Others e. Nil

Total No. of hours PCA used _____

Problem with pump: Y/N Epidural catheter removed after _____ hours.

Problem with epidural: a. Blocked b. Slipped out c. Intrathecal

No. of top-ups _____

Interval between top-ups: (hrs.) a. b. c.
d. e. f.

ACUTE PAIN SERVICE

(APS)

SUMMARY

R.N.
Name
Age
Sex
Race
Ward

RP 126.3

URP/040593

APPENDIX B

STAFF SURVEY:

The Acute Pain Service has been looking after the analgesic requirements of some of the patients following elective surgery in Wards 10A and 10B for the last three months.

We would like to conduct a survey among the staff on Wards 10A and 10B to
a) assess the success of the pilot project
b) to detect any problems encountered
c) get suggestions from the staff.

This survey is confidential. We would appreciate your taking a few minutes to fill up this questionnaire. **Thank you.** Please indicate your answer with a tick (✓).

SISTER STAFF NURSE ASSISTANT NURSE

1. Were the patients who were getting epidural analgesia comfortable in the postoperative period?
   Yes No Not sure

2. Did they have less pain with epidural top ups than if IM pethidine injections were given?
   Yes No Not sure

3. Were the patients using PCA having less pain than if IM pethidine injections were given?
   Yes No Not sure

4. Were the patients using the PCA machine more drowsy than if IM injections were given?
   Yes No Not sure

5. Were most of the patients satisfied with either of these two methods?
   Yes No Not sure

6. If your answer is NO to question 5 please give your reasons as to why they were not satisfied.
   _____
   _____

7. Which method of analgesia do you think is more effective?
   PCA Epidural analgesia

8. Did you have any problems with either of these methods?
   Yes No

9. Would you like the Acute Pain Service to continue with these methods of analgesia?
   Yes No

10. Do you find maintaining nursing records a problem?
    Yes No

11. Do you find assessing patient's pain score a problem?
    Yes No
    COMMENTS _____
    _____