

Occasional Review

Postoperative pain management and Acute Pain Service activity in Canada

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A survey of postoperative pain management practices was mailed to the 56 Canadian university-affiliated teaching hospitals in December 1991. The aims of the survey were (1) to determine the prevalence, structure, and function of Acute Pain Services and (2) to determine the use and management of patient-controlled analgesia (PCA) and epidural opiate analgesia (EOA) in teaching hospitals. Responses were received from 47 hospitals, representing a return rate of 84%. Twenty-five hospitals (53%) operated an Acute Pain Service and an additional 17 (35%) were attempting to organize one. "Time commitment" was given as the primary reason why hospitals were unable to offer an Acute Pain Service. Most commonly used methods of pain relief were EOA and PCA. Most services were multidisciplinary, with 60% having a nurse and 29% a pharmacist. Irrespective of the presence of an Acute Pain Service, PCA was used at 32 (68%) hospitals, and EOA was used at 41 (87%); however, only 15 provided EOA on general wards. Complications have occurred with both PCA and EOA, with 14 of 32 hospitals indicating that they have had a major or serious complication. The data suggest an estimated incidence of severe respiratory depression of 0.03% with PCA and 0.13% with EOA. No deaths were reported at the time of the survey. Epidural opioid-local anaesthetic EOA-LA combinations were used at 26 (63%) hospitals; however, only six administered these combinations on general wards. We conclude that a multidisciplinary team approach to manage postoperative pain is viable in university teaching hospitals of all sizes. EOA and PCA are

widely used; however, only a minority of hospitals use EOA or EOA-LA combinations on general wards.

En décembre 1991, un questionnaire sur l'exercice de la thérapie algique a été expédié à 56 hôpitaux d'enseignement affiliés à des universités canadiennes. L'enquête portait 1) sur le dénombrement, la structure et le fonctionnement des services de traitement de la douleur aiguë et 2) l'usage et la gestion de l'analgesie auto-contrôlée (PCA) et de l'analgesie épidurale aux opiacés (EOA) dans les hôpitaux d'enseignement. Quarante-sept hôpitaux ont répondu pour un pourcentage de 84%. Vingt-cinq hôpitaux (53%) faisaient fonctionner un service de traitement de la douleur aiguë et 17 autres (35%) désiraient en organiser un. La contrainte qu'impose le temps est la raison principale rapportée pour laquelle des hôpitaux ne pouvaient offrir ces services. Les méthodes les plus utilisées sont la PCA et l'EOA. La plupart des services sont multidisciplinaires, 60% emploient une infirmière et 29% un pharmacien. Même en absence d'un service formel, la PCA est utilisée dans 32 hôpitaux (68%), et l'EOA dans 41 (87%); cependant l'EOP n'est disponible aux chambres que dans 15 hôpitaux. Quatorze parmi trente-deux hôpitaux rapportent des complications majeures avec la PCA et l'EOA. Les données recueillies permettent d'évaluer l'incidence de la dépression respiratoire à 0,03% avec la PCA et à 0,13% avec l'EOA. On ne rapporte pas de décès. L'épidurale associant opiacé et anesthésique local (EOA-AL) est utilisée dans 26 hôpitaux (63%), mais on ne l'administre à la chambre du patient que seulement six hôpitaux. Nous concluons que l'approche multidisciplinaire pour la prise en charge du traitement de la douleur postopératoire est viable dans les hôpitaux universitaire de toutes les dimensions. L'EOA et la PCA sont utilisés sur une haute échelle, mais une minorité d'hôpitaux seulement utilise l'EOA ou l'EOA-AL à la chambre du patient.

Key words

ANAESTHETIC TECHNIQUES: epidural, patient-controlled;
ANALGESIA: postoperative;
PAIN: acute, postoperative.

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For the majority of postoperative patients, analgesia is provided by the administration of intramuscular narcotic injections given on an intermittent basis. This conven-

tional technique persists despite the inadequate pain relief that it provides.¹⁻⁴ As many as 20-75% of patients experience moderate to severe pain with this method of postoperative analgesia.^{3,5-8}

Postoperative pain may be inadequately treated due to lack of knowledge and experience on the part of care givers who are often overly concerned with the possibility of addiction. The choice of analgesic is often irrational and knowledge of the drugs is frequently inadequate.⁷ The majority of junior medical staff have had little education in postoperative pain relief, a "chore" often delegated to these junior staff who have sparse knowledge about the administration and side effects of opioids. Ready *et al.* suggest that postoperative pain management can be improved by the establishment of an Acute Pain Service (APS) that specializes in postoperative pain management and is responsible for educating nursing and medical staff.⁹

New pain management techniques have been developed in recent years. Patient-controlled analgesia (PCA) was introduced in the late 1960's and has proved to be a safe and effective method of providing postoperative pain relief.^{10,11} Epidural opioid analgesia (EOA) has also become a very popular method for providing postoperative pain relief.¹²⁻¹⁸ In many institutions, EOA has become the standard for postoperative pain control in patients undergoing certain surgical procedures.^{16,19} However, controversy continues as to the appropriate setting in which to administer and to monitor patients receiving EOA. Some authors still believe that patients receiving EOA should be monitored in a high dependency or step-down unit for 24 hr.²¹ However, Ready reported a large series of patients who received this form of analgesia safely on regular wards and suggested guidelines to ensure the safe administration of EOA.¹⁶ Combinations of opioids and local anaesthetics for epidural administration have also been used for control of postoperative pain, with many centres reporting their safe and effective use,²²⁻²⁴ although this view is not held by all.²⁵

At the time of the survey, no description of a Canadian Acute Pain Service could be found in the anaesthetic literature. A survey was therefore conducted in 1992 first to determine the prevalence, structure, membership, function and funding of Acute Pain Services in Canadian university-affiliated teaching hospitals and to determine why some hospitals were unable to provide this service. The second aim of the survey was to determine the extent of PCA and EOA use as well as the standards for monitoring patients receiving EOA.

Methods

The 16 Canadian university departments of anaesthesia provided the names of 56 affiliated hospitals to which

questionnaires could be mailed. The questionnaires were mailed in December 1991 and addressed to either someone who was involved with the hospital's postoperative pain management services or a member of the anaesthetic department who would forward the questionnaire to a more appropriate individual. Participants were asked to answer all sections of the questionnaire that applied to their institution excluding analgesic techniques offered to obstetric patients. In this survey, an Acute Pain Service was defined as an organized and recognized postoperative pain management service.

The questionnaire had the following sections: demographic information, hospitals not offering either an Acute Pain Service or EOA or PCA, hospitals offering an Acute Pain Service, hospitals offering epidural opioid analgesia, hospitals offering PCA, and results of the hospital's experience with the Acute Pain Service and a section for comments. Hospitals with an Acute Pain Service were asked to reply to all sections, whereas hospitals with no Acute Pain Service were asked to reply to all sections except that pertaining to Acute Pain Services. Three question formats were used: short answer, fill in the blank, and those where the respondents were asked to select the best possible response from a list. This survey was not a scientific study but a general review. In some cases retrospective data based on estimations were requested.

Completed questionnaires were assessed for information that was incomplete or could not be analyzed. Attempts were made by telephone to obtain missing information from eight hospitals.

Results

Questions for which a 100% response rate was not obtained are either indicated in the text as such or noted as: (*n* = number of accepted responses).

Prevalence, structure, and function of the Acute Pain Service

DEMOGRAPHIC INFORMATION

Of the 56 questionnaires sent, 47 responses were received by April 18, 1992, representing a return rate of 84%. Twenty-five (53%) of the 47 hospitals had an organized and established Acute Pain Service. Of the 22 hospitals without an organized Acute Pain Service, 17 were attempting to start this service.

Acute Pain Services were found in hospitals of all sizes, although the largest number were located in hospitals with more than 200 active surgical beds. For those hospitals with less than 200 active surgical beds, 33% had an established Acute Pain Service whereas 67% of those hospitals with more than 200 beds had an established Acute Pain Service (Figure 1).

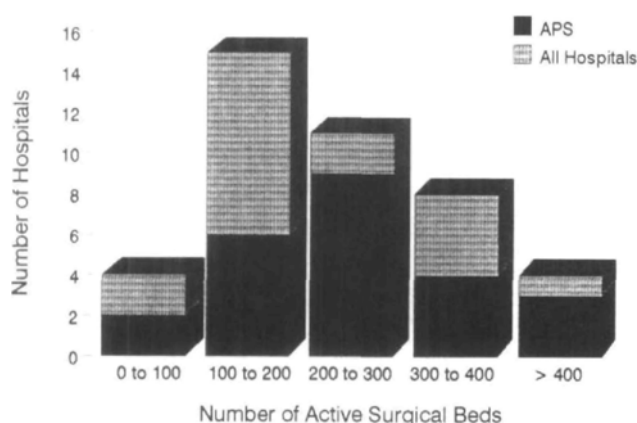


FIGURE 1 Number of hospitals with an Acute Pain Service, shown as a fraction of the total number of hospitals according to the number of active surgical beds. (All hospitals $n = 42$, Acute Pain Services $n = 23$.)

HOSPITALS OFFERING ACUTE PAIN SERVICES

1 Duration of Acute Pain Service operation

Only six (24%) pain services had been in operation for more than two years. The largest number (ten or 40%) had been in operation for one year or less and nine (36%) had been in operation for one to two years (Figure 2).

2 Organization and function of Acute Pain Services

Acute Pain Services across Canada were, for the most part, multidisciplinary. All 25 of the established services were run by anaesthetists, with a range of 2 to 14 anaesthetists involved in each. Other health professionals also have played active roles. Fifteen services (60%) had nurses as regular members of their team and seven (29%) had pharmacists. Two had respiratory technicians participate, and one used services from the departments of Psychiatry, Psychology and Social Work. None had a surgical staff member participating. Fourteen (93%) respondents that had a nurse(s) devoted to their team indicated that their nurse was a vital component.

Three questions were directed to define the work arrangement for the anaesthetists on the Acute Pain Service. For ten (40%) services the anaesthetist had a regular OR day, in nine (36%) the anaesthetist was not scheduled in the OR, in three (12%) the anaesthetist had a "short" OR list, and three (12%) responded with "Other." The Acute Pain Service patients were provided with 24 hr in-house coverage at 19 (76%) of the hospitals. Twenty-four hr in-house coverage was provided by both the staff and resident at eight hospitals, by the staff only at five hospitals, and by the resident only at five hospitals. One

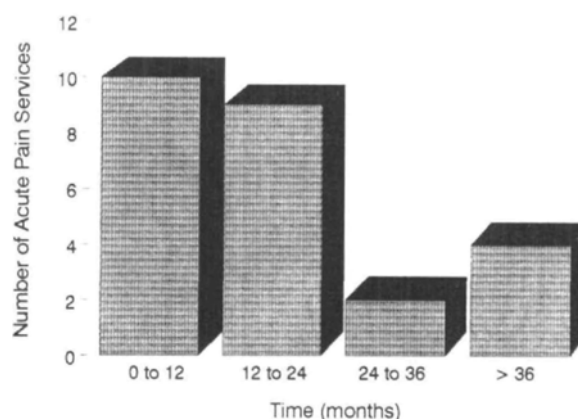


FIGURE 2 Duration of operation of Acute Pain Services ($n = 24$).

respondent did not indicate who provided the 24 hr in-house call. Nurses did not provide 24 hr in-house coverage.

Only eight (32%) departments required a written consultation request from the surgical department for Acute Pain Service involvement. Twenty-three (92%) had standardized postoperative Acute Pain Service orders for patients. Seventeen (68%) had a data base where patient data, complications and comments are maintained. Twenty-two (88%) have ongoing teaching programmes for staff (i.e., nurses, residents). Educational programmes for residents included rotations through the service, daily ward rounds and weekly teaching rounds. Educational programmes for the nurses included regular inservices, video or slide presentations, competency tests and the provision of nursing educators.

3 Activity of the Acute Pain Services

The degree of Acute Pain Service involvement in managing eligible postoperative patients varied among hospitals (Figure 3). From complete data supplied by 16 hospitals the mean number of patients treated per 100 surgical inpatients was 9.1 (SD ± 7.9) with a range from 1.0–28.6. From complete data supplied from 19 hospitals the mean number of days of Acute Pain Service care per patient was 3.0 (SD ± 0.8) with a range from 1.0–14 days.

Overall, Acute Pain Service activity was distributed fairly evenly among the surgical services (Figure 4); however, large differences existed from hospital to hospital.

The survey found a wide variety of pain management techniques used by the Acute Pain Services. Twenty-four (96%) Acute Pain Services offered epidural opioid analgesia (EOA), 22 (88%) offered PCA, 15 (60%) used regional blocks, 12 (48%) used intravenous narcotic infu-

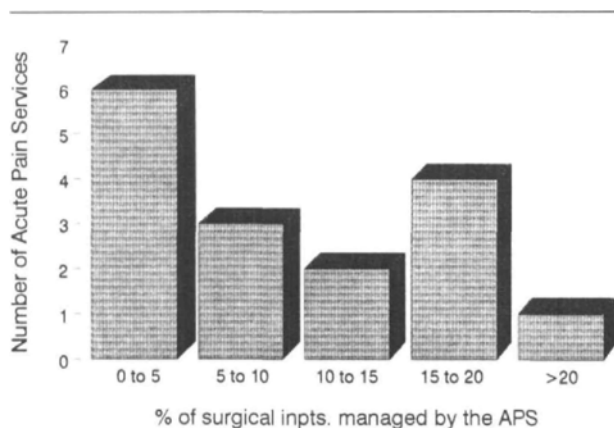


FIGURE 3 The number of pain services grouped according to the percentage of surgical inpatients that were managed by the Acute Pain Service ($n = 16$).

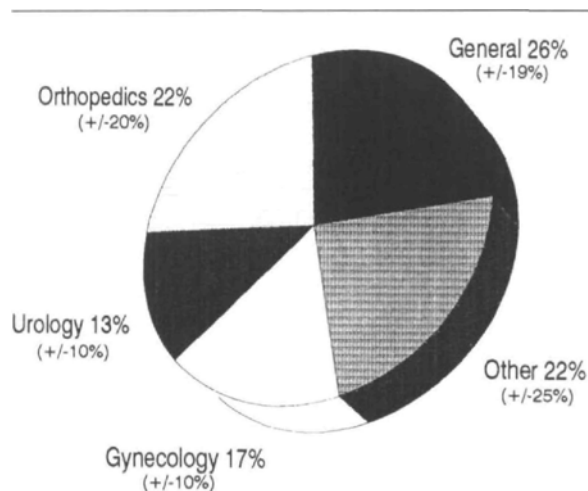


FIGURE 4 Distribution of Acute Pain Service activity among the various surgical specialties ($n = 19$).

sions, and one (4%) used patient-controlled epidural analgesia (PCEA) for postoperative analgesia.

The questionnaire also attempted to determine the relative use of each pain management technique; however, numerical data was received from only eight respondents. Of all patients managed by these services, 76% received PCA, 18% received EOA, 5% received regional blocks, <1% received *iv* opioid infusions, and <1% received PCEA.

The mean number of PCA pumps available per 100 active surgical beds, for all Acute Pain Services ($n = 21$), was 6.1 (SD ± 5.1) with a range of 0.1 to 16.7. The mean number of PCA pumps out of circulation (i.e., cleaning/repair) at any one time was 0.9/10 pumps.

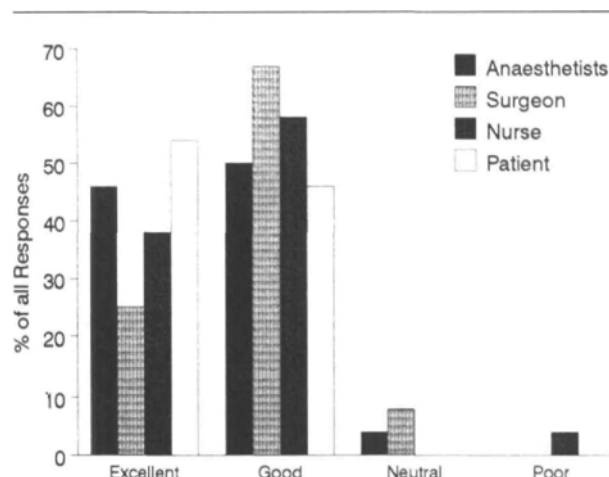


FIGURE 5 Responses of anaesthetists, surgeons, nurses, and patients to the establishment of an Acute Pain Service ($n = 24$).

TABLE I Percentage of acute pain services that experienced problems on initiation of their services ($n = 25$)

Problems on initiation of an APS	% of APSs
Financial constraints	72
Difficulty freeing staff	56
Pain not a priority	52
Inadequate protocols	32
Inadequate data base	28
Communication	24
Lack of interest	24
Too rapid initiation	12

4 Response to the Acute Pain Services

Many of the respondents commented that, with the initiation of the Acute Pain Service, opposition was felt from the nursing, surgical, and even from their own anaesthetic departments. However, once the service was established, responses from the four groups were "good" to "excellent" (Figure 5). The responses appeared to be more favourable from the anaesthetists and patients than from surgeons and nurses. One respondent noted a "poor" response from the nursing department.

5 Problems encountered with initiation of the Acute Pain Services

The three most frequently encountered problems were financial (i.e., cost of equipment), difficulty freeing anaesthetic staff from the OR, and perception by the nursing and surgical staff that improvement of postoperative pain control was not a priority (Table I). Other problems included provision of adequate nursing instruction and certification, bureaucratic inertia, standardization, documentation, and inadequate level of skill or knowledge base among staff (nurses and residents).

TABLE II Sources of funds to acquire PCA pumps. Note multiple sources in some hospitals ($n = 20$)

<i>Financial source</i>	<i>n</i>
Hospital purchased	6
On loan	6
Donations	5
Anaesthesia department funds	4
Government grant	2
Other	1

TABLE III Sources of funding for APS nurse ($n = 12$)

<i>Financial source</i>	<i>n</i>
Hospital budget	5
Nursing department budget	4
Government grant	1
Anaesthesia department	1
Other	1

6 Funding for PCA Pumps and Acute Pain Service Nurse(s)

Acute Pain Services across Canada have approached various and often multiple resources to purchase PCA pumps (Table II) or to fund an Acute Pain Service nurse (Table III).

PCA pumps have been funded by the hospital or individual anaesthetic departments or by private and government donations. Rent-to-own schemes offered by some manufacturers were also used. Similar sources, including nursing departments, have been approached to fund an Acute Pain Service nurse.

HOSPITALS NOT OFFERING ACUTE PAIN SERVICES

Eighty-two percent of responses received from hospitals that did not have an organized Acute Pain Service indicated that the time commitment required by staff to organize and operate an Acute Pain Service was the most important reason why this service was not offered. The next most frequent response was the cost of equipment (Table IV).

Epidural opioid analgesia and patient-controlled analgesia

The second aim of the survey was to determine the extent of EOA and PCA use in all hospitals irrespective of the presence of an Acute Pain Service. Forty-one (87%) of the 47 hospitals used EOA for the management of acute pain. Only 15 (37%) of the 41 hospitals that used EOA-administered epidural opioids on general wards (Table V). All 15 (100%) routinely monitored patients with respiratory rates and sedation scores. One hospital mon-

TABLE IV Reasons for failure to institute an APS ($n = 17$)

<i>Reasons given</i>	<i>n</i>
Time commitment	14
Financial constraints	6
Lack of remuneration	5
Safety concerns	3
Lack of interest	1

TABLE V Locations where patients could receive epidural opioid analgesia alone (EOA) or in combination with local anaesthetics (EOA and LA). Numbers indicate the number of responding hospitals. SDU = step down unit ICU = intensive care unit ($n = 47$)

<i>Location</i>	<i>EOA</i>	<i>EOA and LA</i>
Ward	15	6
SDU	21	15
ICU	33	18

TABLE VI Method of EOA and the location of administration ($n = 41$)

<i>Technique</i>	<i>Location of EOA administration</i>		
	<i>Ward</i>	<i>SDU</i>	<i>ICU</i>
Fentanyl infusion	7	7	12
Morphine intermittent	8	15	23
Morphine infusion	2	4	6

itored patients with apnoea monitors; however, patients receiving EOA were not monitored with pulse oximetry in any hospital. "Morphine intermittent" was the most common EOA modality used (Table VI).

Twenty-six (63%) hospitals that offered EOA used opioid-local anaesthetic combinations, of which only six used the combinations on regular wards. The most common combination of opioid-local anaesthetic for epidural analgesia was bupivacaine-fentanyl which was used in 19 (73%) of the hospitals. Two hospitals used meperidine-bupivacaine, three used morphine-bupivacaine, one used dilauid-bupivacaine, and two hospitals did not provide a response.

Epidural-opioid analgesia was commonly used in step-down or special care units (Table VI). The step-down units (SDU) ranged from a post-anaesthetic recovery room to a separate and distinct unit. Twenty-five (61%) of the hospitals that used EOA had SDU's. Monitoring standards in these units varied among hospitals. Electrocardiography was used in 16 (64%), continuous pulse oximetry in 16 (64%), and invasive arterial blood pressure monitoring in 15 (60%).

Patient controlled epidural analgesia is a relatively new method of postoperative analgesia. Only seven (15%) of 47 hospitals had attempted its use.

TABLE VII Number of complications with PCA or EOA in 32 hospitals. Respiratory depression was defined as "severe." Neurological injury and infection were not defined or rated as to severity.

<i>Technique</i>	<i>Respiratory arrest</i>	<i>Respiratory depression</i>	<i>Cardiac arrest</i>	<i>Neurological injury</i>	<i>Infection</i>	<i>Death</i>
PCA	2	11	0	0	0	0
EOA	4	15	0	1	4	0

Thirty-two (68%) of the 47 hospitals offered PCA which was ordered by "anaesthetists only" at 27 (84%) of the hospitals and by "either anaesthetists or surgeons" at the remaining 5 (16%) hospitals.

Respondents were questioned regarding the occurrence of complications with the use of EOA and PCA. Fourteen of 32 respondents indicated they have had a "major or serious" complication. Table VII depicts a breakdown of these complications at the 32 hospitals which provided complete data.

The risk of respiratory depression with PCA and EOA was estimated from data supplied by eight hospitals (all of which had an Acute Pain Service). The total number of patients served was estimated based on the average number of patients per month and the duration of service. Using this information along with the actual number of cases of respiratory depression or arrest in these eight hospitals, the incidence of respiratory depression was estimated as 0.13% with EOA in 2378 patients, and 0.03% with PCA in an estimated 5905 patients.

Discussion

Acute Pain Service

This survey has demonstrated that there is an interest in postoperative pain management at university-affiliated teaching hospitals across Canada. Not only did 53% of university-affiliated teaching hospitals have an Acute Pain Service, but 77% of those hospitals without an Acute Pain Service were attempting to organize one. The Acute Pain Service is a recent phenomenon in Canada, with the majority having been in operation for two years or less. Although the original Acute Pain Service described by Ready *et al.*⁹ and the services described by subsequent authors^{8,12,15,26} had been based in large university hospitals, our survey has shown that they are viable in teaching hospitals irrespective of size.

Many of the services in Canada appear to have been modeled after the Acute Pain Service described by Ready *et al.* The multidisciplinary approach described by Ready was not unlike the approach used by the majority of Acute Pain Services across Canada.

It appears that Acute Pain Services have been operated successfully with the anaesthetist assigned to the Acute Pain Service working a regular OR day; however, working "short" OR lists, or employing a full-time Acute Pain Service physician was preferred at the majority of hospitals. Both Ready⁹ and Ramsey²⁶ suggest that 24 hr in-house coverage is preferable but only three-quarters of the services in Canada provided this level of coverage.

The majority of pain services in Canada have ongoing teaching programmes for the medical and nursing staff. Respondents confirmed that PCA and EOA can only be introduced on to general post-surgical wards once the staff have been given demonstrations of the equipment and tutorials about these techniques and their monitoring requirements.

Other essential elements of the Acute Pain Service in Canadian teaching hospitals include standardized post-operative orders, protocols and "data bases." Standardized orders and protocols are essential to ensure a consistent standard of care.⁹ A "data base" can serve as a source of information for statistical analysis and research, and ensures that trends of efficacy or complications can be addressed.

The Acute Pain Service as described by Ramsey¹² treated 42% of eligible patients. No Acute Pain Service in a Canadian teaching hospital met or exceeded this level of activity. We found large differences between hospitals in the distribution of Acute Pain Service activity among the surgical specialties. The distribution of Acute Pain Service activity as described by Ready⁹ and Ramsey¹² were spread evenly among the surgical specialties, whereas that described by MacIntyre⁸ and Wheatley¹⁵ was predominantly focused on the general surgical and gynaecological specialties respectively. It appears that no consensus exists as to which surgical specialty or specialties could be best served by an Acute Pain Service.

Acute Pain Services described in the literature provided a mean from 2.3 to 4.6 days of care per patient.^{8,9,15} The services in Canada provided a mean of 3.0 days of care with a range of 1.0 to 14 days. The most popular techniques used by Acute Pain Services in Canadian teaching hospitals were EOA and PCA. Interestingly, more services offered EOA (96%) than PCA (88%); however, the individual patient was more likely to receive PCA than EOA (76% vs 18%). This probably reflects the fact that infusion pumps for postoperative EOA are usually readily available, whereas PCA machines are expensive to purchase or rent. However, once machines are available, PCA is less invasive, easier to initiate, and therefore useful for a larger number of postoperative patients than EOA.

The response to the Acute Pain Services across Canada has been generally very positive from the anaesthe-

tists, surgeons, nurses and patients. The response in other teaching and community hospitals has been very similar.^{8,9,12,15} Some of the many benefits of an Acute Pain Service described by respondents include: reduced patient anxiety and improved postoperative pain relief, potential for valuable increased interaction of anaesthetists with other health professionals, and an increase in time for nurses and surgeons to devote to other activities.

Problems are invariably encountered with the initiation of an Acute Pain Service. It was no surprise that, during these times of fiscal restraint, financial shortage was the most common problem. Many Acute Pain Services have used multiple sources for funding: a potentially successful strategy.

If improving the management of postoperative pain is not seen as a priority by the nursing and medical staff, many respondents indicated that better education would change this misconception. Maintaining close communication with the nursing and surgical staff was also emphasized. For an Acute Pain Service to function effectively, maintaining a multidisciplinary team approach appears to be vital.

PCA and EOA use in Canada

Epidural or peridural opioid administration has become a popular mode of postoperative analgesia. In the past, questions have been raised regarding the safety of administering EOA on surgical wards. Although the majority of surveyed hospitals used EOA, just over one-third of these hospitals used EOA on surgical wards. Canadian anaesthetists appear to be reluctant to administer EOA on regular surgical wards.

Although Bromage,²¹ Walt,²⁷ and Loper,²⁸ believe the provision of epidural opioid analgesia requires a special step-down unit for 24 hr continuous monitoring of gas exchange, others including Ready,¹⁶ Chien,²⁰ and Maier,¹⁹ have suggested that EOA can be safely administered on regular surgical wards provided patients' respiratory rates, sedation scores and pain scores are monitored on a regular basis.

Monitoring patients receiving EOA with sedation scores and respiratory rates is essential.²⁹ All Canadian university-affiliated teaching hospitals that used EOA on surgical wards routinely monitored patients with respiratory rates and sedation scores. It appears that most hospitals would support the view of other investigators that standardized nursing procedure protocols and an educated nursing staff are more effective than apnoea monitors and continuous pulse oximetry for monitoring postoperative patients receiving EOA.^{13,16,31}

The incidence of respiratory depression is difficult to determine as it depends on the definition of respiratory depression and how it is monitored. In this survey the incidence of "severe respiratory depression" with the use

of EOA and PCA was estimated as 0.13% and 0.03% respectively. The risk of respiratory depression with PCA has not previously been reported; however, an incidence of 0.13% with EOA correlates closely with the 0.09% to 2.3% incidence reported by others.^{13,31,32} In addition, the risk of respiratory depression with PCA or EOA may not be different from other modes of opioid therapy.^{33,34} From this survey it appears that if patients are monitored appropriately, administration of EOA on surgical wards is a safe practice.

The safety and efficacy of epidural opioid-local anaesthetic administration is currently being debated. Lubenow,²² Lee,²³ and Schug,²⁴ suggest that continuous epidural infusions of low concentration local anaesthetic and narcotics can provide excellent and safe pain relief in patients after major surgical procedures. Badner,⁷ however, suggests that the addition of low-dose bupivacaine to epidural fentanyl did not improve analgesia after knee surgery and may increase morbidity. Most university-affiliated teaching hospitals in Canada were reluctant to administer epidural opioid-local anaesthetic mixtures on surgical wards. Approximately two-thirds of hospitals that offered EOA administered opioid-local anaesthetic epidurally. However, less than one-quarter of these hospitals administer them on regular wards.

The responses from hospitals that administer opioid-local anaesthetic epidural infusions on regular wards suggest that the incidence of major or serious complications is very low. However, insufficient data was available to determine the actual incidence. It appears that the administration of these mixtures on regular wards is a safe practice; however, the safety of epidural opioid-local anaesthetic combinations and any improved efficacy over epidural opioids alone needs to be confirmed.

Conclusion

This survey has demonstrated that there is a great interest in postoperative pain management in university-affiliated teaching hospitals across Canada. Many hospitals have an organized and established Acute Pain Service modeled after that described by Ready *et al.* Standardized orders and protocols, data bases, ongoing staff educational programmes, and a multidisciplinary team approach appear to be important components. The Acute Pain Service has been viewed as a valuable part of postoperative pain management and has been well accepted across Canada. Which surgical service(s) would be best served by an Acute Pain Service and which method of postoperative analgesia is most appropriate for each patient, or surgical procedure, are questions still unanswered.

Although the majority of hospitals administered epidural opioids or opioid-local anaesthetic combinations, Canadian anaesthetists were reluctant to use these

methods on general post-surgical wards. Epidural administration of opioids on general wards appears to be a safe practice provided nurses are properly educated and the patients' respiratory rates and sedation scores are monitored on a regular basis. The safety of epidural opioid-local anaesthetic administration on general wards and their improved efficacy over epidural opioids alone requires closer examination.

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