



## CLINICAL RESEARCH

# A survey of acute pain service in Canadian teaching hospitals

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### Abstract

**Background:** The first national survey to ascertain the prevalence, structure, and functioning of the APS in Canadian university affiliated hospitals was conducted in 1991. This is a follow-up survey to assess the current status of the APS in Canada.

**Methods:** We requested completion of a 26-question survey from lead personnel of the APS teams or Anesthesia departments of Canadian teaching hospitals.

**Results:** Among the 32 centers that were contacted, 21 (65.6%) responded. Of these respondents, 18 (85.7%) indicated that they have a structured APS (72.22% adults, 5.56% pediatrics, 22.22% mixed). Among the 18 centers with an APS, 16 of the services are led by an anesthesiologist. Eight centers (44.44%) have a regional anesthesia group, of which five (27.75%) have a regional anesthesia group that is distinct from the APS team. Nine centers (50%) offer ambulatory nerve catheter analgesia after discharge home. Fifteen centers (83.33%) use standardized order sets, and 13 centers (72.22%) use an electronic record for APS. More than 50% of the centers use intravenous lidocaine and ketamine as a part of their multimodal analgesia.

**Conclusion:** Most Canadian teaching hospitals do have a functioning APS. This survey has the potential to generate research questions about the availability of standardized and advanced acute pain management in Canada's teaching hospitals.

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## Introduction

The Acute Pain Service (APS) was first suggested through an editorial published in 1976.<sup>1</sup> By 1985, the first APS was established by a group of anesthesiologists at the University of Washington.<sup>2</sup> Ready and colleagues describe their rationale, goals, and experience for developing the first structured APS team.<sup>2</sup> A group of anesthesiologists from the University Hospital of Kiel in Germany published, in 1994, their APS experience which dated back to 1985.<sup>3</sup> After that, many medical organizations started to recognize the importance of establishing a well-designed APS to address the issue of acute postoperative pain.<sup>4</sup> The establishment of an APS helped to expand the usage of some specialized pain management techniques, such as patient-controlled analgesia (PCA), nerve block catheters and epidural infusions of local anesthetic and different opioids in surgical wards.<sup>4,5</sup> However, the structures and practices of an APS is quite varied between, and within the same organizations. Also, not all medical organizations or hospitals around the world have a well-structured APS.<sup>6</sup> In Canada, a survey completed in 1991-1992 revealed that half of university-affiliated teaching hospitals had an established APS and two thirds of those hospitals without an APS were planning to establish this service.<sup>7</sup> After 25 years, our research team decided to conduct a follow-up survey to assess the academic and clinical developments of the APS at major Canadian teaching hospitals.

## Methods

A 26-question survey was provided to the lead personnel of the APS teams or Anesthesia Departments at selected Canadian teaching hospitals. This survey was designed to collect information describing the structure and function of acute pain management at these hospitals. The questionnaire was designed by two Anesthesiologists and members of the APS team at London Health Science Centre – Western University and the content was peer-reviewed for validity by a domain specialist. The survey was designed by expert personnel using Qualtrics software. The survey was available in English only. Our institution's Research Ethics Board provided approval, and a list of targeted Canadian teaching hospitals was compiled. We excluded community hospitals with affiliation to universities, and hospitals offering no or limited inpatient surgical care. A copy of the survey was dis-

tributed to the lead postoperative pain management health care providers at these centers via email, and was accompanied by an explanation of the purpose of our study. The questionnaire included 24 questions with closed answers and 2 open ended questions. The questionnaire was designed in a way not to identify the responders or their institutions. In Q1 'Does your hospital have an acute pain service (APS)?', if the response was no, the survey ended because the rest of the questionnaire depends on the presence of APS.

## Results

### APS demographics and structure

Among the 32 centers that were contacted, 21 centers (65.6%) responded. Out of the 21 respondents (Figure 1), 18 centers (85.7%) stated that they have a formal APS (72.22% adults, 5.56% pediatrics and 22.22% mixed). Acute pain management was provided by a wide range of personnel (Figure 2). At the responding centers, staff anesthesiologists (88.89%) were most like to participate in pain management, together with anesthesia residents (55.56%), registered nurses (55.56%), nurse practitioners (38.89%), pharmacists (11.11%), advanced practice nurse (11.11%), clinical fellows (22.22%), and anesthesia technicians (5.55%). Regarding after-hours (on-call), for postoperative pain management a number of providers are involved. Most centers (72.22%) rely on the on-call (non-APS) anesthesiologist. Other providers include an APS- assigned anesthesiologist (33.33%), a registered nurse (11.11%), a surgeon (5.55%), and/or clinical fellows (33.33%). The volume of patients being cared for by the APS per week was <100 in 61.11% and ≥100 in 38.885% of the centers.

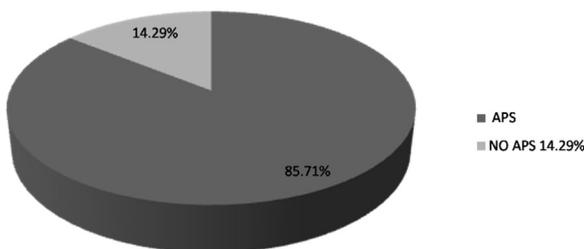
### Pain protocols and standardized orders

Fifteen centers (83.33%) utilize standardized order sets for postoperative pain management and thirteen centers (72.22%) use an electronic record for APS orders and documentation of follow-up. Fourteen centers (77.77%) have updated postoperative pain management protocols. Fifteen centers (83.33%) utilize standardized order sets for postoperative pain management. These standardized orders include printed hardcopy protocols (60%), electronic protocols on hospital website (66.67%), pharmacologic pain interventions (73.33%), and non-pharmacologic pain interventions (20%).

### Postoperative pain assessment

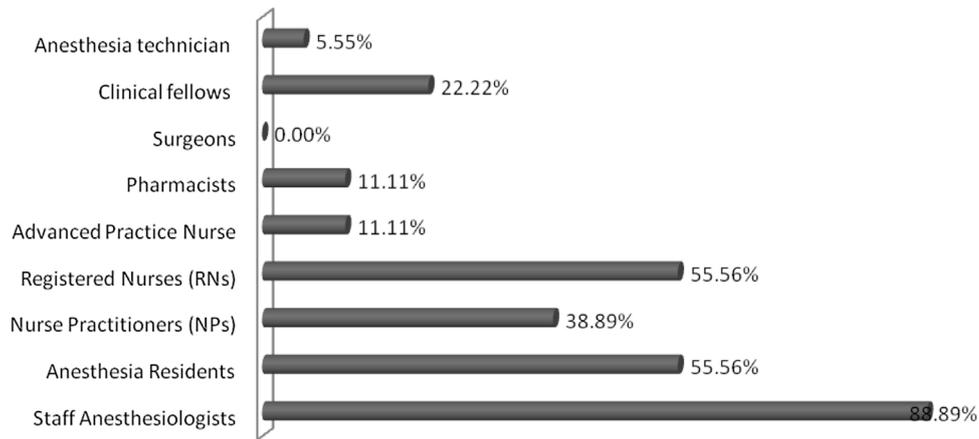
The measure of successful pain management by APS teams is as follows: a change in pain scores (83.33%), changes in functional ability (61.11%), developing less side effects from treatment (55.56%), patients' satisfaction (50%), shortened patients' length of stay (38.89%), less frequent returning to emergency department because of pain or medication side effect after discharge (16.67%) and success of regional anesthesia (11.11%).

**The availability of APS**



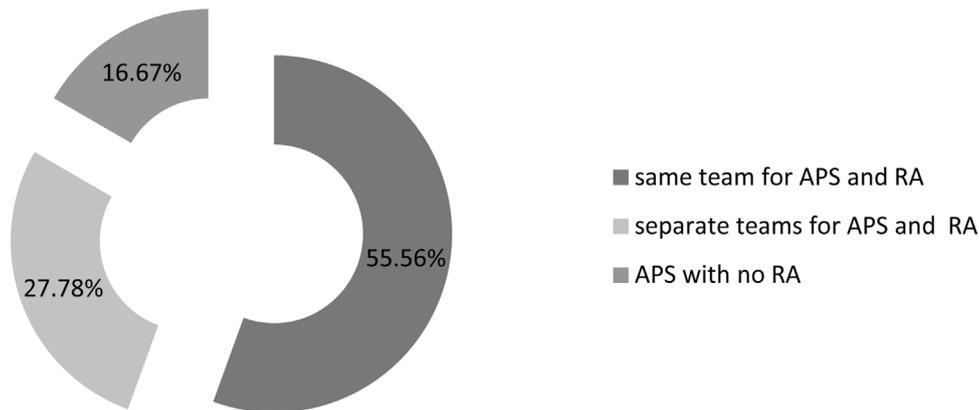
**Figure 1** The presence of APS in main Canadian teaching hospitals.

### APS care providers



**Figure 2** Acute pain management providers in teaching hospitals.

### The relation between APS and RA



**Figure 3** The relation between acute pain service and regional anesthesia teams in teaching hospitals.

#### Regional anesthesia and ambulatory analgesia

Fifteen centers (83.33%) have an established regional anesthesia team. In ten centers (55.56%), regional anesthesia and APS work as one team. In five centers (27.75%), the regional anesthesia team is distinct from the APS team (Figure 3). Nine centers (50%) offer ambulatory nerve catheter analgesia after discharge home. Ten centers (55.55) follow up with their patients after discharge from the hospital when they receive a regional block. The after-discharge follow-up is performed by the regional anesthesia team (33.33%), the anesthesiologist who started the block (33.33%), the APS team (16.67%) or a registered nurse (16.67%).

#### Lidocaine and ketamine

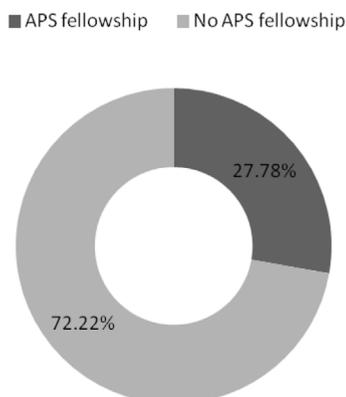
Ketamine is used for postoperative pain management in 61.11% of the centers. Ten centers (55.55%) run intravenous ketamine. Five centers (27.77%) use oral ketamine (off

labelled). Ketamine is added to IV-PCA opioids in two centers (11.11%). Intravenous lidocaine infusion for analgesia is used in ten centers (55.55%). Continuous cardiovascular monitoring is required in 30% of these centers (3/10).

#### Pain management modalities and patient follow-up

All 18 centers which have an APS offer intravenous patient-controlled analgesia (IV-PCA) and epidural analgesia. IV-PCA is followed by the APS team (94.44%), in conjunction with other providers who are not part of the APS team, a registered nurse and/or a clinical nurse specialist (38.88%), and a surgeon (16.67%). Regarding epidural catheter management, follow-up is performed by the APS team (94.44%) or the anesthesiologist who started the epidural (5.56%). Other non-APS members also provide follow-up: a registered nurse and/or a clinical nurse specialist (33.33%), or a surgeon 11.11%. Dedicated regional anesthesia teams are not routinely involved in epidural follow-up.

## The presence of APS fellowship



**Figure 4** The presence of acute pain service fellowship in teaching hospitals.

Continuous peripheral nerve catheter analgesia for inpatients is offered in 94.44% of the 18 centers which offer regional anesthesia. Follow-up is performed by the APS team (88.88%) and/or the anesthesiologist who started the nerve catheter (16.67%), the regional anesthesia team (11.11%), a registered nurse and/or a clinical nurse specialist who are not part of APS team (33.33%), or a surgeon (11.11%).

### Additional training in Acute Pain Management

Five centers (27.75%) have a structured APS fellowship (Figure 4) and 11 centers (61.11%) have a structured regional anesthesia fellowship.

## Provider satisfaction

Regarding the participants' satisfaction about the acute pain management provided by their center(s) the result were as follows: very satisfied (33.33%), satisfied (27.77%), somewhat satisfied (16.66%), dissatisfied (5.55%), very dissatisfied (11.11%), and no response (5.55%) (Figure 5).

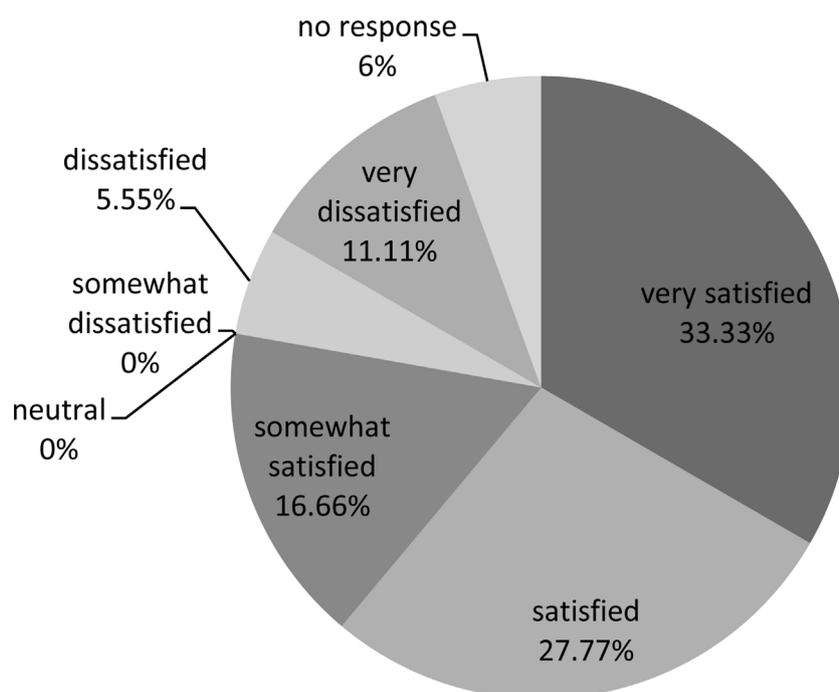
### Suggestions to improve APS

A request was made of the lead personnel of the APS teams for suggestions to improve the APS in their center and other academic centers (Table 1). Most of the suggestions focused on the need for more resources/support to improve the APS and patients care.

## Discussion

Since the 1991 survey (published in 1993) no further follow-up surveys to our knowledge have been completed to assess the status of the APS in Canada.<sup>7</sup> Like the initial survey, we also focus on Canadian teaching centers, however, we restricted our inquiry to major teaching hospitals rather than all the university-affiliated hospitals. The reason for this decision is that not all university-affiliated hospitals will have the same resources to develop a well-structured comprehensive acute pain management program or to establish academic/educational programs such as clinical fellowships.

In the intervening years since the survey by Zimmermann et al., we are able to say that a well-structured, protocol driven APS is more common in Canadian teaching hospitals today. Also, there is progress towards the establishment of new educational programs (Acute Pain Fellowship). Many questions address the important relation between the APS



**Figure 5** Acute pain service providers' satisfaction.

**Table 1** Suggestions by providers to improve acute pain service.

Understanding common issues and solutions across the country (e.g. performing regular surveys/meetings). More support to deal with the challenge of patients with acute-on-chronic pain and/or addiction. Improve human resources and more financial support to improve the infrastructure of the service. Implement more regional anesthesia techniques, lidocaine and ketamine to pain service. Collect data about feedback regarding effectiveness of interventions/care for patients under APS. Implement APS educational/fellowship programs. E-Learning management platforms/modules on pain. APS -management electronic database.
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and regional anesthesia in these centers, as the presence of a regional anesthesia service is one of requirements to develop an advanced APS.

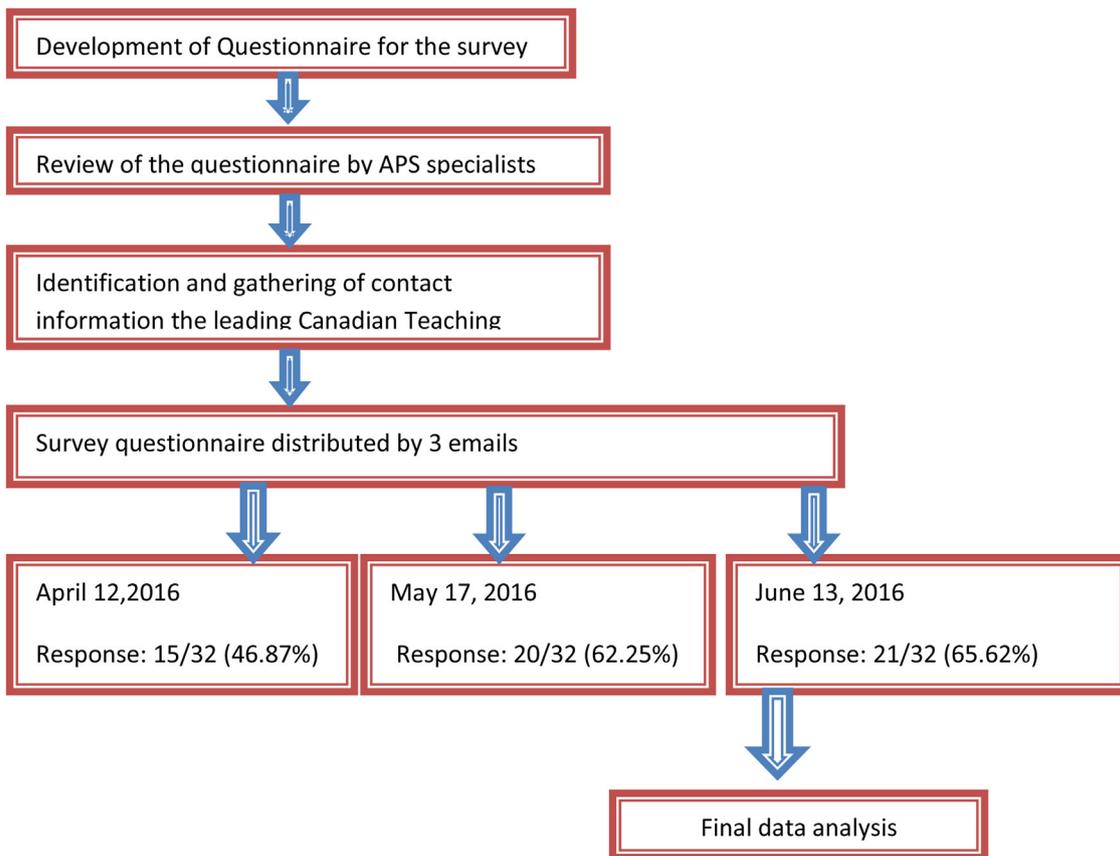
Zimmermann et al. reported that 53% of hospitals had an established APS and another 35% were planning to organize one (Total 88%). In our survey, 85.7% of the hospitals stated that they have a structured APS. In this regard, progress appears to have been made.

Of interest is the finding that from self-reporting there are teaching hospitals without a formalized APS. It may be

expected that for those with an APS there is significant variations in the structure and function between teaching hospitals. Other points of interest include that only 27.75% of Canadian teaching centers offer APS fellowship programs, 22.22% of the centers do not have updated postoperative pain protocols in place, 16.66% of the centers do not utilize an electronic record for APS documentation and follow-up and surgeons appear to play a limited role in APS.

It is desirable that teaching hospitals advance the sub-specialty by developing a comprehensive and advanced acute postoperative pain management system. Such systems would also be expected to function in a similar fashion to other subspecialty programs at teaching hospitals. This would include the opportunity for post-graduate training, research in the area of acute pain management, the development of evidence-driven protocols, auditing of the effectiveness of existing or new protocols; investigating the safety and effectiveness of new pain medications; and studying the cost-effectiveness of postoperative pain management.<sup>4,8</sup> It is also important to have an updated pain management protocol or guideline as indicated by the American Society of Anesthesiologists.<sup>9</sup>

Applying these protocols or guidelines is necessary to ensure a safe and efficient pain service. However, protocols and guidelines only define the basics of acute pain management, and APS team members need to use their own clinical experience to decide about the details of pain management.<sup>8,9</sup> This may indicate the importance of



**Figure 6** Flow chart showing the development of the survey and the data collection process. APS, acute pain service.

specialized APS training for both physicians and nurses.<sup>8</sup> Unfortunately, the results of this survey suggest that some of the teaching hospitals in Canada are still facing a problem in developing and updating their APS protocols and guidelines. Also, it suggests that these are limited opportunities for training programs (Acute Pain Fellowships).

This survey also discovered the absence of consistency among the teaching hospitals in regard to patient's assessment. The majority of the primary teaching hospitals in Canada focus on the changes in pain scores, while only 50-60% of the hospitals focus on the assessment of functional ability, patients' satisfaction or the development of adverse events to pain medications. The most commonly used measure of success in the survey is a measured change in pain scores (83.33 %), followed by changes in functional ability (61.11%), reduced side effects from treatment (55.56%), patients' satisfaction (50%), shortened patients' length of stay (38.89%), less frequent return to the emergency department because of pain or medication side effect after discharge (16.67%), and the success of regional anesthesia (11.11%).

There have been multiple follow-up APS surveys done in Europe and the United States to understand the progress and the limitations of the APS.<sup>6,10-12</sup> There is no consistency regarding the questions used, and/or the type of hospitals involved in these surveys. This lack of consistency makes it difficult to compare the findings between surveys and between countries. What is apparent is that the availability of an APS has increased over the last decade. However, the clinical and academic quality of the APS is still widely variable between health centers.

Patients surveys from the United States and Europe showed that around 55% of surgical patients have experienced poorly controlled pain after surgery despite advances in modalities for pain management.<sup>13-16</sup> Unfavorable low patients' satisfaction indicated that the structure, organization, academic activities, and quality of APS should be revisited and improved.<sup>8,12,16</sup>

Based on our survey results about participant satisfaction and suggestions (Figure 6 and Table 1), there is a need for more support, and improved resources if there are to be improvements in acute pain management. Similarly, it is expected that the availability of educational materials, research activity and training opportunities will improve the quality of acute pain management.

## Limitations

One limitation of this study is related to typical use questionnaires in survey with a self-selection of the questionnaire. Sampling bias also cannot be excluded due to the self-selection of hospitals willing to reply. Our response rate is reasonable for surveys; however, the small sample of hospitals included in this survey can be one of the limitations. In this type of survey, we cannot exclude a bias due to the possibility of overestimation of quality of care and education of responses.

## Conclusion

This is a follow-up survey of the current state of the APS at primary teaching hospitals in Canada. The survey indicated

that the availability of the APS has increased over the last 25 years. Our results provide an impetus for the pain management community to design research projects which delve into how and why the structure and function of an APS varies among those Canadian teaching hospitals, why there are limited opportunities for acute pain training in Canada, where improved infrastructure and support of APS is needed, and analysis of the cost benefit of APS. Regular follow-up surveys will allow continued re-assessment of an important patient care service.

## Conflict of interest

The authors declare no conflicts of interest.

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