

# Acute pain services in Hong Kong: facilities, volume, and quality

## 香港的急性鎮痛服務：設備、數量和質素

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Acute pain services in public hospitals in Hong Kong were studied. Audit data on the volume and quality of acute pain services were collected prospectively from 1997 to 1999, and data on related facilities were collected in 2000. About 20% of patients undergoing a major operation received an acute pain service; of these, 78.6% were satisfied with the treatment provided. In 2000, 86% (18/21) of hospitals providing anaesthetic services were running an acute pain service. Staffing was better in hospitals providing a high volume of acute pain services, ranging from a full-time specialist anaesthesiologist assisted by a half-time trainee to a half-time specialist assisted by a full- or half-time trainee. However, only four hospitals were staffed with pain nurses. In total, 57% of patients received intravenous patient-controlled analgesia and 32% epidural analgesia. The mean duration of acute pain service treatment was 3.1 days. Currently anaesthesiologist-based acute pain services take care of a limited number of patients. To expand the coverage, there should be a move towards an anaesthesiologist-led, pain nurse-based, acute pain service. The present shortage of pain nurses should be addressed.

本文研究了香港公立醫院中的急性鎮痛服務。從1997到1999年，分別收集了經查核的急性鎮痛服務量與質的資料，並在2000年收集了有關設備的資料。大約20%接受大手術的患者接受了急性鎮痛服務，其中78.6%的患者對所提供的治療表示滿意。在2000年，86%(18/21)提供麻醉服務的醫院同時提供急性鎮痛服務。在提供大量急性鎮痛服務的醫院，醫護人員配備較好，人員配備情況，從全職的麻醉科專科醫生輔以兼職的麻醉科受培訓醫生，到由全職或兼職的受培訓麻醉科醫生去協助兼職專科醫生都有。然而，只有四所醫院備有疼痛護士。整體而言，57%的患者接受了靜脈病人自控止痛方法，而32%的患者接受了硬膜外止痛方法。急性鎮痛服務的平均治療時間為3.1天。當前，以麻醉科醫生為主的急性鎮痛服務只能對有限的患者提供服務。要擴大這種服務層面，應朝麻醉科醫生指導，疼痛護士為主的急性鎮痛服務的方向發展。目前疼痛護士的短缺情況應該加以重視。

### Introduction

The scope of anaesthesiology has expanded in recent years to embrace new areas, such as postoperative pain management. In 1995, the Hospital Authority (HA) Central Coordinating Committee (COC) in anaesthesiology commissioned a working party to study the need for developing acute and chronic pain management services in Hong Kong. Members of the working party were anaesthesiologists specialising in pain management in local hospitals. Their report and recommendations were published in June 1995.<sup>1</sup> Key recommendations for the development of acute pain services (APS) included the following:

- (1) the establishment of APS in all major public hospitals;
- (2) the appointment of a consultant anaesthesiologist as service director to spend a significant proportion of his/her time in the organisation and provision of APS;
- (3) the appointment of a pain nurse to assist the anaesthesiologist/director in coordinating the delivery of APS;
- (4) the service to be provided with adequate resources in terms of patient-controlled analgesia (PCA) pumps, monitoring devices, and drugs; and

- (5) the setting up of mechanisms for regular auditing and quality assurance of the service.

The report prompted debate about the role of anaesthesiologists in pain management, as these specialists have always been in short supply in Hong Kong. Recognising the expertise of anaesthesiologists in acute pain management, the HA provided special funding to some hospitals in the following year (1996) to develop APS. It also adopted clinical indicators of quantity and quality to monitor the service delivery. This report reviews the development of APS in Hong Kong since 1996, focusing on the facilities, volume, and quality.

## Methods

### Definitions

The HA Working Group on Clinical Outcome Indicators (WGCOI) defined anaesthesiologist-based APS as services where anaesthesiologists were in charge of patients' postoperative pain management, with regular follow-up. Admission and discharge criteria for the service were clearly defined.<sup>2</sup> On discharge, the patient was asked to rate his/her overall satisfaction about the pain treatment they had just received, using an easily understandable three-point satisfaction scale (good, fair, and unsatisfactory). The number of patients receiving postoperative APS as a percentage of the total number of patients undergoing major operations (%APS) was adopted as the quantity indicator by the WGCOI. The choice of major operations as the quantity denominator was based on the assumption that patients undergoing major operations were more likely to experience moderate-to-severe postoperative pain, and priority for acute pain treatment should be given to them. Major operations were as defined in the Hong Kong Government Gazette and included caesarean section. The number of patients reporting 'good' satisfaction with their pain treatment as a percentage of the total number of patients receiving postoperative pain treatment (ie the APS volume or 'workload'; n-APS) was adopted as the quality indicator.

### Data collection

This was a two-part audit. The first part collected prospective data on quantity and quality indicators of APS delivered between 1 February and 31 March 1997, and between the same dates in 1998 and 1999. Standard data collection forms for the aforementioned quantity and quality indicators were sent to all public hospitals providing anaesthetic services. Completed forms were returned to the convenor of the WGCOI for compilation. The second part surveyed the facilities available and/or used in the delivery of APS in February 2000. Questionnaires were sent to all public hospitals providing anaesthetic services. Data collected from each hospital included: the range of surgical specialities available; staffing available for, and involved in the delivery of, APS; APS workload in 1999 and the treatment modalities employed; availability of standard protocols; and teaching and continuing medical education

programmes for medical and nursing staff. Although reporting to both parts of the audit was considered voluntary, each hospital received a friendly reminder when the questionnaire was not returned in time. Collected data was entered into a spreadsheet (Microsoft Excel 97, Windows 98; Microsoft Corporation, Redmond, US) and hospital names were replaced by codes in the subsequent data processing and presentation processes. To analyse the effect of the number of major operations performed on the set-up of APS and pain service indicators, hospitals were arbitrarily categorised into two groups: those performing a high volume of major operations (HV-op;  $\geq 400$  per month); and those performing a low volume of major operations (LV-op;  $< 400$  per month). Similarly, to analyse the effect of APS workload on the set-up of APS and pain service indicators, hospitals were arbitrarily categorised into two groups: those providing a high volume of acute pain treatments (HV-APS;  $\geq 75$  per month); and those providing a low volume of acute pain treatments (LV-APS;  $< 75$  per month). Most of the larger (ie with more than 1000 beds) general hospitals providing anaesthetic services belonged to the HV service group, and many also belonged to the HV-APS group. The Statistical Package for Social Science (Windows version 9.0; SPSS Inc., Chicago, US) was used to analyse the data. Where appropriate, the Mann-Whitney *U* test and Chi squared test were employed to determine statistical significance, which was taken to be indicated by a *P* value of less than 0.05.

## Results

The questionnaire return rate for the first part of the audit ranged from 75% (1997) to 90% (1998). While the overall %APS remained stable from 1997 (19.9%) through 1999 (20%), there was an increase of four hospitals providing APS and an increase of 8.6% in the number of patients receiving APS (Table 1).

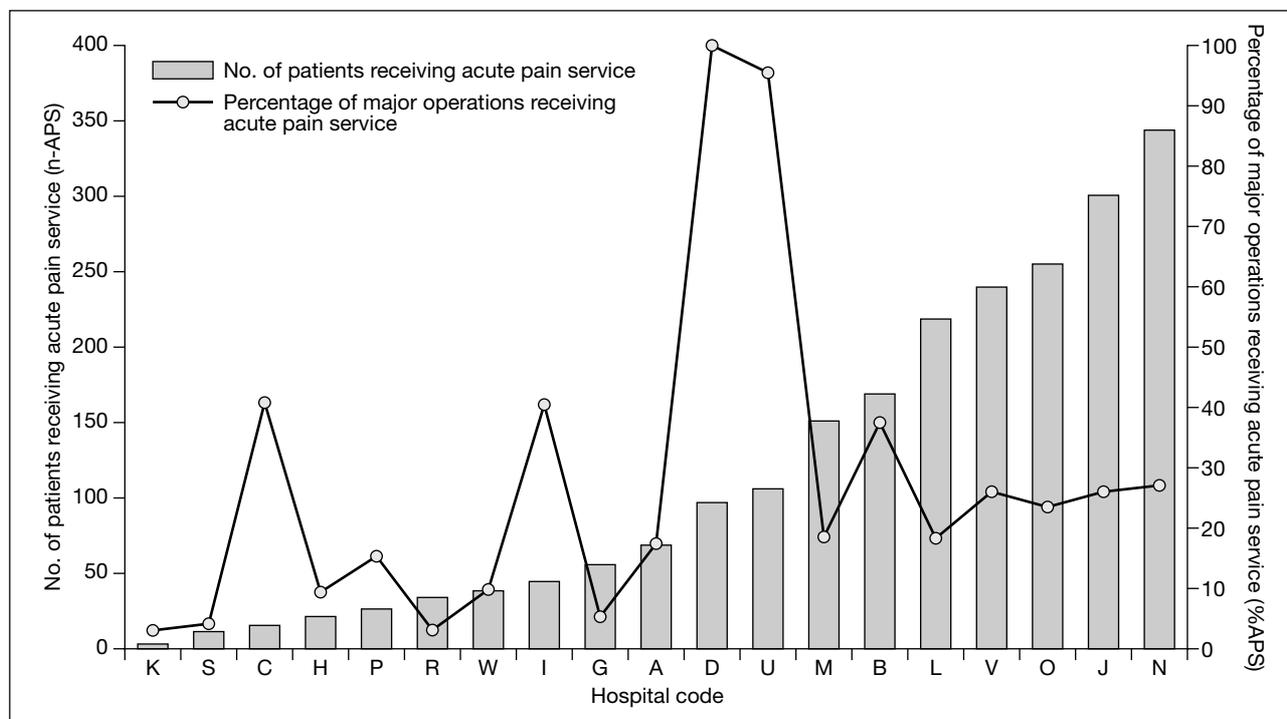
There were large differences between different hospitals, both in terms of %APS and n-APS (Fig). The mean (standard deviation [SD]) annual APS workload in HV-APS hospitals in terms of the number of patients treated was 1674 (440). Although not statistically significant, the %APS was consistently higher in the LV-op group ( $P=0.3$ ). In 1999, the %APS varied from 23% to 38% in HV-APS hospitals, versus 3% to 100% in LV-APS hospitals. Individual hospitals also demonstrated some fluctuation in %APS and n-APS during the study period. The global satisfaction rate, however, was stable throughout the 3 years. The number of major operations performed or APS workload had little impact on patient satisfaction.

Ninety percent (19/21) of hospitals responded to the facilities survey; of these, 18 provided APS. Most (93.3%) hospitals provided APS after orthopaedic and traumatology operations. Acute pain services were least commonly offered after neurosurgical and day surgery operations (Table 2). Specialist and trainee anaesthesiologist involvement in

**Table 1. Summary of quantity and quality indicators for acute pain services from 1997 to 1999\***

Year	1997	1998	1999	1997-1999 average
No. of responding hospitals	15	18	19	-
No. of hospitals providing anaesthesia services	20	20	22	-
No. of hospitals providing APS†	15	17	19	-
Total No. of patients treated‡	2023	2106	2197	2109
Global percentage of patients receiving APS§¶	19.9	19.3	20	19.8
Mean high-volume operations group¶ (SD)	17.4 (10.7)	17.1 (8.8)	18.5 (9.4)	17.8 (9.2)
Mean low-volume operations group** (SD)	29.8 (30.0)	39.6 (36.5)	34.1 (34.4)	29.3 (26.7)
Mean high-volume APS group†† (SD)	23.3 (7.8)	22.2 (6.7)	25.3 (6.5)	23.4 (6.2)
Mean low-volume APS group†† (SD)	24.5 (30.0)	33.9 (37.3)	28.8 (34.8)	25.1 (27.0)
Global percentage of patients satisfied with their pain treatment¶	77.8	78.1	80	78.6
Mean high-volume operations group¶ (SD)	82.3 (8.0)	76.7 (9.0)	75.9 (11.0)	77.7 (8.2)
Mean low-volume operations group** (SD)	73.8 (24.2)	81.8 (15.0)	79.1 (19.0)	79.0 (15.0)
Mean high-volume APS group†† (SD)	82.5 (7.6)	76.5 (9.4)	77.0 (11.3)	74.6 (11.2)
Mean low-volume APS group†† (SD)	75.6 (21.8)	81.5 (14.4)	78.2 (18.7)	80.7 (13.1)

\* No statistical differences among groups (Mann-Whitney U tests)  
 † APS acute pain service  
 ‡ In the months of February and March  
 § Calculated from total number of acute pain treatments delivered (n-APS)/total number of major operations  
 ¶ Figure for the whole of Hong Kong  
 ¶ Performing ≥400 major operations per month  
 \*\* Performing <400 major operations per month  
 †† Delivering ≥75 pain treatments per month  
 †† Delivering <75 pain treatments per month



**Fig. Variation in the number of patients receiving acute pain services in different hospitals in Hong Kong in 1999**

**Table 2. Provision of acute pain services for different surgical specialities in Hong Kong\***

	No. of hospitals offering such speciality	Hospitals providing acute pain services No. (%)
General surgery	16	13 (81.3)
Paediatric surgery	9	8 (88.9)
Gynaecology	12	10 (83.3)
Obstetrics	9	8 (88.9)
Orthopaedics and traumatology	15	14 (93.3)
Thoracic surgery	5	4 (80.0)
Neurosurgery	8	3 (37.5)
Day surgery	14	4 (28.6)

\* Data obtained from facilities survey

providing APS in HV-APS hospitals ranged from a full-time specialist working with a half-time trainee to a half-time specialist working with a full- or half-time trainee. Compared

with HV-APS hospitals, significantly fewer specialists and trainees were involved in providing APS in LV-APS hospitals (Table 3). Three hospitals in the HV-APS group were

**Table 3. Staffing and workload of acute pain services in Hong Kong\***

	Low-volume APS <sup>†</sup> group, n=11 (mean, SD)	High-volume APS group, n=7 (mean, SD)
Sessions per week <sup>‡</sup> staffed with:		
Specialist anaesthesiologist	0.7, 1.2	5.7, 2.7 <sup>§</sup>
Trainee anaesthesiologist	1.1, 1.2	6.1, 3.4 <sup>§</sup>
Pain nurse	0.1, 0.3	3.9, 5.2
APS workload in 1999 <sup>  </sup>	299, 180	1672, 440
Modalities of pain treatment <sup>¶</sup>		
Intravenous PCA <sup>**</sup> (%)	59.4, 25.5	54.3, 22.1
Epidural analgesia (%)	33.7, 20.2	31, 16.9
Intrathecal analgesia and other plexus analgesia (%)	6.8, 14.8	14.5, 16.8
No. of electronic PCA pumps	10.6, 6.6	30.2, 10.8 <sup>§</sup>
No. of hospitals using disposable PCA pumps	1	3 <sup>††</sup>
Pain treatment per electronic PCA pump	32.3, 21.6	63.3, 24.8 <sup>§</sup>
Days per patient managed by APS team	3.0, 1.4	3.3, 0.3

\* Data obtained from facilities survey

<sup>†</sup> APS acute pain service<sup>‡</sup> Eleven sessions per week counted as a full week<sup>§</sup> P<0.02 by Mann-Whitney U test<sup>||</sup> Total No. of acute pain treatments delivered (n-APS)<sup>¶</sup> Expressed as a percentage of the total number of pain treatments delivered (n-APS)<sup>\*\*</sup> PCA patient-controlled analgesia<sup>††</sup> No. used per year ranged from 10-120

provided with a pain nurse, of whom two were employed full-time. One LV-APS hospital had a part-time nurse.

The bulk of pain treatment modalities in both HV-APS and LV-APS hospitals consisted of intravenous PCA and epidural analgesia (patient- and non-patient-controlled), accounting for on average 57% and 32%, respectively (Table 3). Analgesia via the intrathecal route and nerve plexuses were included in other categories. The percentage of patients receiving intravenous PCA in each hospital ranged from 11% to 100%. The number of electronic PCA pumps available in each hospital ranged from three to 42. While APS workload had no significant effect on the modalities of treatment employed, pain treatment per electronic PCA pump was significantly higher in HV-APS hospitals (Table 3). Acute pain service teams looked after each patient for a mean (SD) of 3.1 (1.0) days and this was not affected by APS workload.

Apart from three LV-APS hospitals, preprinted APS order forms were used in all hospitals. All hospitals had protocols available for ward nurses and two thirds had protocols available for recovery room nurses. In addition, all hospitals employed a standard patient chart containing blood pressure and respiratory rate. Ninety-four percent of hospitals included sedation score on the chart, 89% included heart rate and pulse oximetry, 61% included degree of motor block, and 56% included sensory level. Regular monitoring of pain scores was done by four (22%) hospitals. Seventy percent of HV-APS hospitals conducted more than one pain round daily compared with 18% of LV-APS hospitals (P=0.1).

All except one hospital provided educational materials for the patient (Table 4), with pamphlets being the most common device. Although most hospitals provided an educational programme for recovery room nurses (72%) and

**Table 4. Number of hospitals providing educational activities for acute pain service in Hong Kong\***

	Low-volume APS <sup>†</sup> group <sup>‡</sup> No. (%)	High-volume APS group <sup>§</sup> No. (%)
Instruction for patients	10 (91)	7 (100)
Pamphlet	7 (64)	6 (86)
Booklet	1 (9)	0 (0)
Video	2 (18)	1 (14)
Talk	6 (55)	3 (43)
Nurse education		
Recovery room nurse	8 (73)	5 (71)
Ward nurse	10 (91)	6 (86)
Regular sessions available	0	3 (43)
Frequency		
Once per year	4 (36)	2 (29)
Twice per year	2 (18)	4 (57)
> twice per year	0 (0)	1 (14)
Continuing medical education available for anaesthesiologists	10 (91)	7 (100)
Quality assurance programmes in place	11 (100)	7 (100)
Presence of research activities	3 (27)	6 (86) <sup>  </sup>
Teaching activities for trainee anaesthesiologists	9 (82)	7 (100)
Teaching medical students	1 (9)	3 (43)

\* Data obtained from facilities survey

<sup>†</sup> APS acute pain service<sup>‡</sup> From a total of 11 low-volume acute pain service hospitals<sup>§</sup> From a total of 7 high-volume acute pain service hospitals<sup>||</sup> P<0.05 by Chi squared test

ward nurses (89%) [Table 4], only three did so regularly. All hospitals conducted quality assurance programmes for APS. Significantly more hospitals in the HV-APS group were involved in research activities compared with the LV-APS group ( $P < 0.05$ ). Four hospitals were also involved in teaching medical students.

## Discussion

A multidisciplinary APS team contributes towards improved postoperative pain relief, better patient outcomes,<sup>3</sup> and increased cost-effectiveness due to savings in nursing time.<sup>4</sup> This study examined the provision of APS in Hong Kong from 1997 to 1999. The interhospital variations in %APS reflected differences in caseload and case-mix. On average, the %APS was higher in smaller hospitals providing specific tertiary services, such as cardiothoracic surgery, compared with larger general hospitals offering a broader range of operations. The greater manpower needed to take care of the larger APS workload in HV-APS hospitals was evident in the form of higher staffing levels compared with LV-APS hospitals.

Limitations of this study included subject bias from the self-reporting questionnaire, as well as sampling bias on account of the fact that, due to resource constraints, data collection only took place for 2 months of each year. To overcome the latter, we collected data over three consecutive years. Added compensation came in the form of the high questionnaire return rate.

Acute pain services have become an essential part of anaesthetic services in Hong Kong: 86% of hospitals providing anaesthetic services were running formal APS programmes. Surveys conducted around the mid 1990s in Australia,<sup>5</sup> New Zealand,<sup>6</sup> Canada,<sup>7</sup> the US,<sup>8,9</sup> Europe,<sup>10</sup> and the UK<sup>11</sup> showed that 14%<sup>6</sup> to 53%<sup>7</sup> of hospitals were running APS programmes. Windsor et al<sup>11</sup> commented on the wide variation among survey respondents in the UK as regards the perception of what constituted an APS set-up. We defined APS loosely, without specifying the need for dedicated personnel, high-dependency care, or the availability of prefilled syringes. These factors, together with the rapid development of APS worldwide, explain the apparently high percentage of APS observed in Hong Kong.

Patient-controlled analgesia was the most common treatment modality employed for APS. Intravenous PCA, for example, accounted for 57% of all pain treatments delivered. In agreement with our findings, published data from overseas have highlighted the wide variation in the number of patients using PCA in individual hospitals, ranging from 20% in the US<sup>12</sup> and Singapore<sup>13</sup> to 77% in Canada<sup>7</sup> and the UK.<sup>14</sup> This variation is most likely explained by differences in clinical practice, case-mix, and the willingness of the patient to accept epidural analgesia. Although it offers a better quality of pain relief compared with intravenous PCA,<sup>15-18</sup> some patients are reluctant to accept epidural

analgesia because of fears regarding potential rare neurological complications (personal communication).

Pain relief and satisfaction are the two important quality indicators in APS, although good pain relief does not necessarily equate to good satisfaction. Ready<sup>19</sup> remarked that neither pain levels nor the presence of nausea/vomiting predicted satisfaction. Rather, patients commonly appreciated efforts made by the pain management team and these perceived efforts resulted in satisfaction, irrespective of whether or not the effort was successful in meeting the intended therapeutic goals.<sup>19</sup> Our patient satisfaction scores were comparable to published results in Malaysia (83%),<sup>20</sup> Singapore (79%),<sup>13</sup> and the US (89%),<sup>19</sup> although studies of selected patient groups yielded even higher satisfaction scores (99%).<sup>21</sup> We chose satisfaction score as a quality indicator instead of pain score because of resource constraints affecting our study. However, as patient satisfaction per se is not a good indicator of effective pain relief,<sup>22</sup> it is important to monitor both satisfaction and pain scores in any APS audit. According to new pain standards promulgated by the Joint Commission on Accreditation of Healthcare Organizations in the US, regular monitoring of pain scores, including those for rest pain and incident pain, is essential.<sup>23</sup>

Ideally, APS should be provided to all patients in need. However, it is difficult to find an international benchmark to judge how good Hong Kong as a whole is in treating those in need. Our %APS (20%) is low compared to Ramsey's figure of 46%.<sup>24</sup> Of course, major operations do not always result in moderate-to-severe pain requiring PCA or epidural analgesia. In addition, laparoscopic operations are less painful and some can now be done on a 'day stay' basis. Major ear, nose, and throat operations, as well as superficial operations, such as mastectomies, require little analgesia. Further studies looking at the satisfaction and pain scores of patients not receiving APS are needed.

Studies have shown that dedicated anaesthesiologists and pain nurses contribute to improving the quality and outcome of the pain service provided.<sup>25</sup> The caseload that can be handled by an anaesthesiologist alone ultimately has its limits.<sup>26</sup> On the other hand, pain nurses can perform some of the tasks necessary in supervising and educating patients on pain treatments; their availability would definitely increase the coverage of APS. Our findings indicate that staffing for APS in Hong Kong urgently needs to be addressed. Dedicated anaesthesiologists were only available in a few hospitals, and, contrary to the recommendation of the COC working party, only two (11%) hospitals had a full-time pain nurse. The latter compares with 39.3% of hospitals in the UK<sup>11</sup> and 60% in Canada.<sup>7</sup>

The above notwithstanding, the model of delivering APS, whether it be anaesthesiologist-based, pain nurse-based, or a mixture of both, has to be carefully considered. Despite a substantial 27% increase in the number of hospitals providing APS in 1999, there was only a modest

increase in n-APS (8%). Possible explanations for this include sampling bias, the internal redistribution of workload within the HA after the opening of new hospitals, or the limited caseload that anaesthesiologists alone can handle. In the nurse-based, anaesthesiologist-supervised APS model proposed by Rawal,<sup>26,27</sup> a nurse assesses the pain and administers prescribed analgesic treatment(s) according to the pain intensity. However, this may not be feasible in Hong Kong where postoperative ward nurses would require specialist tuition, and, in any event, are already busy with other aspects of patient care. The alternative approach is the truly multidisciplinary anaesthesiologist-led pain nurse-based model. According to this scheme, anaesthesiologists continue to admit patients into the pain service using the usual criteria. Pain nurses assist in supervising the delivery of pain treatments, while ward nurses routinely monitor patients' postoperative pain scores and refer non-APS patients with significant pain to the APS team. This serves as a quality assurance check and expands the coverage of APS. Pain nurses clearly play a vital role in any model for delivering APS and the present shortage of dedicated pain nurses in Hong Kong should thus be addressed.

## Conclusion

Despite the availability of postoperative APS in 86% of hospitals in Hong Kong, only 20% of patients undergoing a major operation receive acute pain treatment, with an overall satisfaction rate of 78.6%. On average, smaller hospitals performing fewer major operations were more likely to provide APS for their patients, while larger hospitals performing greater numbers of major operations had better staffed APS. Notably, a pain nurse was only available in four hospitals. The shortage of pain nurses should be addressed in order to expand the coverage of APS.

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