



Acute pain services in the United Kingdom

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Summary This survey addresses the structure and function of the acute pain services (APS) in the UK 10 years after its initial commencement. APS is now available in many hospitals (89.4%). The APS team consists mainly of anaesthetists, occasionally includes nurses and pharmacists, and rarely physiotherapists and psychologists. Anaesthetists, mainly, cover the out-of-hours service and nurses only occasionally. Dedicated medical staff sessions did not exist in 37%, and were limited to 1–2 sessions per week in 49% of the hospitals that responded to the questionnaire. Regular training commitment by medical staff did not exist in 25% of hospitals. Frequency of nursing training sessions varied from nil in 12% to almost monthly in 40% of hospitals.

Patient controlled analgesia (PCA) and epidurals were available for post-operative analgesia in almost every single hospital responding to this questionnaire.

Protocols for epidurals were available in 92% of hospitals, without clear relationship to the actual presence of APS. Anaesthetists designed these protocols in 27%, nurses in 1%, both anaesthetists and nurses in 43% and the whole team in 20% of hospitals. Written consent for epidurals was rarely obtained. The place of care for patients with post-operative epidural analgesia was surgical wards in 73%, HDU in 51% and ITU in 48% of respondent hospitals. The most single common factor in the decision on place of care was the availability of trained nursing staff. Monitoring usually comprised respiratory rate, sedation and pulse oximetry.

Bupivacaine 0.1% was the most commonly used local anaesthetic for post-operative epidural analgesia, while diamorphine followed by fentanyl were the most commonly used epidural opioids. Other adjuvants to epidurals were rarely ever used; only clonidine was used in 7% of hospitals. Continuous epidural infusions were used in 84% of hospitals while patient controlled epidural analgesia PCEA was used only in 19% of hospitals.

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1. Introduction

It is unfortunate and even unacceptable that effective pain management after surgery may not be considered as one of the medical profession's achievements after entering the 21st century.

Post-operative pain is not only a predictable problem but it occurs in a presumably well-controlled environment where medical staff, modern medication and other sophisticated hospital facilities should be available. Furthermore, it is probable that effective pain relief is associated with earlier discharge from hospital for many patients and that poor pain relief may result in post-operative complications [1].

Probably one of the earliest publications related to this subject was by Egbert in 1964 which

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concluded that "... if an anaesthetist considers himself a doctor who alleviates pain associated with operations, he must realise that only part of his work is in the operating rooms; the patients need ward care by their anaesthetists as well" [2].

An editorial in *Anaesthesia and Intensive Care* [3] went further and advocated "analgesia teams" to supervise and administer pain relief and to be responsible for education and training.

It was suggested that an anaesthetist, because of familiarity with analgesic drugs and regional analgesia techniques, should play a leading role in the team, but it was acknowledged that this major change in practice would come about through changes in attitudes, hospital routine and appropriate allocation of staff [3].

The steering force for the development of these analgesia teams was originated by conclusions from many professional bodies such as the interdisciplinary expert committee reports by the National Health and Medical Research Council of Australia [4], the Royal College of Surgeons of England and the Royal College of Anaesthetists [5], the US Department of Health and Human Services [6], and the International Association for the Study of Pain (IASP) [7].

The stated goals of the American guidelines [6] were to:

- Reduce the incidence and severity of patients' acute post-operative or post traumatic pain.
- Educate patients about the need to communicate unrelieved pain so they can receive prompt evaluation and effective treatment.
- Enhance patient comfort and satisfaction.
- Contribute to fewer post-operative complications and, in some cases, shorter stays after surgical procedures.

These guidelines emphasised a collaborative, interdisciplinary approach to pain control. The guidelines advocated including all members of the health care team in the process of pain management, with input from the patient and the patient's family, with an institutional approach to the management of acute pain, and with clear lines of responsibility. The institutional plan should include the use of an individualised, proactive pain control plan, developed preoperatively by patients and practitioners, frequent patient assessment, and the use of both drug and non-drug therapies to prevent and control pain.

In the USA, Ready et al. [8] in 1988 were the first analgesia team to describe a successful acute pain service (APS). This has been followed by other coun-

tries; Canada [9], New Zealand [10] and in some hospitals in Europe [11–14].

The recommendations made in the report "Pain after surgery" by the Royal Colleges of Surgeons and Anaesthetists published in 1990 [5], addressed education, practice, resources, development and research. It emphasised pain assessment and having a named member of staff to be responsible for and implement the hospital policy for pain management.

Five years later, a survey of acute pain services in the United Kingdom revealed that less than half of the hospitals, which responded to this survey, had acute pain services [13]. In 1996, Windsor et al. [14] reassessed the situation and found that the number of hospitals with a multidisciplinary acute pain service had significantly increased from 2.8% before September 1990 to 42.7% at the end of 1994. It was observed that over the same period of time the number of hospitals with a named clinician and an acute pain nurse responsible for the acute pain service had increased.

Now it is more than a decade since the original recommendations by the Royal Colleges of Surgeons and Anaesthetists were published. The survey presented in this study was conducted to re-evaluate the situation of acute pain services in the United Kingdom.

This survey aimed at determining:

- The management of acute pain services, particularly addressing the structure of the team, use of protocols, the environment of care, medications and the techniques used as well as the rate of side effects and complications.
- The response to the recommendations made by the Royal Colleges of Surgeons and Anaesthetists and whether they have been implemented.
- The reasons why some hospitals were unable to implement these recommendations.

2. Methods

This survey is a non-experimental, descriptive, cross-sectional survey. The approach of this survey was based on a cohort, which comprised all hospitals with college tutors of the Royal College of Anaesthetists. This methodology was chosen to reduce the element of sampling error. This group is believed to reflect the management of acute pain services across the country as it has been shown in an earlier survey [13].

The survey used a postal questionnaire, designed specially for the study (Appendix A), which was sent to all college tutors from a list supplied by the College in April 2000. This was followed a month

later by a reminder letter enclosing a copy of the questionnaire for non-respondents.

The questionnaire was deliberately kept to two-sided A4 page to encourage respondents to complete and return it. Tick boxes were used to facilitate filling the data; however, a free text space was left for further comment to encourage participants to enter further relevant information or comments.

The first part of the questionnaire addressed the structural and administrative components of APS. The second part addressed epidural analgesia: medication used, method of administration (i.e. infusion versus patient controlled), monitoring and side effects. Specific questions about the use of adjuvants other than opioids (e.g. clonidine) were included in an attempt to identify at least how common this practice is in the UK as this was one of the few questions, which was not addressed in other previous surveys.

The site of care of patients receiving epidural analgesia was particularly asked and the rationale behind it was asked as free comments.

Information regarding the use of brachial plexus block for post-operative pain management was requested, as well as free comments about other methods of pain relief. Data were recorded in a spreadsheet in Excel program and were reported as percentage, average and standard deviation as applicable. Free comments were grouped and summarised at the end of the results, particularly those entries regarding the rationale for choosing the site of care of patients receiving epidural analgesia.

The approval of the local ethical committee was obtained prior to dispatching the questionnaires, which were used to collect the required information. Respondents were assured regarding confidentiality and anonymity.

3. Results

A total of 282 questionnaires were mailed to the anaesthetic college tutors in 282 different hospitals. One hundred and eighty-seven responded during the first month. These are shown in Fig. 1

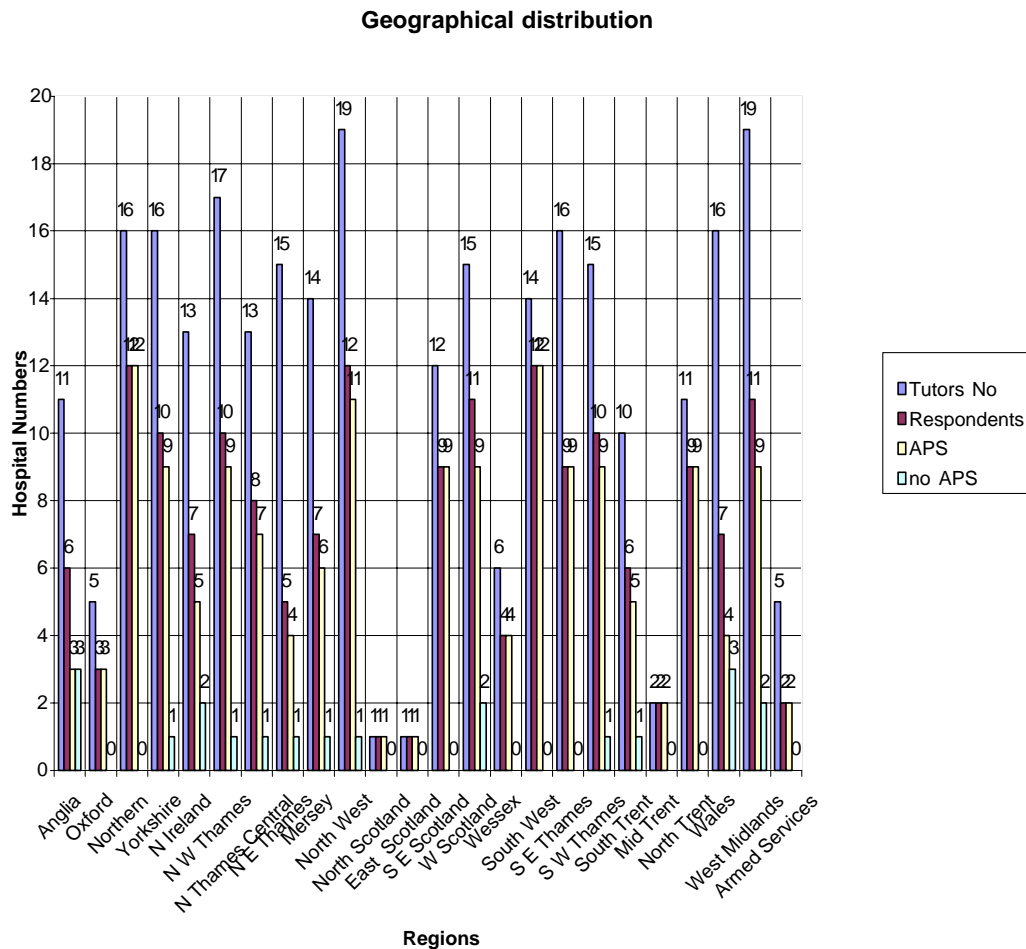


Fig. 1 Geographical distribution of the first 182 respondents.

according to their geographical distribution. Reminders were sent to the remaining 95 hospitals 4 weeks later. Forty hospitals out of those 95 responded; a total response rate of 80.4%. The last 40 respondents were not included in the figure of geographical distribution as some of them were not coded and some respondents deleted the code number. Only 5 of these last 40 had no APS.

APS were available in 89.4% of the total number of hospitals that responded. All the data were for the period of 1-year ending December 1999. Data are presented as numbers and percentages of respondents. Values are reported as average, standard deviation and/or range as applicable.

3.1. APS structure

Team members represented in the service are; anaesthetists in 202 hospitals (99%), nurses in 186 hospitals (91%), pharmacists in 96 hospitals (47%), physiotherapists in 26 hospitals (12%), psychologists in 10 hospitals (4.9%), surgeons in 9 hospitals (4.4%) and others, as managers, in 5 hospitals (2.4%) (Table 1).

Out-of-hours epidural service was provided by 220 hospitals (96.9%). Surprisingly, all the seven hospitals, which did not have an out-of-hours service, had APS. Only 1 out of 23 hospitals without APS did not have out-of-hours service for post-operative acute pain management. In this study anaesthetists in 215 (94%), nursing staff in 67 (29%) and other medical staff in 3 (1.3%) hospitals provided this service, as shown in Table 2. One hospital used operating department assistants.

Table 1 Disciplines represented in APS

Team members	Total no.	%
Anaesthetists	202	99
Nurses	186	91
Pharmacists	96	47
Physiotherapists	26	12
Psychologists	10	4.9
Surgeons	9	4.4
Others	5	2.4

Table 2 Out-of-hours cover

Out-of-hours cover	Total	%
Anaesthetists	215	94
Nursing staff	67	29
Other medical staff	3	1.3
Others	1	0.004

Table 3 Dedicated medical staff sessions

No. of sessions	Nil	1	2	3	4	5	<5
Total	84	80	33	9	3	8	3
%	37	35	14	3	1	3	1

The percentages in Table 2 do not add up to 100% due to the overlap in the cover provided by anaesthetists and nursing staff.

In response to the question addressing the dedicated medical staff sessions to cover the acute pain service the following results were obtained.

Dedicated medical staff sessions did not exist in 84 (37%) hospitals, one session per week in 80 (35%) hospitals, two in 33 (14%) hospitals, three in 9 (3%) hospitals, four in 3 (1%) hospitals, five in 8 (3%) hospitals (Table 3).

The service in 3 hospitals had 6, 7 and 10 sessions per week respectively and 9 (0.3%) had not commented on that question.

In response to the question regarding the sessions of regular training commitment by medical and nursing staff, results varied from none to one session per month as shown in Table 4. More than one respondent indicated that they are about to start a new acute pain service.

3.2. Place of care for patients with epidurals

The place of care for patients with post-operative epidural analgesia was the surgical ward in 165 (73%) hospitals, high dependency unit HDU in 116 (51%) hospitals and intensive care unit ITU in 110 (48%) hospitals (Table 5). The percentages total exceeds 100% due to the use of more than one site by many hospitals. The presence of APS allowed for more patients with epidurals to be cared for on surgical wards. In 29.2% of hospitals with APS, patients with epidurals were cared for on surgical wards in comparison to 15.3% of hospitals without APS. On the other hand, the absence of APS put extra burden on ITU/HDU. In 46.1% of hospitals without APS, patients with epidurals were cared for in ITU/HDU as compared to 22.2% in hospitals with APS as shown in Table 6 and Fig. 2. The rationale for choosing the place of care differed greatly and even contradictions were noticed in the comments responding to this particular question. Comments addressing this point are summarised below.

- Patients are cared for on wards as staff is trained (65 hospitals).
- Patients are not cared for on wards as staffing level is unacceptable (37 hospitals).

Table 4 Number of hospitals having regular training sessions by medical and nursing staff per year

Training sessions	None	1–2 (years)	3–4 (years)	5–6 (years)	7–8 (years)	9–10 (years)	11–12 (years)	Do not know
Medical	57 (25%)	78 (34%)	11 (0.04%)	1 (0.004%)	0	0	24 (10%)	38 (16%)
Nursing	28 (12%)	31 (13%)	12 (0.05%)	2 (0.008%)	0	0	92 (40%)	55 (24%)

Table 5 Place of care for patients with epidurals

Place of care	Total no. of hospitals	%
Surgical ward	165	73
HDU	116	51
ITU	110	48

- Proven safety level and audit results so all patients are cared for on ward.
- Wards are the best to promote teaching and reduce pressure on ITU.
- Ideally patients should be cared for on HDU, but if no bed then on ward if no comorbidity, otherwise cancel.
- Patients should be cared for on ward in uncomplicated cases, but on HDU if there are other medical or surgical indications.
- All patients are cared for on ward unless comorbidity then they would be on HDU.
- Patients are not cared for on wards due to lack of sufficient monitoring on wards (nine hospitals).
- All patients are cared for on ITU, as there is no APS team.

- All patients are cared for on HDU.
- All patients are cared for on HDU or ITU to avoid unwanted problems.
- Patients with epidurals should not be cared for on a single room.
- All patients are cared for on ward as no HDU, no APS.
- All patients are cared for on wards as no HDU, ITU is full.
- If no HDU, all patients are cared for on recovery overnight.
- Patients having epidurals with opioid are cared for on HDU, those without opioids are cared for on ward.
- Patients with high epidural are cared for on HDU. No HDU, so all patients are cared for on ITU.

It is possible to observe from these comments that the site of care for patients with epidurals could be decided according to:

- Training of ward staff.
- Patient morbidity.
- Availability of monitors on wards.

Table 6 Place of care for patients with epidurals in relation to presence or absence of APS

	Hospital with APS (%) (n) 87.2% (198)	Hospital without APS (%) (n) 11.5% (26)	Did not answer 1.3% (3)
Surgical wards	29.3% (58)	15.4% (4)	Not applicable
ITU/HDU	22.2% (44)	46.2% (12)	Not applicable
Both	48% (95)	26.9% (7)	Not applicable
Did not answer	0.5% (1)	11.5% (3)	Not applicable

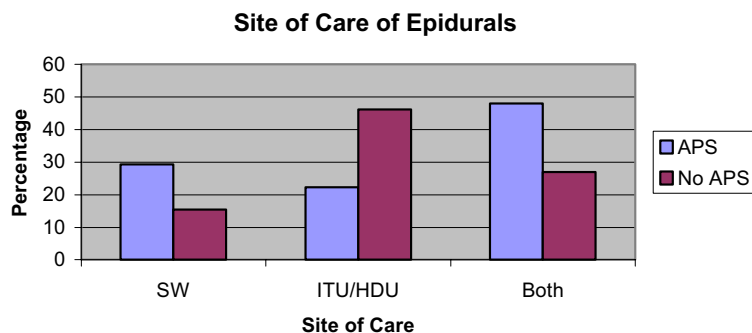
**Fig. 2** SW = Surgical Ward, ITU = Intensive Care Unit, HDU = High Dependency Unit.

Table 7 Methods used for pain management

Methods used	Total no. of hospitals	%	Mean % of patients treated	S.D.
IM	190	84	36.25	24.94
PCAS	224	99	36.25	22.33
Epidurals	205	90	15.85	13.62
Nerve blocks	167	73	9.82	11.98
Blocks with catheters	72	31	0.98	2.62

- Availability of beds on ITU/HDU.
- Epidural administration of opioids.
- Level of epidural.

3.3. Methods of pain relief

Intramuscular (i.m.) opioids were used in 190 (84%) hospitals where the mean percentage of patients treated by this modality was 36.25%. The corresponding figures for PCAS was 224 (99%) and 36.25%, epidurals was 205 (90%) and 15.85%, nerve blocks was 167 (73%) and 9.82%, and nerve blocks with catheters in 72 (31%) and 0.98%.

Table 7 summarises the average use and standard deviation of each method.

Wide varieties of other pain management methods were reported in the replies to the questionnaire but not quantified. These included oral nonsteroidal anti-inflammatory analgesics (NSAIDs), oral opioids, subcutaneous and intravenous infusions of morphine, spinal catheters and paravertebral infusions, analgesics given per-rectum and sublingual as well as transcutaneous electrical nerve stimulation (TENS).

3.4. Epidurals protocols

Other groups of questions requested information regarding the use of epidurals post-operatively. Protocols for epidurals were available in 210 (92%) hospitals. The absence of APS did not necessarily lead to unavailability of protocols, as out of the 23 hos-

Table 8 Different concentrations of bupivacaine used

	Bupivacaine (%)			
	0.07	0.1	0.25	Others
Total no.	7	205	16	9
%	3	90	7	0.03

pitals that had no APS, 16 of them (69%) had protocols for epidurals.

Out of the 204 hospitals with acute pain service, 195 hospitals (81.25%) had set protocols for epidurals. These protocols were designed by anaesthetists in 63 (27%) hospitals, nurses in 3 (1%) hospitals, both anaesthetists and nurses in 99 (43%) hospitals and by a whole team in 46 (20%) hospitals.

Written consent for epidurals was obtained in only 22 (9%) hospitals.

Different concentrations for bupivacaine were used (Table 8). Six centres used ropivacaine for post-operative epidural infusions.

Opioids were used with local anaesthetics in 218 (96%) hospitals, again with a wide variety of drugs and concentrations (Table 9).

Epidural fentanyl was used in 162 (71%) hospitals, diamorphine in 103 (45%) hospitals, and morphine in 8 (3%) hospitals and sufentanil in 4 (1%) hospitals. Two hospitals used epidural pethidine, one used buprenorphine or pethidine, one used buprenorphine alone and one used alfentanil for post-operative obstetric analgesia.

Other drugs were added to epidural local anaesthetics in 21 (9%) hospitals, including clonidine in 17 (7%), ketamine in 2 (0.08%) and midazolam in one hospital.

Continuous epidural infusions were used in 190 (84%) hospitals while patient controlled epidural analgesia PCEA was used in 43 (19%) hospitals.

3.5. Monitoring for epidurals

The following monitors were used for patients having post-operative epidurals; blood pressure (BP) in 216 (95.1%) hospitals, pulse rate (P) in 209 (92%)

Table 9 Epidural opioids used for post-operative analgesia

	Epidural opioids			
	Fentanyl	diamorphine	Morphine	Sufentanil
Total no.	162	103	8	4
%	71	45	3	1

Table 10 Monitoring for epidural analgesia

	BP	P	RR	SaO ₂	Sedation	Motor	Sensory	UOP	Pain
No. of hospitals	216	209	211	140	201	135	143	139	199
%	95.1	92	92.9	61.6	88.5	59.4	62.9	61.2	87.6

hospitals, oxygen saturation (Sa O₂) in 140 (61.6%) hospitals, respiratory rate (RR) in 211 (92.9%) hospitals, sedation score in 201 (88.5%) hospitals, motor blockade in 135 (59.4%) hospitals, sensory blockade in 143 (62.9%) hospitals, urine output UOP in 139 (61.2%) hospitals and pain score in 199 (87.6%) hospitals (Table 10).

Other observations included nausea and vomiting in 19 hospitals out of the 227 respondents (0.08%), inspecting the site of the catheter in 3 (0.01%), temperature in 1, itch in 1, total dose in 1, satisfaction in 1 and lower leg temperature in 1 hospitals.

Quite a few pain-scoring systems were used by different hospitals as shown in the following list:

- Verbal rating scale (VRS) 0–3.
- VRS 1–10.
- VRS 1–100.
- Visual analogue scale (VAS) without numerical.
- VAS not specific.
- VAS rest and movement.
- 0–3 scale.
- 0–4 scale.
- 0–5 scale.
- 1–5 scale.
- Linear score.
- Verbal rating scale (VRS)
- 0–5 with faces.
- Locally devised score.
- 0 = no pain, 2 = maximum pain.
- Nurse informal score at rest and movement.
- York score.
- Burford scale.
- Horton et al.
- Hayward modified.

The last four scoring systems were used by individual hospitals but no details were provided by them.

3.6. Side effects

Naloxone was used to treat respiratory depression due to epidural opioids in 69 (30%) hospitals. The average use was 0.144% with a standard deviation of 0.55.

Morphine was associated with respiratory depression in 43 (19%) followed by diamorphine in 22 (9%)

Table 11 Incidence of side effects

	Pruritus	PONV	Urine retention
Average (%)	11.8	11.8	14
S.D.	13.8	13.8	21.6
Range (%)	0–60	0–80	0–100

Response rate to this particular question was 133 (59%) due to inadequate data collection in many APSs.

then fentanyl in 20 (8%) hospitals with acute pain service.

The incidence of other side effects was not given by more than half the respondents due to lack of accurate figures. Of those who answered these particular questions addressing the incidence of side effects, 133 (59%) reported an average incidence of pruritus in 11.8% of cases with standard deviation of 13.8, with a wide range from 0 to 60%. Post-operative nausea and vomiting (PONV) incidence was 11.8% with a standard deviation of 13.8 as well and a range between 0 and 80%. Urine retention was reported to be occurring in 14% of cases on average with a standard deviation of 21.6 and a wide range between 0 and 100% (Table 11).

Forty-four (19%) hospitals stated that they routinely catheterise patients with post-operative epidurals.

Comments regarding side effects included failure of epidurals in 30% of cases in the first 24 h in one hospital. Hallucination was thought, by one respondent, to be a more common side effect than was actually reported by patients. Another comment stated that hypotension associated with physiotherapy and sedation with PCAs are the two most common problems.

3.7. Clonidine in APS

The use of clonidine in APS apart from epidurally was reported by 18 (7%) hospitals. Four hospitals (1%), used it for brachial plexus block. Only 12 hospitals (5%), obtained written consent for brachial plexus block.

3.8. Economic considerations

The following comments were made about funding (Table 12).

Table 12 Comments regarding funding

Comments	Reply no.
Ward-based epidurals are currently under threat from proposals to reduce levels of trained nursing staff on wards	40
We have been running the service for 3 years but have not commenced an audit. Funding for the service has not been clearly established. We are fighting for separate funding to help the development of the service	123
Just got funding for an acute pain nurse. HDU hopefully on the way	134
I hope if we get additional consultant anaesthetist at least one acute pain session will be included	135
We have no pain service because management will not fund it. All large post-operative cases go to HDU/ITU	161
We have been denied funding for an APS for my 3 years in post. I am so angry about it. I have audited our pain management and highlighted its shortcomings to senior management. "There is no money"	163
"Pharmacy unable to source or fill local anaesthetic bags, one pain nurse who is part time" were some of the main problems in developing the service	176
Quality issues are "flavours of the month" with the NHS. However, investment in acute pain issues with a specific nurse in our hospital is non-existent. All "lip service", no action	232
Awaiting nurse funding to fully support APS	244

4. Discussion

This survey carried out in 2000 was an attempt to get a picture of APS in the UK 13 years after the initial reports recommending the initiation of such a service in each hospital.

According to Talbot [15] participants who may confound or contaminate the results should be excluded. Therefore, this sample excluded private hospitals and small hospitals where there was no college tutor. Hospitals without a college tutor have no trainees. This situation does not reflect the common practice in the majority of UK hospitals.

Not all college tutors are involved in APS but the lack of a national register, at least at the time of sending the questionnaires, prevented the targeting of consultant anaesthetists who run the actual service personally. Also, the lack of acute pain nurses in every hospital made it impossible to target them as a sample representing APS practice in UK.

Another approach could have been to target heads of anaesthetic departments as per previous studies [14,16], but it was felt that college tutors would either fill the questionnaire themselves or delegate them to their colleagues in charge of the APS. Windsor et al. [14] sent questionnaires to 490 hospitals and received 358 replies (73.1%), while the questionnaires by the Clinical Standards Advisory Group (CSAG) report [16] were sent to 250 NHS trusts.

Other investigators such as the Clinical Standard Advisory Group [16] have undertaken pilot studies where the research team visited two local sites. Pilot site data were not included in quantitative anal-

yses but the findings were reflected to an extent in the commentary and discussion section of that survey. As there were 52 people involved in that national project, it was possible to undertake these field visits as pilot studies, however that was difficult to undertake in this study due to lack of resources.

Questionnaires have an inherited element of invalidity if respondents are answering questions to demonstrate how things should be rather than how things are. This has been described as the "words/deeds dilemma" by Couchman and Dawson [17]. One of the reasons for this behaviour by respondents may be the feeling of threat if they score below the average when standards are concerned for example. However, if a survey is assessing a situation which has been proven to be not fully developed and/or funded by previous studies [13,14], one would expect the collected data to be more accurate or even underestimating rather than overestimating the exact reality.

As it was recommended that a response rate of more than 50% should be achieved for better reliability of surveys [18], a reminder letter was sent to non-respondents a month later.

Literature review and previous surveys were used to design the questionnaire then the opinion of a panel of multi-professional experts was sought on the validity and reliability of the questionnaire. No further suggestions were made so the questionnaires were sent to college tutors.

The design of questionnaires should not be too structured so the data will not be just what the investigator is looking for, nor should it be too

unstructured so the data will be difficult to be compared and analysed [18].

Similar surveys have been undertaken in the UK before [13,14], however their data could be considered as a "one-shot" or cross-sectional study and these studies have been undertaken more than 5 years ago, it was felt necessary to have another look at the same kind of data again. The most recently published study by McDonnell et al. [19] in 2003 highlighted the current provision and the role of the acute pain teams (APTs) in post-operative pain management in the UK. Some questions were not included in McDonnell et al. [19] study and were addressed in this present study, for example out-of-hours cover, designated medical sessions, epidural opioids and other modalities for pain management (Appendix A).

This present survey tried to obtain a global picture of the services in the UK by combining most of the aspects investigated in earlier questionnaires from different countries.

From comparing this study with the previous ones, quoted in Table 13, one can identify certain areas that were not looked at by the previous two studies from the UK [13,14]. These areas are mainly which local anaesthetics or opioids are used epidu-

rally, and which nonopioid adjuvants are used in the APS, if any. The incidents of side effects with epidurals and which techniques were used (infusion or patient controlled) were also not investigated in these previous studies (Table 13).

Two main areas were not covered in this questionnaire, economics, and staff and patient satisfaction from the service. The economic aspect was covered in the previous surveys in the UK [13,14] and this will be discussed later.

Staff satisfaction from the service would have been an interesting question to address. But to keep the questionnaire in a reasonable length and not exhausting, with the natural sequence of less enthusiasm in returning, the issue of staff satisfaction and its causes were left for further future research.

Patient satisfaction has become a popular issue recently. This angle of the acute pain service needs to be explored further but this could not have been included in this survey, which aimed at the service providers.

4.1. Number of APSs in the UK

Acute pain services APS were available in 89.4% of responding hospitals (80.4% response rate). This

Table 13 surveys addressing structure of APS

	Study										P.S.
	16 (221)	17 (358)	18 (324)	19 (226)	20 (79)	21 (105)	22 (177)	23 (88)	24 (105)	25 (42)	
Staffing	+	+	+	+	+	+	+	+	-	-	+
Out-of-hours	-	+	-	-	-	-	-	-	-	-	+
Designated medical sessions	+	+	-	-	+	+	+	-	-	-	+
Teaching	-	+	-	+	-	-	+	+	-	-	+
Research/audit	-	-	-	+	-	-	+	+	-	-	-
Epidural protocol	-	-	-	+	-	-	-	-	-	-	+
Staff satisfaction	-	-	-	-	-	+	-	-	+	-	-
Economics	+	-	-	+	-	+	-	-	-	-	-
Epidural opioids	-	-	-	-	-	-	-	-	+	+	+
Epidural L.A	-	-	-	+	-	-	-	-	-	+	+
PCEA#infusion	-	-	-	-	+	-	-	-	-	-	+
Monitoring	-	-	-	-	-	+	-	-	+	+	+
Ward#HDU#ITU	-	-	-	+	+	-	+	-	+	+	+
Ambulation guidelines	-	-	-	+	-	-	-	-	-	+	-
Epidural nonopioid drugs	-	-	-	-	-	-	-	-	+	-	+
Side effects	-	-	-	-	-	-	-	-	+	-	+
PCA	+	-	+	+	+	+	-	-	-	-	+
Other modalities	+	-	-	-	+	+	+	-	-	-	+
Postop pain protocol	-	+	-	+	-	-	-	-	-	+	-

+: questions regarding this particular issues have been asked in that survey; -: questions regarding this particular issues have not been asked in that survey; P.S: present study. The number in parenthesis are value in (n).

indicates more than doubling in the number of services since the last two surveys [13,14], almost 5 years ago, which showed an increase from 2.8% before September 1990 to 42.7% at the end of 1994. This trend echoes the trend in other countries; in United States, the number of anaesthetist-based APSs was 73% in hospitals with 100 beds or more in 1995 [20]. In New Zealand, a survey published in 1997 showed that the number of formal acute pain services increased from 12 to 17 in 22 crown health enterprise CHE hospitals (77%) with 150 beds or more [22].

4.2. APS structure

A formal APS provision requires specific resources for the service such as staff and funding [13], which could be tailored to the needs and resources of each institution [23]. APS was developed in the context of the large university hospital in Seattle in 1986 [8]. The American model, consisting of an anaesthesiologist, nurse, pharmacist and physiotherapist, providing a 24 h service was not available in any of the European hospitals that participated in a recent survey in 1998 [24]. That survey included 105 hospitals representing 17 European countries depending on their population.

Different APS models were described in the European survey as in Table 14 [24]. The results of this study are mainly in line with the first European model in Table 14 [24].

Anaesthetists and nurses were represented in 99 and 91% of APSs, respectively. Pharmacists 47%, physiotherapists 12% and sometimes psychologists 4.9% are involved with the service.

If early mobilisation and less post-operative pulmonary complications are proven benefits of this service particularly with epidural analgesia, it does

not make sense then that physiotherapists are presented in only 12% of APSs.

However, in another survey in UK in 1996, Cambitzi [25] collected a self-administered postal questionnaire from all acute pain management nurses in England and Wales. A response rate of 88% was achieved. The constitution of the pain management teams in that study was anaesthetists in 85 (96.5%) of them, pharmacists in 55 (62%), physiotherapists in 25 (28.4%), surgeons in 9 (10.2%) and ward nurses in 7 (7.9%).

The involvement of physiotherapists in acute pain service teams would optimise the benefits of modalities such as epidural analgesia. Timing of boluses, either by staff or by patients, with deep breathing and passive exercises would enable patients to get the best out of these activities with the minimum amount of pain or discomfort. Awareness of possible side effects (e.g. postural hypotension, sedation) by the physiotherapists would make them more familiar and more competent when dealing with such patients. All this would best be achieved in a context of a team that has a multidisciplinary approach to post-operative pain. All those who work in this area have few anecdotal stories about coordination between different departments with the consequence of patients suffering and/or, to say the least patients' inconvenience.

A multidisciplinary team as was suggested originally [5,8] means that all members of the team should visit all patients under their care on a daily basis. It was found that only 68% of centres rarely perform ward rounds with a consultant anaesthetist and 96.5% without a pharmacist [25].

Surgeons are rarely part of the service, 4.4% in this study, which could be due to either reliance on anaesthetic input to the service or may be the lack of understanding of the multidisciplinary concept and the role that surgeons can play.

A respondent from this survey commented that one of the very rare occasions where naloxone had to be used to treat respiratory depression after epidural opioid was following administration of opioid by a different route by a member of the surgical team despite the clear advice of the nursing staff. Involving surgeons in the design of protocols and in the acute pain service team may prevent this.

The Royal Colleges of Surgeons and Anaesthetists [5] recommended that research should be encouraged into the use of counselling and psychological methods in the management of post-operative pain. This may come as no surprise to those who have a grasp of the multifaceted nature of pain. Increasingly literature shows that pain from all categories, i.e. chronic and acute, will contain both

Table 14 APS models in Europe^a [23]

Model	No. of hospitals
Special nurse and anaesthesiologist for acute pain	10
Anaesthesiologist for acute pain only	5
Junior (in-training) anaesthesiologist supervised by senior consultant	3
Anaesthesiologist 'on call' responsible for acute pain	14
Model description not available	5

^a Based on data from 37 European hospitals that had APS. In 63 European hospitals, there was no APS. No response was received from one hospital.

physical and psychological factors [26]. Stewart [27] found that 'carers can offer a great deal by way of pain relief, other than the administration of pain-relieving medicine'. Listening, attending, responding and other communication skills are all required by carers to enable patients to be part of their own recovery process and to participate in the management of their pain. These skills would be highly appreciated when dealing with children or families of many patients.

These recommendations and findings should be a useful lever for those involved in APS especially during their efforts to plan, expand and finance their services.

4.3. Economical considerations

Many comments in this survey raised the issue of unavailability of funds needed for the APS and that the administration of many hospitals only pay lip service to this highly appreciated and invaluable service as shown in Table 12. In another survey, 32% of physicians consider economic costs to be the main reason for their inability to provide the analgesic treatment of their choice [24].

The findings of an earlier national survey of acute pain services in UK in 1996 highlighted that 62 (28.1%) of hospitals studied employed a specific acute pain nurse. Only 36 hospitals (16.3%) had funding especially for medical sessions in the management of acute pain. Of the hospitals with an established acute pain service, only 18 (18.6%) had received additional funds [13].

In that European survey, it was the cost of equipment such as PCA pumps rather than analgesic drugs that were considered important. Respondents from the UK and Sweden in that survey commented on the lack of staff. Most respondents commented that economic issues were becoming increasingly important.

From the above, it is clear that decisions on the development and/or maintenance of an acute pain service appear to be made, to a large extent, on the financial viability of these programs. As a result, the survival of these programs could be in doubt in many hospitals.

4.4. Out-of-hours service

Anaesthetists provided this service in 94%, and nurses in 29% of hospitals. The questionnaire did not request detailed status of anaesthetists providing the service, but in a previous study it was shown that the cover was provided by trainee anaesthetists in 88.1% and in 33.3% some element of cover by a consultant anaesthetist was available

[14]. In that study also, 72.2% of hospitals with APS provided out-of-hours service.

This commitment to the service by anaesthetists should be reflected in their workload and training programs particularly if it is mainly those in training posts who provide the service.

The lack of contribution from other medical staff cannot be over emphasised if we are talking about a multidisciplinary model of patient care.

4.5. Dedicated medical staff sessions

In 37% of hospitals, there were no dedicated medical staff sessions at all for the service. In 35%, there was only one session per week (a session is a half working day). These figures are similar to the situation in Australia and New Zealand where 16 out of 37 hospitals (43.2%) had no senior anaesthetic sessions at all, while 15 hospitals (40.5%) had between 1 and 5 sessions per week [21]. This was confirmed 2 years later in New Zealand where 58% of responding hospitals to a similar survey indicated that they have senior medical staff dedicated to the service for 20 h per week or less [22]. One respondent reported that the dedicated medical staff time was lost, as the input of the senior nursing staff is so good; 'they contact us as required'.

4.6. Regular training commitment by medical and nursing staff

The present study shows that in 25% of hospitals there are no teaching or training sessions by medical staff, 34% of the hospitals perform training sessions once or twice per year, only 10% of hospitals every 1 or 2 months and 16% of hospitals did not answer this question. Teaching sessions by nursing staff were non-existent in 12% of hospitals, once or twice a year in 13% of hospitals, every 1–2 months in 40% of hospitals and those who did not know were 24% of hospitals. These results are not as specific as the results of Cambitzi study [25] which were referred to earlier; where 55.6% of acute pain nurse specialists spent between 11 and 20 h of a 150 h month on direct teaching of nursing staff. Informal teaching was undertaken by 92% of that sample, whereas 87.5% of the sample also taught formally, with more than half of this formal teaching being carried out on English National Board (ENB) courses, which are specialised post-registration modular programmes provided through universities.

Teaching and training by APS teams is one of its essential duties [5,8]. This activity was well analysed in a study from New Zealand where teaching covered anaesthetic consultants and registrars,

ward and recovery nurses, residents, surgical registrars as well as surgical consultants [21].

4.7. Epidural protocols

There was no relationship between the availability of APS and the existence of epidural protocols. Protocols were available in 210 (92%) of hospitals. Protocols were designed by anaesthetists alone in 27%, by anaesthetists and nurses in 43% and by the whole team in only 20% of hospitals. This reflects again the lack of team spirit and that the multidisciplinary concept has not been taken into consideration yet. No data were collected as to whether these protocols were evidence based or opinion based. This could be addressed in a future survey looking at evidence-based guidelines.

4.8. Site of care for patients with epidurals

Patients with post-operative epidural analgesia were cared for on surgical ward in 73%, in HDU in 51% and on ITU in 48% of hospitals. These results are similar to those obtained from New Zealand in 1995 [21], where out of 104 hospitals using epidural opioids post-operatively; 74 of them care for these patients on surgical wards while 30 of them are on HDU/ITU. The findings of the present study are in agreement with a recent survey, which showed a significant association between where patients with epidurals could be nursed and the existence of an APS [15]. Both surveys are in agreement that there is a clear relationship between the presence of an APS and the site of care of patients with epidurals.

Some hospitals responded by choosing HDU because of the lack of trained staff on surgical wards, others looked after these patients on wards due to lack of HDU or ITU beds. Other hospitals relied on their safety records and audit results over the years to care for these patients on surgical wards, while others cared for them on ITU to avoid unwanted problems. However, most of the comments stated that trained staff level was the most important significant factor for deciding on the place of care.

It is generally agreed that patients treated with spinal opioids should be observed carefully because of the risk of respiratory depression. However, there is no consensus regarding the duration or the type of monitoring. Observation of patients in ITU, post-operative care units (PACU), or HDU for 12–24 h after epidural or intrathecal morphine has been recommended [28,29]. For lipophilic opioids, the recommendations are vague or non-existent [30]. Provision of spinal opioid analgesia on surgical wards is controversial; some consider the technique safe [31,32] while others do not [28,29]. The issue

of where and how to monitor these patients has major medical and economic implications. Critical care facilities (ITU/HDU) are well suited to meet the needs of post-operative patients at special risk (advanced age, serious underlying conditions, or extensive surgery). Whether the use of epidural opioids in a healthier patient makes critical care admission necessary, the expense and limited availability of these facilities makes this an impractical decision.

To require admission to the ITU/HDU for the administration of epidural opioids is to deprive some patients of the benefits of the technique. Although not yet demonstrated, it is possible such a decision could result in a greater incidence of complications (e.g. myocardial infarction, pneumonia, deep vein thrombosis, and pulmonary embolus) that may be associated with inadequate analgesia.

More studies now offer evidence that post-operative epidural opioids can safely be offered on conventional hospital wards. Guidelines for safe practice must be followed if this type of care is to be offered. These guidelines apply within or outside the ITU/HDU and have been published previously [33].

Although there remains a small risk associated with using post-operative epidural opioids, with application of current knowledge, it has become an exceedingly high-benefit, low-risk technique.

The policy of nursing patients on surgical wards was well accepted in most (60%) hospitals in Europe [30]. Interestingly, in 26% of hospitals even ASA III to IV patients were nursed on regular surgical wards.

4.9. Concentrations of bupivacaine and types of opioids used

The commonest concentration of bupivacaine used was 0.1% in 90% of hospitals and the commonest opioid added was fentanyl in 71% followed by diamorphine in 45% of hospitals. Other opioids that were used rarely were sufentanil, buprenorphine, pethidine and alfentanil. This variety is much less than that reported in the European survey of 17 nations by Rawal in 1996; where 12 different opioids were used epidurally. These included, in a descending order, morphine, fentanyl, sufentanil, buprenorphine, pethidine, diamorphine, alfentanil, nicomorphine, piritramide, doloxene, methadone and oxycodone [30]. Some of the above mentioned drugs were not available in parenteral form in the UK at the time of the survey, which explains the longer list in the European survey. This is a cause of concern, as many of these drugs have not been studied for neurotoxicity to establish their safety.

Also, this variety can be a source of errors especially in that many hospitals used more than one opioid with different regimens.

4.10. Clonidine

Clonidine was the most commonly added non-opioid to epidurals (7%). It was also the most commonly used in 11 countries in Europe [30].

It is hard to find clear evidence for the effectiveness of clonidine as an adjuvant to post-operative epidural as concluded by an attempt to perform a meta-analysis of its efficacy [34]. But in a more recent randomised double blind study looking at patients undergoing intestinal surgery, three groups have been studied, each group contained twenty patients. The group who had epidural clonidine bolus of 10 $\mu\text{g}/\text{kg}$ followed by 6 $\mu\text{g}/(\text{kg h})$ required less anaesthetic agent and had a more efficient post-operative analgesia than the two groups who received two different concentrations of bupivacaine 0.25 and 0.125% [35].

The need for well-designed randomised dose-response controlled studies based on previous studies is clear so that the optimum use of clonidine, as an adjuvant to other more traditional analgesics administered via the epidural route, can be determined.

The results of the present study show that the use of clonidine for brachial plexus analgesia is rare in the UK. The same need for similar studies applies for the optimum use of clonidine in brachial plexus block.

4.11. Pain scoring systems

Surprisingly, more than 20 different pain scoring systems were reported by respondents ranging from visual analogue scale with different scales; verbal rating scale; using faces; locally devised scores. VAS scale 0–10 has been validated but not 1–3 scale, which has been used by few respondents. It is difficult to know which scoring system is superior, but a questionnaire rating the intensity of pain was filled by 267 patients admitted over a period of 3 weeks in Crawford Long Hospital in Atlanta. The questionnaire contained three pain-rating scales: two visual analogue (one contained a 100 mm line; the other contained six faces depicting graduated levels of distress), and a cognitive number rating scale [36]. Visual analogue scale containing faces was selected most frequently (48.6%), followed by the number (35.3%), and the line scale (16.1%). At several hospitals, in the European survey, the VAS was only used with epidural or PCA techniques. In general, anaesthetists were dissatisfied with pain assessment and

documentation procedure at their hospitals; they acknowledged the need for such measures but were unable to introduce them with current levels of staffing. Some respondents to that survey noted that improvement was possible only if anaesthetists were made responsible. Interestingly, a few respondents commented that receiving and answering the questionnaire had stimulated them to take steps to improve the organisation of pain management on surgical wards [24].

4.12. Limitations

The results of this survey have to be interpreted cautiously because of the following flaws and difficulties:

- Data were generally retrospective, recall bias cannot be excluded, and consequently figures for adverse effects could be underestimated.
- Targeting APS teams or hospital administration as in other studies [14] could have resulted in more numbers of hospitals to be recruited. But due to the lack of a national directory presenting APS, at least at the time of sending the questionnaires, and for more informative replies regarding training and dedicated sessions, college tutors were targeted as in a previous study [13].
- Geographical distribution could be identified only for the 187 respondents who responded following the first dispatch of questionnaires. The second dispatch of respondents which was received following the reminder could not be traced geographically partly due to the lack of coding of the extra copies of the questionnaires which were sent with the reminders, and partly because some respondents deleted the code. However, the results shown in Fig. 1 indicate that all regions were represented fairly evenly in this study.
- Data addressing modalities of pain management and incidents of side effects were not that accurate and even completely lacking in many hospitals due lack of auditing and information collection systems.

However, many results are based on exact data such as the number of APSs, their structure, protocols, plus site of care, and monitoring, drugs used.

4.13. The future of acute pain services

As was discussed earlier, the Agency for Health Care Policy and Research (AHCPR) guidelines have advocated that health care institutions develop and implement an institutional plan for pain management [6]. Since the publication of the AHCPR guidelines, other accrediting agencies have acknowledged the

importance of pain management and have made an institutional pain management plan as part of their standards for acute care hospitals.

While such an institutional plan is important in establishing an environment conducive to the appropriate management of pain for the hospitalised patient, strong evidence is lacking that the presence of such a plan will improve pain management in hospitalised patients.

In addition to an institutional plan establishing the need for adequate pain management, there needs to be a process to ensure that this care is being provided. In response to this perceived need, the American Pain Society's Quality of Care Committee published guidelines for a quality improvement plan to ensure adequate acute and cancer pain management in hospitalised patients [37]. This plan should contain the following key elements:

- Assuring that a report of unrelieved pain raises a "red flag" that attracts clinicians' attention.
- Making information about analgesics convenient where orders are written.
- Promising patients responsive analgesic care and urging them to communicate pain.
- Implementing policies and safeguards for the use of modern analgesic technologies.
- Coordinating and assessing implementation of these measures.

Considerable interest has developed over the last several years in the development and use of utilisation management and critical pathways [38]. Critical pathways describe a course of care for patients with similar problems and treatments. A critical pathway should be an integrated and interdisciplinary plan that leads to high-quality, cost-effective care.

The critical aspects in the development of a critical pathway are:

- Standardise the course of events that lead to a successful outcome.
- Interdisciplinary approach to patient care.
- Include health care team education in the implementation of the plan.
- Monitor the cost of care and patient outcome to ensure the pathway meets established goals.

There are growing data that demonstrate that this model of care does lead to improved outcomes and reduced cost [39–41]. This model of care for hospitalised patient, which resembles the integrated interdisciplinary approach advocated for the chronic pain patient, may be an opportunity for the survival of acute pain services [42].

In the case of acute pain management, it appears that gains in improving patient care could be obtained by exploring the use of the concepts seen in the creation of critical pathways for selected patient populations. A traditional acute pain service often provides pain management in consultation with the primary care service by carving out pain management from the remainder of the patient's care. In the post-operative setting, interaction with the surgeon can be infrequent, and pain management may not be integrated with the overall care plan of the patient. In fact, the acute pain service and the surgical service may only interact when a critical adverse event occurs, straining relationships between health carers.

The development of a critical pathway for the surgical patient should begin with the decision to operate and extend to the moment of patient discharge. While acute pain management would be a vital part of such a plan, other elements are equally important. For example, a model of a pre-operative evaluation clinic provided a high-quality, cost-effective care [41]. Other investigators have shown that the selection of anaesthetic technique has direct impact on the quality of post-operative pain control [42]. Many clinicians have emphasised that pain control at rest is not as important as pain control with movement, which allows the patient to participate in rehabilitation following surgery. Still others have shown that early effective post-operative pain control may reduce the chances for long-term chronic pain problems [43]. All of these parts of the patient care experience will have to be integrated into a seamless perioperative critical pathway for the surgical patient.

Some investigators have begun to integrate acute pain management into the post-operative rehabilitation of the surgical patient. Using a patient-focused approach similar to critical pathway development, pain management has been integrated into a global rehabilitation plan for the surgical patient [44]. While the role of the acute pain service remains important, this care is not provided in isolation to other aspects of the patient's care, but in the broader context of integrated rehabilitation of the patient [45]. Early data indicate that this approach may lead to improved outcome as well as earlier recovery and faster hospital discharge [46–48].

Participation in perioperative care by an organised acute pain service cannot only improve the quality of pain control, but should also decrease the incidence and severity of some adverse events. Pain therapy has risks, many of which can lead to patient harm. Some of these regarding epidural analgesia have been discussed earlier, but even PCA therapy,

which is considered to be safe, has the potential for serious adverse outcome [49]. Opioid administration is associated with alterations in ventilation. Life threatening respiratory events associated with the use of PCA have been reported [50]. These events are almost always associated with human error. Patient care through an acute pain service may decrease the incidence and severity of these adverse events, thus improving outcomes and decreasing health care cost.

The acute pain service has taken a leadership role in the establishment of monitoring standards and is often responsible for the training of nurses with regard to these standards. However, the question of who dictates the standard of monitoring was not addressed in this questionnaire, but one can presume that anaesthetists involved in the acute pain service team would be most likely involved at least in the setting up of these standards. Changes in staffing of acute care hospitals may make it more difficult to ensure conformance with patient monitoring requirements in some settings. As hospital care evolves, it is vital that individuals expert in providing pain management maintain a leadership role to ensure adequate care to these individuals.

While most acute pain services concentrate their services on behalf of individuals experiencing pain from surgery or trauma, other hospitalised patients frequently experience poorly controlled pain. For example, in a recent manuscript on the care of the dying patient, the Council on Scientific Affairs of the American Medical Association stated "the current patient care delivery system is deficient in regard to the care of the terminally ill. Expertise in pain management is not available to patients, and comprehensive and enduring care is the exception" [51].

Clearly, this patient population can also benefit from the development of critical pathway that integrates pain management into their care and ensures patient's access to experts in the field of pain management when indicated. The same can be said without doubt about patients with acute trauma in accident and emergency departments, as well as many other medical patients with acute painful conditions, e.g. sickle cell anaemia, who can benefit from the service. A hospital-based acute pain service can play a vital role in providing these necessary services.

5. Conclusion and recommendations

5.1. Conclusion

The data of this survey do not resolve many controversial issues (e.g. the best place to care for pa-

tients with epidurals, best concentration of local anaesthetic, best opioid or other adjuvants); however, they do give some indication of current practice and highlight some difficulties faced by the service in the UK.

APS is available now in many hospitals (89.4%). The APS team consists mainly of anaesthetists and nurses, sometimes pharmacists, and rarely physiotherapists and psychologists.

The need to establish a national database to facilitate regular national audits cannot be over emphasised. There is also an urgent need to address funding of APS nationally and to standardise guidelines so patients would not be deprived of such highly appreciated service.

5.2. Recommendations

The results of this survey and the literature review identified areas for further assessment and generated recommendations.

- Many teams are still lacking the multidisciplinary nature of their originally described structure.
- As anaesthetic departments make the "back-bone" of such services; this fact should be reflected on the anaesthetists' workload commitment.
- Training junior anaesthetists should include acute pain management at an early stage of their curriculum as they are usually in the front line dealing with problems particularly after hours.
- Nursing staff training is the most common factor for not initiating a full service on surgical wards, so skills needed to monitor patients receiving PCA and epidurals must be included in their curriculum at an early stage.
- As the structure and processes of the APS have been established, future research should focus on cost and patient outcome evaluation.
- Well-designed, multidisciplinary protocols, patient information sheets and staff information are all required to be widely implemented by APS nationally.
- The standardisation of protocols in line with evidence-based practice, clinical governance and the National Institute of Clinical Effectiveness (NICE).
- Pain scoring systems should incorporate patient self-rating to involve both patients and providers in the process.
- More funds need to be invested into this service, as this will lead both directly and indirectly to shorter hospital stay and less pressure on ITUs and HDUs; investment that would be welcomed and well spent.

- More education to surgeons, nursing staff, anaesthetists and patients is the key for the continuation and survival of this service.
- APS need to be tailored to the needs and resources of individual institutions as many hospitals are already using a wide range of modern analgesic modalities without the benefit and explicitly designated time or structure of a formalised pain service.
- The development of a critical pathway for surgical patients should be developed in liaison with acute pain services for better use of resources and for a better interdisciplinary approach.
- The need for regular national audits.
- The establishment of a national acute pain database to facilitate regular national audits.

Appendix A. Survey of acute pain service in the UK

Please answer the following questions by ticking the appropriate box

- Do you have Acute Pain Service (APS) in your hospital
 - Yes
 - No
- Which of these disciplines are represented in your APS?
 - Anaesthetists
 - Surgeons
 - Nurses
 - Pharmacist
 - Physiotherapist
 - Psychologist
 - Other (Please specify)
- Who runs “out of hours” epidural service for postoperative pain
 - Anaesthetist
 - Other medical staff
 - Nurses
 - Others (Please specify)
- Do you have dedicated medical staff sessions for the running of the APS?
 - Yes
 - No
- Do you run regular training in your hospital for

Medical staff		Nursing staff
<input type="checkbox"/> Yes		<input type="checkbox"/> Yes
<input type="checkbox"/> No		<input type="checkbox"/> No
- Where do you look after patients with epidural opioids for postoperative pain
 - Surgical wards
 - HDU
 - ITU
- What methods of postoperative pain management are used in your hospital

<input type="checkbox"/> Intramuscular opioids	%	} approximately
<input type="checkbox"/> PCAS	%	
<input type="checkbox"/> Epidurals	%	
<input type="checkbox"/> Nerve blocks	%	
<input type="checkbox"/> Nerve blocks with catheters	%	
<input type="checkbox"/> Others (please specify)	%	
- Do you have written protocol for Epidural
 - Yes
 - No
- Which concentration of Bupivacaine is mostly used in your epidurals for APS
 - 0.07%
 - 0.1%
 - 0.25%
 - Other (please specify)
- Do you use opioids with LA for postoperative epidurals?

- Yes No
- If yes, what opioids are used in your epidural for APS ?

<input type="checkbox"/> Diamorphine	%	}	approximately
<input type="checkbox"/> Morphine	%		
<input type="checkbox"/> Fentanyl	%		
<input type="checkbox"/> Sufentanyl	%		
<input type="checkbox"/> Other (please specify)	%		
 - Do you use other drugs with LA in your epidurals for APS?

Yes No
 - If yes, what do you use?
 - Clonidine
 - Ketamine
 - Other (please specify)
 - Do you use clonidine in Acute Pain Management apart from epidurals?

Yes No
 - If you use clonidine for APS epidurals do you use it as:
 - Bolus then infusion
 - Infusion only
 - What dose do you use for epidural clonidine?
 - Epidurals for postoperative pain in your hospital are
 - Patient Controlled Epidural
 - Not patient controlled
 - Do you obtain written consent for Epidural blocks?

Yes No
 - Do you use clonidine in Brachial Plexus Block?

Yes No
 - If yes
 - Bolus Dose:
 - As infusion (catheter technique) Dose:
 - Do you obtain written consent for Brachial Plexus Block?

Yes No
 - What parameters do you monitor in patients receiving postoperative epidurals?

<input type="checkbox"/> BP	<input type="checkbox"/> Motor block
<input type="checkbox"/> Pulse	<input type="checkbox"/> Urine output
<input type="checkbox"/> SaO2	<input type="checkbox"/> Sensation block
<input type="checkbox"/> Respiratory rate	<input type="checkbox"/> Pain score (which scoring system you use?)
<input type="checkbox"/> Sedation	<input type="checkbox"/> Other (please specify)
 - Regarding side effects; approximately, what percentage of your patients having epidurals had respiratory depression requiring naloxone?

%
 - Which opioid is mostly associated with respiratory depression in your APS?

Diamorphine

Morphine

Fentanyl

- What other side effects requiring treatment do you get?

Pruritus %

Nausea & vomiting %

Urine retention %

Other (please specify) %



approximately

- Further comments

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