Application of a modified form of the Glasgow pain scale in a veterinary teaching centre in the Netherlands

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The Glasgow Composite Measure Pain Scale was developed to measure acute pain in dogs in a hospital setting. In this investigation a modified version of the scale was applied in a centre with a different surgical case load and analgesic protocols, and where English is not the first language, to test its validity in a different clinical environment. The modified scale was used to score pain in 60 dogs during the 24 hours after surgery. Their levels of sedation and a clinical impression of their pain were scored at the same time. Three questions were considered; first, how the modified pain score was related to the pain assessed subjectively, secondly, how it related to variables such as the surgical procedure and the dog's health and thirdly, how it changed over time. The mean modified pain scores for the dogs rated subjectively as having no, mild, moderate or severe pain were significantly different, indicating that the modified scale distinguished between pain of different severities. The changes in the dogs' scores also followed the expected changes in their level of pain with time, providing empirical evidence that the scale measures pain.

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THE importance of providing effective pain management for small animals is being increasingly accepted by the veterinary profession (Lascelles and others 1995, Capner and others 1999, Hugonnard and others 2004, Paul-Murphy and others 2004). However, recent surveys of the perioperative provision of analgesia to small animals suggest that the use of analgesic drugs in small animal veterinary practice is suboptimal (Lascelles and others 1995, Dohoo and Dohoo 1996, Capner and others 1999, Hugonnard and others 2004, Williams and others 2005). In some of these studies, difficulties in recognising pain were cited as one of the major causes for withholding analgesics. Generally, the respondents did not feel confident of their ability to recognise and assess pain, suggesting that the development of tools to facilitate its assessment in a practice setting should contribute to improvements in its management.

The recognition of pain in animals is problematic (Anil and others 2002). In people, the self-reporting of pain is the gold standard for the assessment of pain (Mathew and Mathew 2003), and allows the experience of the individual to be evaluated. However, in veterinary medicine, the recognition of pain relies on the interpretation of an animal's behaviour by an observer, because there is no effective means of communication between them.

Until recently, the methods used to assess pain in animals were the scales used in human beings; the simple descriptive scale (SDS) (Taylor and Houlton 1983, Waterman-Pearson and Kultham 1988), the numerical rating scale (NRS) (Taylor and Houlton 1983, Taylor and Herrtage 1986), and the visual analogue scale (VAS) (Reid and Nolan 1993, Welsh and others 1993). However, these scales have been shown to be unreliable in the assessment of acute pain in dogs in a hospital setting (Holton and others 1998); moreover, they measure only one dimension of the pain experience, namely its intensity, whereas multidimensional or composite rating scales also take into account the sensory and affective qualities of pain. The multidimensional McGill Pain Questionnaire (MPQ) (Melzack and Torgerson 1971), developed to provide quantitative assessments of clinical pain that could be treated statistically, is one of the most widely used tests for the measurement of pain in man. The Glasgow Composite Measure Pain Scale (CMPS) is a behaviour-based composite scale to assess acute pain in dogs, the prototype of which was described by Holton and others (2001). It was developed by using similar methods to those described by Melzack and Torgerson (1971) for the MPQ, and it takes the form of a structured questionnaire completed by an observer while following a standard protocol which includes the assessment of spontaneous and evoked behaviours, interactions with the animal and clinical observations. It is the first scale designed for use in dogs in which the validity of the categorisation and assignation of expression within each category was assessed statistically by using clustering techniques and Cronbach's alpha coefficient (Cronbach 1951).

There are other composite scales for use in animals (Morton and Griffiths 1985, Conzemius and others 1997, Hellyer and Gaynor 1998, Firth and Haldane 1999), but the CMPS is unique by virtue of the fact that it was designed by using psychometric principles, which are well established in human medicine for the measurement of complex and intangible constructs such as intelligence, pain and quality of life (Coste and others 1995, Landgraf and Abetz 1996). The psychometric approach to the design of the scale involves an established process of item selection, questionnaire construction and testing for validity, reliability and sensitivity which, in addition to the validation carried out by Morton and others (2005), supports the validity of the CMPS for measuring pain in a clinical situation. Furthermore, the application of the method of Paired Comparison Scaling Model (Thurstone 1928) to derive weights for the items in the scale allows for measurements to an interval level, which is particularly important in quantitative studies of pain because the difference between two points on the scale can be integrated regardless of their position on the scale. Each item has a weight assigned to it and the sum of the weights for the chosen items gives the pain score for the animal (Table 1) (Morton and others 2005).

The use of psychometric principles for measuring pain in people is widespread throughout the world, but it is recognised that they may not apply strictly to populations other than that for which they were designed; where the system has been translated into another language validation studies are normally carried out to ensure that it remains reliable (Jakobsson and Horstmann 2006). The validation of the CMPS has been limited to that carried out by Morton and others (2005) in the Glasgow University Small Animal Hospital where it was developed and where English is the first language. This paper describes the results of studies carried out in the University of Utrecht Small Animal Hospital, a centre with a different surgical case load and different anaesthetic and analgesic protocols, and where English is not the first language.

A key step in the psychometric process of constructing the scale is to test it with a selection of end users to ensure

TABLE 1: Transformed weights applied to the behaviours scored within each of the seven categories of the modified composite measure pain scale

Category	Behaviour	Transformed weight
Demeanour	Aggressive/depressed	1·22
	Uninterested	1·56
	Nervous/anxious/fearful	1·13
	Quiet/indifferent	0·87
	Happy/content	0·08
Posture	Rigid	1·20
	Hunched	1·13
	Normal	0·00
Comfort	Uncomfortable	1·17
	Comfortable	0·00
Vocalisation	Cry	0·83
	Groan	0·92
	Scream	1·75
	Quiet	0·00
Attention to surgical wound	Chewing	1·40
	Licking/looking/rubbing	0·94
	Ignoring	0·00
Mobility	Refuses to move	1·56
	Stiff	1·17
	Slow/reluctant	0·87
	Lame	1·46
	Normal	0·0
Response to touch	Cry	1·37
	Flinch	0·81
	Snap	1·38
	Growl/guard	1·12
	Do nothing	0·0

TABLE 2: Scoring systems used to evaluate the dogs' level of sedation and make subjective estimates of their level of pain

Score	Definition
Sedation	
0	Fully alert and able to stand and walk
1	Alert, able to maintain sternal recumbency and walk but may be ataxic
2	Drowsy, able to maintain sternal recumbency but unable to stand
3	Fast asleep, unable to raise head (modified from system used by Lascelles and others [1994])
Pain	
None	Happy and bouncy, eating, sitting/lying in the cage, sleeping, walking freely, no signs of discomfort. Anxiety exhibited by constant barking and elevated heart rates but not associated with pain, can be a feature of hospitalised dogs
Mild	Generally quiet, still eating and sleeping, wagging the tail when approached but may limp during walking, tend to guard the surgical area and react to palpation. Respiratory rate may be increased
Moderate	Depressed (keeping the head down), may tremble, uncomfortable, sitting or lying in a tense body position (standing with abdomen tucked in and tail hanging down, or lying with all four legs stretched out), lying but not sleeping. May or may not eat, may cry, be slow to interact with caretaker, may pay attention to the wound and react to wound pressure (by looking back, licking or even trying to bite)
Severe	Vocalising continuously, increased respiratory rate, not interested in surroundings but may respond to a direct voice (may stop crying, may turn the head and eyes), dilated pupils. May be restless, changing its position continuously or may refuse to move (urinates and defecates without moving). Sometimes may be quiet or may be shaking, refuses to eat

that it is suitable for its intended respondents (Vaillancourt and others 1991) and to refine the design of the questionnaire where appropriate. As a result of this process the order of the categories in the prototype CMPS questionnaire was changed to improve its efficiency when using it with the standard examination protocol. Similarly, as a result of feedback from users, items within each category were re-ordered in increasing order of the severity of pain. This modified version of the CMPS (Fig 1) was used in this study. Its validation would provide strong evidence that the Glasgow CMPS is suitable for use in a broader clinical context than that for which it was designed, particularly in small animal practice where the case load and analgesic protocols may vary widely and where language difficulties might affect its performance.

MATERIALS AND METHODS

The 60 dogs used in the study had all been referred for either soft tissue or orthopaedic surgery, and they all remained in hospital for at least 24 hours after surgery. No breed, gender or age restrictions were imposed, but dogs judged to be too aggressive on the basis of their preoperative behaviour to participate in postoperative pain scoring were excluded.

Each dog entered the study when it was extubated. The anaesthetic and analgesic regimens were not standardised, and a variety of different anaesthetic and analgesic protocols were used. They were standard protocols in use at Utrecht and applied according to each dog's predetermined American Society of Anesthesiologists (ASA) status and the surgical procedure to be carried out.

The dogs were premedicated with either medetomidine (Domitor; Pfizer Animal Health) and buprenorphine (Temgesic; Schering-Plough) or with methadone and midazolam (both pharmacy preparations) and anaesthesia was induced with propofol (Propofol; Fresenius Kabi) or thiopental (Nesdonal; Merial) and maintained with either isoflurane (Isoflo; Abbott) or halothane (Fluothan; Abbott). Sedation with medetomidine was reversed by the intramusuclar administration of atipamezole (Antisedan; Orion) before extubation. Perioperative analgesia was also not standardised and varied according to the anaesthetic protocol and the surgical procedure. All the dogs received carprofen (Rimadyl; Pfizer Animal Health) intravenously during induction of anaesthesia unless it was contraindicated. For postoperative analgesia either buprenorphine or methadone was given at regular intervals, or according to clinical judgment, for a minimum of 24 hours after the surgery.

The modified pain scale was used to assess the level of pain in all the dogs at regular intervals during the first 24 hours after surgery. The assessments were all made by one observer (E. P.). Each dog was assessed on four separate occasions during each of three time periods up to three hours, three to 12 hours and 18 to 24 hours after the dog had been extubated.

The application of the pain scale was standardised throughout the study. The dog's behaviour was assessed initially from outside the kennel and any spontaneous vocalisation, attention to the surgical area and posture were recorded. The door of the kennel was then opened and the dog's name called to encourage it to approach. When possible the dog was taken out of its cage and walked to assess its mobility; when this was not possible, its ability to stand was assessed. Gentle pressure was applied around the wound and the dog's response to touch was evaluated. Finally, the assessor formed overall impressions of the dog's demeanour and comfort and recorded them. After completing the assessment, the observer made a subjective assessment of the dog's levels of pain and sedation on the basis of a SDS, using the terms, none, mild, moderate or severe for pain, and a scale from 0 to 3 for sedation (Lascelles and others 1994) (Table 2). Whether the dog had undergone soft tissue or orthopaedic surgery, and its health, assessed according to the ASA system used to classify anaesthetic risk were also recorded (Table 3).

Statistical analysis

Three questions were considered; first, how the modified pain scores related to the subjective assessments on the basis of the SDS; secondly, how they related to the type of surgery undertaken and the ASA status of the animals; and thirdly, how they changed over time. The statistical analyses were car-

TABLE 3: Classification system of the American Society of Anesthesiologists to assign five categories of anaesthetic risk

Category	Definition
1	Normal healthy patient with no detectable disease
2	Patient with a mild systemic disease
3	Patient with severe systemic disease that limits activity but is not incapacitating
4	Patient with an incapacitating systemic disease that is a constant threat to life
5	Moribund patient not expected to survive 24 hours with or without the operation

TABLE 4: Mean differences (95% confidence intervals [CI]) between the mean modified composite measure pain scale pain scores of dogs six and 23 hours after soft tissue or orthopaedic surgical procedures in relation to subjective estimates of their pain (none, mild, moderate or severe) made on the basis of a simple descriptive scale

Time (hours)	Categories of pain	Difference between mean values (95% CI)	P
6	Moderate-mild	1·937 (1·08-2·80)	<0·0001
6	Severe-mild	3·160 (0·25-6·07)	0·0287
23	Moderate-mild	1·635 (0·35-2·92)	0·0081
23	Mild-none	2·551 (0·93-4·17)	0·0009
23	Moderate-none	4·186 (2·20-6·18)	<0·0001

ried out by using MINITAB version 14 (Microsoft). Two main types of statistical analysis were applied to the data.

Box-plots and descriptive statistics were used initially to investigate how the dogs' modified pain scores were related to their subjective pain score on the SDS, their health on the ASA classification and the type of surgery. A one-way analysis of variance was then applied to investigate whether the population mean modified pain scores were significantly different across the different levels of these variables. The measurements were made during three different time periods after surgery, so that the precise times of data collection varied. Accordingly, to simplify the data analysis, the initial statistical analyses were carried out on the data collected immediately after, and six and 23 hours after the dogs were extubated. The data were normally distributed and equal variances could be assumed.

The changes in the modified pain score during the first 24 hours after surgery were also examined. Initially, the measurements made two, six and 23 hours after extubation were used, with box-plots and descriptive statistics being used as before to investigate whether there were any differences. A repeated measures analysis of variance was then used to examine the changes in modified pain score during the 24 hours after extubation; paired *t* tests were applied to establish whether the population mean scores were significantly different at times.

Dog's name______________ Hospital number______ Date_______

Time__________ Procedure______________________

A. Look at dog in kennel
Is the dog?

(i)		(ii)		(iii)	
Quiet	☐	Ignoring any wound, painful area	☐	Normal	☐
Crying or whimpering	☐	Licking, looking or rubbing it	☐	Hunched/tense	☐
Groaning	☐	Chewing it	☐	Rigid	☐
Screaming	☐				

For clinical reasons it may not be possible to carry out question B

Please tick if this is the case ☐ and then proceed to C

B. Put lead on dog and lead out of kennel

When the dog rises/walks is it?
(iv)

- Normal ☐
- Lame ☐
- Slow/reluctant ☐
- Stiff ☐
- It refuses to move ☐

C. If it has a wound/painful area apply gentle pressure 2 inches round the site
Does it?
(v)

- Do nothing ☐
- Flinch ☐
- Growl/guard area ☐
- Snap ☐
- Cry ☐

D. Overall
Is the dog?
(vi)

- Happy and content/happy and bouncy ☐
- Quiet or indifferent ☐
- Aggressive ☐
- Nervous/anxious/fearful ☐
- Depressed/uninterested ☐

Is the dog?
(vii)

- Comfortable ☐
- Uncomfortable ☐

FIG 1: Modified Glasgow composite measure pain scale

RESULTS

There were 31 female and 29 male dogs of a variety of breeds and crossbreeds. They ranged in age from three months to 13 years (mean 6·2 years), and in weight from 2 to 54 kg (mean 22 kg). Forty-four of the dogs underwent a wide range of soft tissue procedures, and the other 16 a range of orthopaedic procedures.

Sedation scores

The dogs' sedation scores indicted that only 50 per cent of them were awake when they were extubated, and the results from this time were therefore omitted from the formal analyses, which included only the data collected six and 23 hours after extubation. All 60 of the dogs were assessed at six hours, but only 54 of them were assessed at 23 hours.

At six hours, 54 of the dogs were alert (sedation level 0), two were mildly sedated (level 1) and four were moderately sedated (level 2). Of the 45 dogs which were ASA 1 or 2, 43 were alert, one was mildly sedated and one was moderately sedated. Of the 15 dogs which were ASA 3 or 4, 11 were alert, one was mildly sedated and three were moderately sedated. In contrast, at 23 hours all 54 dogs were alert; 42 of them were ASA 1 or 2 and 12 were ASA 3 or 4.

Relationship between the dogs' modified pain score and their subjective SDS pain score

Only one of the 60 dogs was assessed as being in severe pain. There were significant differences between the mean modified pain scores of the dogs assessed subjectively by the SDS as having no, mild, moderate or severe pain at both six and 23 hours after extubation (P<0·001) (Fig 2) and the differences were in the correct order, that is mild<moderate<severe (Table 4).

Relationship between modified pain score and type of surgery

At six hours after extubation there was no significant difference between the mean modified pain scores of the dogs that underwent soft tissue or orthopaedic surgery; however, at 23 hours the dogs that underwent soft tissue surgery had a lower mean pain score, and the difference was nearly significant (P=0·62) (Fig 3).

Relationship between pain score and ASA classification

There were no significant differences between the mean modified pain scores of the dogs with different ASA statuses.

Changes in mean modified pain scores with time

The preliminary analysis using a boxplot (Fig 4) suggested that the mean modified pain scores tended to decrease with time. The formal analysis showed there was a significant time effect (P=0·004), with significant reductions in mean pain scores between two and 23 hours and between six and 23 hours (Table 5).

TABLE 5: Mean differences (95% confidence intervals [CI]) between the mean modified composite measure pain scale pain scores of dogs two, six and 23 hours after soft tissue or orthopaedic surgical procedures

Pain score	T value	P value	95 per cent CI	Conclusion
Two hours and six hours	–0·44	0·89	–0·62 to 0·43	Insignificant
Two hours and 23 hours	–3·17	0·005	–1·27 to 0·18	Significant
Six hours and 23 hours	–2·74	0·019	–1·18 to 0·08	Significant

DISCUSSION

The aim of this study was to apply a modified version of the CMPS to measure acute pain in dogs after they had undergone orthopaedic or soft tissue surgery at the University of Utrecht. There were significant differences between the mean modified pain scores of the dogs, which were related directly to the scores assigned to the dogs by the same assessor on a subjective SDS scale, showing that the modified version can distinguish between different severities of pain. However, the modified pain scores were not related significantly either to the type of surgery undergone, or to the ASA health status of the dogs. These results support the findings of Morton and others (2005), and provide further evidence that the modified CMPS is a useful scale for measuring acute pain in dogs.

Testing the validity of a pain scale is inherently difficult because of the requirement for an appropriate 'gold standard' with which comparisons can be made. In human beings, the VAS has been considered to be the 'gold standard' (Williams and others 2000) because it allows 'self reporting' of the pain; in animals self-reporting of pain is impossible and any assessment has to be made by a trained observer. There have been many studies of the use of behavioural changes, rather than changes in physiological or biochemical variables, to assess pain in animals (Holton and others 1998, 2001, Kent and others 1998, Firth and Haldane 1999, Thornton and Waterman-Pearson 1999, Fox and others 2000, Roughan and Flecknell 2000, 2001). It is disputable whether a new pain scale can be validated by comparison with a pain scale that has not been validated in animals, such as a VAS, NRS or SDS. There may be significant agreement between the scales simply because both give equal weights to similar behaviours, regardless of whether they are indicative of pain.

In this study the modified CMPS was compared with an assessment of pain on the basis of an SDS, both assessments being made by the same observer, who was experienced in use of both the scales. The SDS is recognised to measure only the intensity of pain, but it is widely used because of its simplicity (Reville and others 1976). In human beings, an SDS is less sensitive for measuring pain than a NRS or VAS (Ohnhaus and Adler 1975, Holton and others 1998). Holton and others (1998) compared a VAS, NRS and SDS for measuring acute pain in dogs and found that the NRS was the most suitable in a clinical setting when more than one observer was assessing the pain. Morton and others (2005) compared the CMPS with a NRS when the pain assessments were made by more than one trained observer.

In this study, a SDS was chosen because it is simple and because there was a single assessor. The dogs were examined in accordance with the modified CMPS protocol before they were scored by the SDS, so that the SDS scores may have been influenced by the observation of the same behaviours that contributed to the modified CMPS scores. This is likely to have improved the correlation between the SDS pain scores and the modified CMPS scores (Labus and others 2003) and would have confounded the data, particularly because the assessor was trained to use the SDS by experts familiar with the modified CMPS. At present, there is no objective gold standard technique for measuring pain in veterinary practice, and any new pain scale has to be validated against existing subjective behavioural scoring systems. This is an inherent weakness in the technique used to validate the modified CMPS in this study and would have been present regardless of which other pain scale had been used for comparison.

There were no significant differences between the modified pain scores recorded in dogs with different ASA statuses or sedation scores, providing evidence that the modified CMPS was measuring pain rather than other factors that might have affected the dogs' behaviour. The dogs with a higher ASA classification were not healthy and were likely to have undergone more complex and longer surgical procedures. Furthermore, their ASA status could have influenced their level of sedation after surgery and their speed of recovery from anaesthesia. Several of the behavioural descriptors that constitute the modified CMPS may be influenced by sedation, which is particularly evident in the immediate postoperative period when the animal is recovering from anaesthesia. Six hours

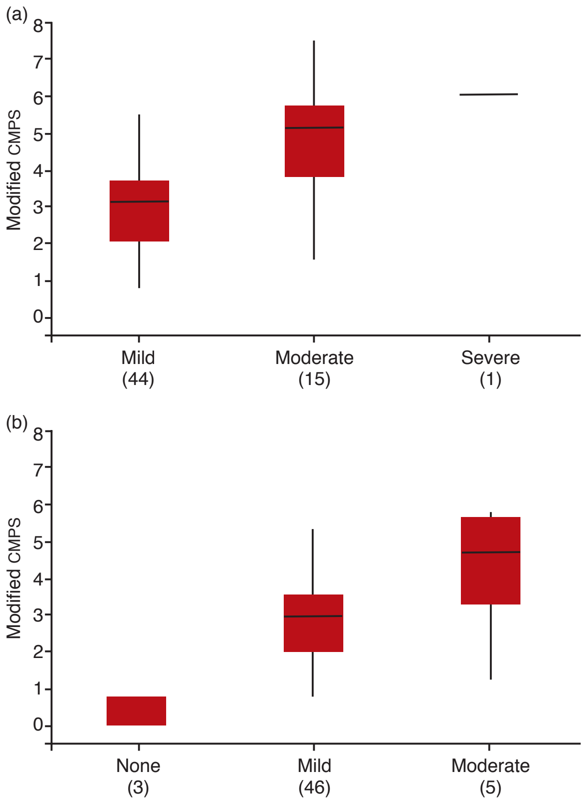

FIG 2: Boxplots of the dogs' modified composite measure pain scale (CMPS) pain scores in relation to the subjective estimates of pain made on the basis of a simple descriptive system (a) six hours and (b) 23 hours after they were extubated after either soft tissue or orthopaedic surgical procedures. Numbers of dogs are given in brackets

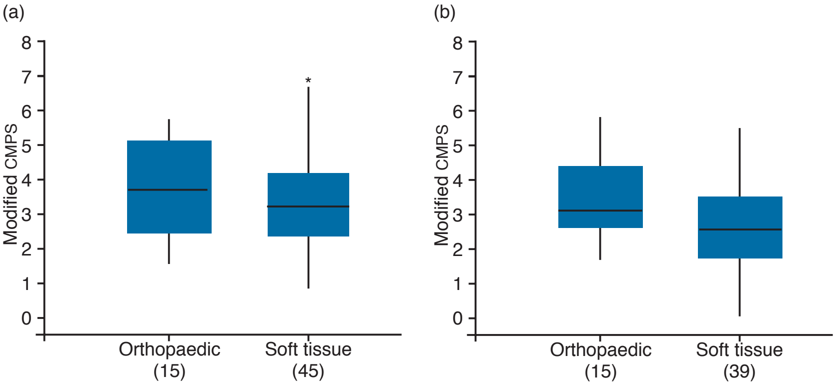

FIG 3: Boxplots of the modified composite measure pain scale (CMPS) pain scores of the dogs that underwent either orthopaedic or soft tissue surgical procedures (a) six hours and (b) 23 hours after they were extubated. Number of dogs are given in brackets. * Outlier

after surgery, 27 per cent of the dogs with an ASA status of 3 or 4 showed signs of mild to moderate sedation, compared with only 5 per cent of the dogs with an ASA status of 1 or 2; at 23 hours all the dogs were alert. In addition to a higher level of sedation, the dogs with an ASA status of more than 3 may have been depressed as a result of systemic disease, but any such effect did not confound the data.

One of the aims of this study was to evaluate the modified CMPS in a clinical environment where different types of surgeries and different analgesic protocols are used. Control groups that did not undergo surgery, or which did not receive analgesics were therefore not included; the latter type of control group is considered to be unethical by many animal pain researchers, but including one would have improved the ability of the study to validate the modified CMPS.

Most of the dogs were judged by the SDS to be in mild or moderate pain, and only one was judged to be in severe pain. This was due to the effectiveness of the analgesic protocols used, but it had the disadvantage that it limited the range of pain behaviours to be observed. To observe animals in severe pain would probably have required the analgesics to be withheld, an unethical procedure. However, the modified CMPS scores were significantly different from each other for the dogs assigned to the different pain categories, higher pain scores being given to those judged to have been in greater pain by the SDS. This suggests that the modified CMPS is sensitive enough to distinguish pain of different severities, an essential requirement for it to be clinically useful.

The pain scores were significantly lower at 23 hours after extubation than at two or six hours. It is generally accepted that surgical pain is most severe in the early postoperative period (Hellyer and Gaynor 1998) and then gradually declines as the inflammatory response wanes. Morton and others (2005) found that pain scores assessed by the CMPS and NRS also decreased with time after surgery, suggesting that the CMPS measures pain. It also suggests that after many types of surgery the requirement for analgesia is highest in the first 24 hours and that the administration of analgesics should be adjusted to meet this requirement.

The design of the study imposed some limitations on the collection of data. First, the times when the dogs' postoperative pain was scored were determined by when the surgery was carried out, so that not all the animals were scored at the same intervals after their surgery. In the final statistical analysis only the data collected at six and 23 hours after the surgery were evaluated, because they were considered to be the most relevant time points, particularly because by six hours the effects of the analgesics given intraoperatively and the anaesthetic drugs should have diminished. Secondly, the assessor was aware of the type of operation carried out and the anaesthetic or analgesic drugs administered in the perioperative period. As a result, he might have been biased when applying the modified CMPS and SDS because of preconceptions about the pain likely to be experienced by the animal. It would have been difficult to overcome this limitation because, owing to the range of procedures studied, bandaging the animals to mask the site of surgery would have been technically difficult, and because the assessor was familiar with the analgesic and anaesthetic protocols applied in the clinic.

Whether the operation was a soft tissue or orthopaedic procedure did not significantly affect the dogs' pain scores at six hours, but the relationship was nearly significant at 23 hours. Animals undergoing orthopaedic procedures tended to have higher pain scores than soft tissue cases, which supports the common assumption that orthopaedic procedures are more painful than soft tissue procedures (Lascelles and others 1995, Capner and others 1999).

To be clinically useful a pain scale must be easy to use and quick to apply, and be applicable to dogs of different breeds undergoing a wide variety of surgical and medical procedures. The modified CMPS was easy to use and the assessor quickly became familiar with using the scale. Regardless of the numerical pain score assigned, the assessor was forced to assess behaviours that may be associated with pain and draw a conclusion about whether the animal required additional analgesia. In practice, this would be a major contribution towards the improved management of pain.

The results of this study demonstrate that the modified CMPS is a useful scale for measuring perioperative pain in a clinical setting that can be applied when the assessors are not native English speakers. They also provide evidence for its validation as a new multi-dimensional pain scale for measuring acute pain in dogs, supporting the findings of Morton and others (2005), and suggesting that it may be appropriate for small animal practice where a wide variety of analgesic and anaesthetic protocols are used.

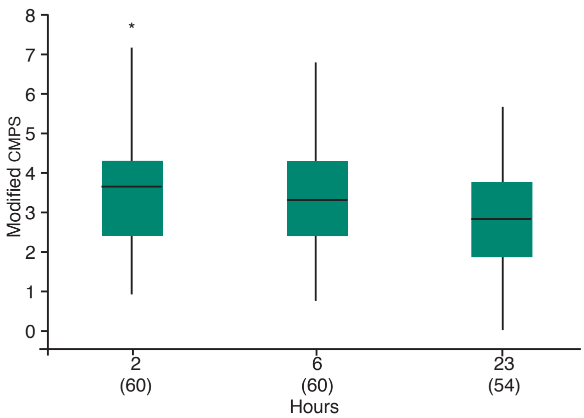

FIG 4: Boxplots of the modified composite pain scale (CMPS) pain scores of the dogs at two, six and 23 hours after they were extubated after orthopaedic or soft tissue surgical procedures. Numbers of dogs are given in brackets. * Outlier

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Application of a modified form of the Glasgow pain scale in a veterinary teaching centre in the Netherlands

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