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PAIN MANAGEMENT

Update on Clinical Acute Pain Assessment in Cats

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Pain is defined as "a distressing experience associated with actual or potential tissue damage with sensory, emotional, cognitive, and social components."[1] Failure to recognize acute pain states and provide adequate analgesia, known as oligoanalgesia, can have a variety of immediate and long-term deleterious effects (**TABLE 1**).[2] Perioperative oligoanalgesia can result in peripheral and central sensitization, a condition in which lowering of the patient's sensitivity threshold to noxious and non-noxious stimuli intensifies the patient's painful state, leading to chronic, maladaptive pain.[3] Increased sensitivity to noxious stimuli is called hyperalgesia; when a stimulus (e.g., a gentle touch) that otherwise would be considered nonpainful results in intense pain, it is called allodynia. Both can result from inadequate pain treatment.

The key in treating pain is to first identify if a patient is experiencing it via the use of a pain assessment tool (PAT). This article discusses the state of acute clinical pain assessment in cats, with specific focus on the usage and implementation of PATs during the perioperative period.

TABLE 1 Physiologic Effects of Inadequate Pain Management in Cats[2]

	INADEQUATE MANAGEMENT OF ACUTE PAIN	INADEQUATE MANAGEMENT OF CHRONIC PAIN
Increased	Heart rate Respiratory rate Myocardial workload Oxygen consumption Systemic vascular resistance Bronchial tone	Cortisol Glucagon Antidiuretic hormone Aldosterone Angiotensin Growth hormone Catecholamines Renin Inflammatory mediators
Decreased	Gastrointestinal motility	Insulin

PROBLEM AREAS
Effective pain assessment tools allow practitioners to identify the presence of pain in companion animals that may be disguising their discomfort.

BOX 1 Clinical and Physiologic Signs of Acute Pain in Cats[5–8]

Autonomic system changes
- Arterial hypertension
- Tachypnea
- Tachycardia
- Mydriasis

Postural changes
- Hunched, rigid posture
- Lowered head position (below shoulder line or tilted down)

Facial changes
- Orbital tightening (narrowing of the orbital area)
- Muzzle tension (flattening and stretching of the muzzle)
- Tightly closed or squinted eyes
- Altered ear position (tips of ears pulled apart and rotated outwards)

Behavioral changes
- Growling and vocalizations
- Reduced activity and/or interactions with people
- Hiding
- Decreased grooming
- Decreased appetite
- Intention to wound or self-mutilate

Adverse reaction to palpation
- Growling and vocalization
- Tries to bite observer performing the palpation
- Hides or flees to avoid palpation

CHALLENGES IN FELINE PAIN ASSESSMENT

The saying "cats are not small dogs" holds true when evaluating pain. Signs of pain in cats are often subtle and more difficult to identify than those in dogs (**BOX 1**).[4] For example, cats have fewer social behavioral displays, often due to their solitary hunting lifestyle, which contributes to their lack of identifiable pain expressions.[9] Domestication of cats has also introduced "tolerance" of human proximity, increasing the likelihood for hidden pain-related behaviors (stoic nature) and expressions.[10]

Feline pain assessment in a veterinary hospital possesses separate challenges. Cats are less likely to visit veterinary hospitals than dogs,[11] reducing their ability to acclimate themselves to a hospital setting. Cats also require a means of transport that may not be habitual in their everyday lifestyle (i.e., carrier), further exacerbating stress and anxiety. These emotions in the hospital may alter physiologic variables,[12] thereby artificially increasing pain scores when using certain feline pain scales.[13] For example, the white-coat phenomenon of increased blood pressure could influence pain scores reported on the UNESP-Botucatu Multidimensional Composite Pain Scale. It is important for practitioners to always evaluate all components of pain (sensory, emotional, cognitive, and social).

SELECTING AN ACUTE PAIN ASSESSMENT TOOL

Choosing a pain scale can be overwhelming for any veterinary practitioner. Limited exposure to PATs (due to their lack of incorporation into veterinary school curricula) and to advances in feline pain assessment in the past 5 to 10 years may increase uncertainty.[2] In a U.K. survey, only 8% of practices used a formal pain scoring system, although 80% of veterinary staff members agreed a scale would be a useful clinical tool.[14] Several PATs are available (unidimensional versus multidimensional, validated versus nonvalidated), and each possesses its own intricacies, further complicating implementation.

When choosing a PAT, veterinarians should look for one that possesses the characteristics listed in **BOX 2** and is practical for the individual clinic. To improve clinic compliance for pain assessment, staff should be educated on the PAT before its implementation.

BOX 2 Characteristics of an Effective Pain Assessment Tool

- Differentiates between presence and absence of pain
- Provides an intervention point for when to administer an analgesic agent
- Evaluates the sensory, emotional, and physiologic aspects of pain
- Categorizes the intensity, frequency, duration, and quality of the painful condition (acute versus chronic, transient and intermittent versus sustained, mild versus severe)
- Practical; requires minimal training and equipment
- Has minimal intra- and interuser variability

Short, didactic training sessions and educational seminars to improve knowledge of pain management and assessment can reduce incidences of oligoanalgesia.[15] Seminars can be delivered by in-house veterinarians, obtained from online resources, or attended at regional and national continuing education meetings. **TABLE 2** lists several starting points.

CURRENTLY AVAILABLE ACUTE PAIN ASSESSMENT TOOLS FOR CATS

Unidimensional Scales

Several varieties of acute PATs exist for cats.[5,16] The simplest are unidimensional scales. Examples of these include visual analogue scales (VASs), numerical rating scales (NRSs), and simple descriptive scales (**FIGURE 1**). A VAS allows the observer to measure pain along a single 100-mm line ranging from 0 mm (absence of pain) to 100 mm (maximal pain). An NRS is similar to a VAS, but the scale is divided into numerical units (e.g., 0 to 10, absence of pain to worst pain, respectively). Simple descriptive scales allow the observer to choose a rating that best describes the patient's pain. Descriptions include the degree of pain intensity (e.g., mild, moderate, severe) and a descriptor to help the observer identify what constitutes this degree. On some occasions, the description is converted to a numeric score.

These PATs require the user to record a subjective score for pain intensity and evaluate only the sensory component of pain. They often do not consider psychologic features and the different characteristics of pain (i.e., dull, throbbing, burning, or sharp). Advantages associated with these scales include their practicality, requirements for minimal training, and ease of use (**BOX 3**). However, due to their subjective nature, they can be affected by observers' implicit bias (e.g., age, gender, cultural differences, personal health, clinical experience),[2,18] leading to observer variability in

TABLE 2 Online Pain Management Educational Resources for Veterinarians

RESOURCE (YEAR)	URL	DESCRIPTION
Feline Grimace Scale website (2020)	felinegrimacescale.com	Provides extensive information on the feline grimace pain scale, online pain assessment practice, and additional information about feline pain and its assessment.
Article: "New feline pain scale interprets pain from cats' facial expression" (2019)	aaha.org/publications/newstat/articles/2019-092/new-feline-pain-scale-interprets-pain-from-cats-facial-expressions	News article discussing the Feline Grimace Scale and pain assessment tools used in cats.
North American Veterinary Anesthesia Society (2018)	mynavas.org	Provides documents, guidelines, and information pertaining to continuing education on pain management and assessment. Information provided via paid membership. In collaboration with ACVAA, ECVAA, AVTAA, and AVA.
American Animal Hospital Association/American Association of Feline Practitioners Pain Management Guidelines for Dogs and Cats (2015)	aaha.org/aaha-guidelines/pain-management-config/pain-management-intro	Available free online for veterinary practitioners. Provides an extensive resource for feline pain management and assessment.
Word Small Animal Veterinary Association and Global Pain Council Guidelines for the Recognition, Assessment, and Treatment of Pain (2014)	wsava.org/global-guidelines/global-pain-council-guidelines	Available free online in 7 languages. Provides an extensive resource for feline pain management and assessment.
American College of Veterinary Anesthesia and Analgesia's position paper on the treatment of pain in animals (2006)	acvaa.org/wp-content/uploads/2019/05/treatment-of-pain-in-animals.pdf	Available free online. Provides information about behaviors associated with pain, but limited information on pain assessment tools.
List of ACVAA-Endorsed Certificate Programs	acvaa.org/continuing-education/certification-endorsement-program	Provides global resources for continuing education courses on pain education.

ACVAA=American College of Veterinary Anesthesia and Analgesia; AVA=Association of Veterinary Anesthetists; AVTAA=Academy of Veterinary Technicians in Anesthesia and Analgesia; ECVAA=European College of Veterinary Anesthesia and Analgesia

scoring.[17] These PATs also do not require the veterinarian to interact with the patient, but rather to observe from a distance. These scales do not describe an intervention level (i.e., value at which analgesia should be administered), which is left to the user to determine. For these reasons, unidimensional scales lack validation for assessing acute pain in cats and should be used with prudence.

A refinement of the VAS was designed to include a dynamic and interactive visual analog scale. This alteration allows it to act more like a multidimensional scale. Using this model, the patient would receive 3 scores based on (1) observing for signs of pain from a distance, (2) as approached and with interaction, and (3) following palpation of the area of insult.[6]

Multidimensional Scales

Multidimensional acute pain scales consider the complex, multifaceted experience associated with pain and, compared with unidimensional systems, can provide a more accurate assessment of the presence or absence of pain and its intensity. These PATs evaluate several patient behaviors from a distance and how the patient interacts with the observer and responds to palpation of nonpainful and painful regions. They may or may not include physiologic parameters (e.g., blood pressure). These PATs offer enhanced reliability when used by observers of varying experiences;[19] however, interobserver differences in scoring are still possible.[18]

To date, 2 validated multidimensional PATs exist to assess acute pain in cats: the Glasgow Composite Measure Pain Scale-Feline (Glasgow CMPS-Feline) and the UNESP-Botucatu Multidimensional Composite Pain Scale (UNESP-Botucatu MCPS). Despite their validation, the use of these tests is limited in cats that are aggressive and fearful, in states of dysphoria, and those receiving ketamine-based anesthetic protocols.[7,20,21] Other acute PATs for cats have gained popularity, but these currently lack validation and therefore proof of negligible variability in observer scoring (**TABLE 3**).

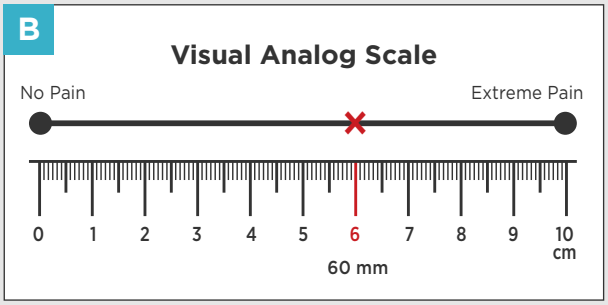
Glasgow CMPS-Feline

The Glasgow CMPS-Feline is a structured, easy-to-use questionnaire. Observers assess spontaneous and induced behaviors during clinical observations and interactions with the animal, respectively. It has been refined from the original version to improve performance sensitivity and now includes a 3-point face scale evaluating ear and muzzle positions.[23] It also

A

Simple Descriptive Scale

SCORE	DESCRIPTION
0	**No pain.** Cat is clinically normal in regard to activity, attitude, and appetite.
1	**Mild pain.** Normal appetite and activity, but slightly sensitive to touch at the surgical site with intermittent vocalizations when placed in a specific position or when pressure is applied to surgical site.
2	**Moderate pain.** Noticeable reduction in activity and appetite, consistent vocalizations or growling, and signs of pain when pressure is applied to surgical site.
3	**Severe pain.** Little or no activity, no appetite, constant vocalizations or growling, severe persistent reaction to palpation (i.e., thrashing, growling, and aggression) when pressure is applied to surgical area or other sites.



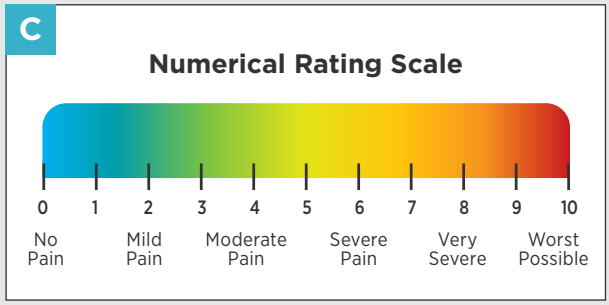


FIGURE 1. General examples of unidimensional acute pain assessment scales used in cats. **(A)** Simple descriptive scale, **(B)** visual analog scale, **(C)** numerical rating scale.

provides a validated cutoff value (score ≥5 out of 20) indicating when analgesic intervention is required. The latest version validated its utility in patients with pain from a variety of sources (postsurgical, trauma, and medical cases) assessed by observers with varying experiences.[23]

UNESP-Botucatu MCPS

The UNESP-Botucatu MCPS evaluates 3 dimensions of pain: (1) pain expression (response to palpation of the surgical area, abdomen, and flank; vocalizations; and miscellaneous behaviors), (2) physiologic variables (blood pressure and appetite), and (3) psychomotor change (posture, comfort, activity, and attitude).[13] This PAT requires more training for the observer and time to perform the evaluation compared with the Glasgow CMPS-Feline, which may pose difficulty in high-volume veterinary hospitals with limited staff.

To facilitate staff training and reduce variability among observers, the creators of this PAT designed a website that provides video examples of varying levels of pain intensity for each dimension (**TABLE 3**). An intervention level is reported (score ≥8 out of 30), along with classification of overall scores as absence of pain (0), mild pain (1 to 8), moderate pain (9 to 21), and severe pain (22 to 30). Although it includes blood pressure measurement, this measure can be omitted without compromising global pain assessment and altering intervention level.[13] This suggestion is based on the poor internal consistency of blood pressure measurement in cats, the low contribution of this parameter to total variance in score, and the lack of feasibility in awake cats.[13]

Nonvalidated Scales

Several nonvalidated multidimensional acute pain scales are available for use in cats. These scales evaluate dimensions of the pain response similar to those in the validated PATs, but they have reduced reported reliability[24] and lack similar scrutiny. The Colorado State University Feline Acute Pain Scale (CSU-FAPS) is simple to use with moderate to good interobserver reliability when used by veterinarians with advanced training in anesthesia (**TABLE 3**).[24] It uses a description-based scaling system evaluating psychologic and behavioral expressions of pain, responses to palpation, and body tension, with accompanying pictures to help assess visual degrees of pain intensity. Other acute PATs used in cats include the University of Melbourne Pain Scale and 4A-Vet Pain Scale; however, they do not provide additional advantages over the validated alternatives.[22,25]

Feline Grimace Scale

Grimace scales use simple, rapid methods to evaluate a set number of facial characteristics specifically associated with pain. Recently, the feline grimace scale (FGS) proved reliable and valid for use in assessing acute pain in cats.[8] The FGS assesses 5 action units (AUs): ear position, orbital tightening, muzzle tension, whisker position, and head position. A score of 0 (absent), 1 (moderate or uncertain), 2 (obvious), or "not possible to score" is appointed to each of the 5 AUs. The scores from all AUs are combined, excluding any marked as "not possible to score," then divided by the maximum possible score (10) to determine a single total pain score.[8] Intervention to administer analgesia is recommended when the total score is >0.39 out of 1.0.

BOX 3 Advantages and Disadvantages of Unidimensional Acute Pain Scales[6,16,17]

Advantages
- Practical
- Quick and easy to complete
- Simple to use and incorporate into daily practice routines
- Require little training
- Can be customized to meet clinic needs
- Allow rapid institution of a preventive analgesic plan
- Potentially easy for owners to use at home

Disadvantages
- Significant variability (up to 36%) in results when used by nonexpert observers
- Observer bias can affect score
- Only evaluate one dimension of pain (sensory)
- Intervention level for analgesic administration is not previously determined
- Lack validation
- Often not standardized
- Limited number of available response options
- Lack sensitivity when detecting slight changes in pain intensity

TABLE 3 Commonly Used Multidimensional Acute Pain Scales for Cats

MULTIDIMENSIONAL ACUTE PAIN SCALE	VALIDATED	INTERVENTION SCORE FOR ANALGESIC ADMINISTRATION	LIMITATIONS	COMMENTS	ONLINE ACCESS
Glasgow Composite Measure Pain Scale-Feline	Yes	≥5 out of 20	Earlier version lacked sensitivity (approximately 25% of cats were misclassified). Affected by patient demeanor.	Easy to use and practical. Ideal for fast-paced, busy practices. Requires minimal training prior to implementation and provides a template for clinical use. Refined scale preferred (Glasgow CMPS-Feline). A canine version is available as well.	aprvt.com/uploads/5/3/0/5/5305564/cmp_feline_eng.pdf (free)
UNESP-Botucatu Multidimensional Composite Pain Scale	Yes	≥8 out of 30	Requires slightly more time to complete than other PATs. Includes assessment of blood pressure and appetite. Only validated to assess pain after feline ovariohysterectomy. Can be influenced by ketamine-based protocols and aggressive demeanor.	Excellent online videos to provide training and promote consistency among observers. Can classify pain intensity. Online tests can assess users' ability to use the scales appropriately. Can be used and is effective without assessing blood pressure. Available in 3 languages.	animalpain.com.br/en-us (free)
Colorado State University Feline Acute Pain Scale	No	None provided	Lacks reliability in veterinarians without advanced anesthesia training. Ability to assess severe pain is undetermined.	Easy to use and practical. Ideal for fast-paced, busy practices. Requires minimal training before implementation and provides a template for clinical use. Further refinement may produce validity in the future. A canine version is available.	csu-cvmbs.colostate.edu/Documents/anesthesia-pain-management-pain-score-feline.pdf (free)
University of Melbourne Pain Scale	No	≥10 out of 27	May be ineffective in sedated patients. Originally used in dogs; reliability in cats is undetermined. Limited evidence to support its use in cats.	Incorporates physiologic factors (heart and respiratory rate, temperature) and response to palpation, activity, mental state, posture, and vocalizations. Can be used to differentiate slight, moderate, severe, and unbearable states of pain.	Requires journal access.[22]

The FGS validation article is open-access, and an easy-to-use training manual can be downloaded from a dedicated website (TABLE 2) to be printed and laminated for everyday clinical use. An online video that discusses the utility of the FGS in clinical practice is also available to watch on the website.

IMPLEMENTING A PAIN ASSESSMENT STRATEGY

Frequency of monitoring acute pain is as important as choosing a PAT. Pain assessment should be incorporated along with measurement of other vital signs and physical examination. Pain should be assessed more frequently closest to the time of insult; as the patient's comfort level improves, the frequency can be gradually tapered (TABLE 4). If analgesic intervention is immediately required or pain is intensifying, assessment should be more frequent. Frequency of pain assessment is always best determined on a case-by-case basis and depends on the analgesic drug's duration of action.

Limitations in assessing pain may be associated with insufficient daily staffing, lack of after-hours staff, aggressive or fractious patients, or outpatient procedures limiting pain assessment past 8 to 12 hours postsurgery (e.g., neutering procedures). Despite these limitations, pain assessment should never be overlooked, regardless of veterinary practice type.

Simple PATs, such as the unidimensional scales, can be used at home by clients to assess pain in pets that cannot remain in the hospital after painful procedures. To improve the effectiveness of these scales, clients should be educated on their use during discharge. Alternatively, clients can be asked to send a short video of their pet to their veterinarian via text or email to aid in determining the status of pain.

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CONCLUSION

Inadequately diagnosed and treated acute pain can result in serious, lifelong physiologic and psychologic consequences. Implementation of PATs can improve a veterinary hospital's success in pain management. It is important that veterinarians review a variety of PATs to determine which suits their veterinary practice best. Resources on pain management are available online to educate veterinarians, staff, and clients on how to improve observer reliability and increase staff and owner compliance. TVP

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TABLE 4 Sample Postsurgical Pain Assessment Schedule[a]

TIME	PREOPERATIVE	0.5 H	1 H	2 H	3 H	4 H	5 H	6 H	8 H
Pain Score									
TIME (CONTINUED)	**12 H**	**16 H**	**24 H**	**32H**	**40 H**	**48 H**	**60H**	**72 H**	**96 H**
Pain Score									

[a]It is important to consider the analgesic drug's duration of action when determining assessment frequency. If the patient receives an unacceptable pain score (i.e., requiring immediate analgesic intervention), pain assessment should be more frequent (i.e., every 1 to 2 hours) until pain is controlled.

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