It is now a settled matter that the adaptive capacities of animals, coupled with the innate biases of human observers, seriously impairs our ability to “know” which of our patients are in pain, how much they are in pain, and sometimes, even where they are in pain. Historically the absence of behaviors easily associated with pain (crying, whimpering, etc.) has been equated with the absence of pain. In fact, animals can lie quietly in pain, or conversely act painful until the approach of a person whereaboutson the painful behavior is replaced by a happy, tail-wagging greeting. Therefore it is first incumbent for veterinary clinicians to operate under the assumption that some procedures and conditions are inherently painful, without the patient having to “prove” they are in pain. Any surgical procedure, trauma, and many medical conditions such as gastroenteritis, pancreatitis, cystitis, inflammatory bowel disease, and certain neoplasms are all examples of where it is incumbent upon the clinician to include pain management in their treatment plan.

Pain is complex, experiential, individual, and multifactoral in its expression. Nevertheless, scoring pain is increasingly recognized as the “4th vital sign” in animals after temperature, pulse, and respiration (in humans it is the 5th, after blood pressure). Indeed the AAHA certification guidelines now require this assessment on every patient (MA23, PM1).2

Overt signs of pain vary by species, and even within species some breeds and individuals have enhanced local and descending inhibitory mechanisms when compared others. Also, realize that pet owners may be better at “reading” their pet than a stranger, and being in a strange environment modifies behavior as well. A recent review article discusses both the progress and challenges in assessing acute pain in cats.3

Some of the “new onset pain behaviors” shown by cats in acute severe pain: hunched position, lowered head, have squinted eyes, or object to handling when they are in pain. However, some cats actually purr when they are distressed or in pain! Cats in severe postoperative pain may become aggressive, tearing at the bandage, frantic and vocalizing. Also, cats are more likely to exhibit withdrawn behavior – crouching in the back of the cage, unwilling to use the litter box, etc., than dogs.4 Some investigational work is being done to examine whisker and tail twitch as a sign of pain in cats.5 A recent paper illuminated behaviors (usually by the owner at home) by which 80% of experts associate feline pain6, including but not limited to: Lameness, difficulty to jump, abnormal gait, reluctant to move, overall decreased activity, absence of grooming or over-grooming of peri-articular area, changed in feeding behavior form, less rubbing on people, shifting of weight, avoiding bright areas.

An investigational tool in human medicine is evaluation of facial expressions, on the premise that certain muscle movements universally occur in our species when pain is present; this has been called “the primal face of pain.” Computer software programs are being developed to detect these expressions that are then translated into an automated score.7 Similar primal facial expressions of pain are thought to exist in animals, e.g. furrowed brow, squinted eyes, ears turned back or away from the forward position, and even without a computer program these subtle changes can provide additional information to the veterinary observer. Facial expression changes are now considered a valid measure of acute pain in rats and mice, and investigation with this tool is underway in cats.8

Scoring pain in non-verbal patients is a special challenge, examples of which includes not only animals but neonates3,10 infant children11 and incapacitated (physically or mentally) adult humans.12 Measuring objective physiologic parameters has proven to be unreliable as indicators of pain,13 largely because of the influence of other non-pain influences e.g. stress, distress,
anxiety, and normal biologic variation. Therefore we are left with subjective evaluations and such scoring systems should meet the following criteria:

- Interobserver variability and observer bias is minimized
- Distinguish between varying levels of pain intensity
- The degree of “importance” of pain to the subject is detected.

Several terms that refer to qualities of a pain rating tool include: validity (the ability of the scale to effectively measure what it is supposed to measure), responsiveness (whether the tool can detect a change in pain, particularly one that is meaningful to the subject), and reliability (whether two observers will give similar ratings using the tool). A pain scale should also ideally be **multidimensional**, in that several aspects of the pain intensity or pain related disability are rated. Pain is felt to have multiple dimensions, and in human chronic pain rating tools, subjects may be asked a number of different questions about their pain - to rate the intensity, to describe how much it interferes with work or with family relationships, and to indicate how unpleasant the pain is. The importance of, or degree of unpleasantness of pain, or of any symptom may be related to the impact on survival that a given symptom has.

Despite the challenges, advances have been made in the use of behavioral evaluations to assign acute (especially post-operative) pain scores, falling under the following general categories:

- SDS (Simple Descriptive Scale), where the observer picks value on a 0-4 or 0-10 scale (no pain to mild pain to moderate pain to severe pain to worst possible pain) that most accurately describes the patient.
- VAS (Visual Analogue Scale)\(^{16}\), where a point is picked along a graduated 0-100mm “ruler”, with 0 being no pain and 100 being the worst possible pain; classically employed, it can only be used by a patient that can self-report (i.e. is verbal, not animals, neonates, stroke victims, etc.), although sometimes an observer is used to pick the spot as a proxy, as would be necessary in veterinary medicine.
- DIVAS, an expansion of the VAS which includes dynamic (the animal is aspected to move) and interactive (the wound is palpated) observations
- NRS (Numerical Rating Scale)\(^{17}\), where values are assigned to several designated clinical criteria, the sum of which gives the pain score.

A commonly used “merge” between DIVAS, SDS, and NRS for post-operative pain in dogs and cats is the Colorado State Pain Scale.

Once verbal descriptions of behavior become part of pain scales, then care must be taken to ensure that all potential users of the scale assign equal meaning and importance to the words or terms in the description. Arbitrary word meanings can increase the subjectivity of the measurement. With both VAS and NRS the observer’s skill of evaluation is crucial to accurate assessment. Although an observation is recorded rapidly, VAS, NRS and SDS are considered to have poor reliability when multiple, less skilled observers are using them; advantages and disadvantages are commonly discussed. Many observers will never have seen an animal experiencing the “worst possible pain”, and so the VAS scale is subject to bias. In addition, the values that are generated from these scales are non-numerical, thus it cannot necessarily be assumed that a subject whose pain was rated at 8 was twice a painful as one whose pain was rated at 4.

The advantages of the SDS and the VAS systems are inherently found in their simplicity and ease of use. However, they also historically result in the most variability, especially between observers.\(^{18}\) However, both inter- and intra-observer variability is diminished by adding in dynamic and interactive observation, that is, without and then with patient interaction, asking the patient to move, and palpation of the surgical site.\(^{19}\) Patient demeanor must be taken into account as this can be a confounding factor in validated pain scoring systems.\(^{20}\)
A pain scale that would take into account the various dimensions of pain would be theoretically more useful in indicating how much the pain “meant” to the animal, but VAS, NRS and SDS scales are said to be unidimensional. An alternative, multidimensional type of scale is the composite measurement scale (CMS), constructed such that it takes into account such dimensions as the temporal patterns, location, interference with basic function, or of enjoyment of life. These have been widely developed for human patients although these require the ability to answer questions on the impact pain. In veterinary medicine we would instead use a basic but essential understanding of pain rating tools and animal behavior, and combining those with actual “in the trenches” experience with observations. Such scales would ideally “ask” the subject to evaluate how much their pain meant by observing their willingness to do context specific things. In theory, the CMS approach of looking at several indicators of well-being (e.g., posture, body weight or food intake, motor impairment, evoked pain responses and social interaction, for example) might also hedge against the problem of a single measure being confounded by unexpected factors.

The CMS considered most validated and in most widespread use in veterinary medicine is the Glasgow Composite Measure Pain Scale (CMPS), for both dogs21 and cats22 (www.newmetrica.com). It identified and defined over 100 descriptive terms used by veterinarians to describe the behavior of dogs experiencing discomfort, and placed them into categories. These numerous descriptors were designed to minimize bias and interpretation by observer; it has been found to be most accurate for acute musculo-skeletal (trauma) and post-operative pain, rather than painful medical conditions. It has been published as a long (and rather time-consuming) form, and more recently as a short form which speeds patient evaluation considerably23. Each of several categories of descriptors is then scored, and the combined value gives the final score. The maximum score is 24, and the closer to this maximum the more painful the patient.

An additional CMPS for cats is the UNESP-Botucatu Multidimensional Composite Pain Scale24 (www.animalpain.com.br/en-us); it helpfully comes with visual tutorials regarding feline-specific pain-related behaviors.

There are several advantages that are common to the various scoring systems such as the Glasgow and UNESP-Botucatu CMPS. One is that they force the observer to evaluate the patient in ways they may not ordinarily undertake. Another is that they recognize that animals will behave differently when they have human interaction, and that pain may not be evident until the affected area is palpated. A limitation of CMPS is that it takes several moments to perform, and the argument can be made that this diminishes the likelihood of proper assessment frequency.

Whatever system is used, it should include the following features 1) an observation of the patient without interacting, 2) an observation of the patient while interacting, and 3) palpation of the painful site. The author uses a hybrid DIVAS/SDS system for its simplicity, however inclusive of the 3 features above, and placing overall assessment of pain on a 0-10 scale for the procedure involved. Interobserver variability is minimized by ensuring that the same observer is used, insofar as possible, throughout the assessment period, with the observer is mindful of the patients pre-surgical “normal” behavior and temperament in the cage and run.

Assessing and scoring chronic pain presents a special challenge due to the adaptive capabilities of animals and the fact that clinical signs are often dominated by behaviors the pet is no longer doing, as opposed to exhibiting new pain-related behaviors. Owners may recognize orthopedic pain only when the gait is asymmetric (only 1 limb affected, or far worse than a contralateral limb, thus “lameness”), but bilateral disease (e.g. osteoarthritis) may not reveal a single limb being favored (i.e. no lameness reported). Instead the patient may merely shift weight forward or back w/ resultant muscle atrophy and hypertrophy accordingly. Changing the rise from lying down, a shortened stride, swing the pelvis into a subtle “wobble,” stiff gait, or improving gait.
when “warmed out” also points to osteoarthritis pain. Decreased range of motion (ROM) may indicate joint capsule fibrosis and/or osteophytes.

Several scoring systems have been devised although none have achieved criterion viability, and generally evaluate “quality of life” and “disability” rather than strictly pain. Examples include in dogs:

a. CODI: Cincinnati Orthopedic Disability Index.\(^2\) Includes a client-specific outcome measure (CSOM), whereby the pet owners are asked not only standard questions but also to volunteer specific activities of daily living that have become difficult for their dog, the degree of impairment, and the final score is normalized to a 0-100 scale. Based on the human MACTAR (McMaster-Toronto Arthritis) and WOMAC (Western Ontario McMaster) arthritis index in humans, variations of CSOMs have been applied to a number of OA pain studies in dogs.
b. CBPI: Canine Brief Pain Inventory.\(^2\) Derived from the human Brief Pain Inventory, the CBPI questionnaire asks owners to place their dogs on a 0 best-10 worst scale in 3 domains, a Pain Severity Score (4 subdomains of pain its present and least, worst, and average over the previous week), a Pain Interference Score (7 subdomains of general life enjoyment plus ability of general activity, to rise, walk, run, climb stairs), with a combined overall best score of 0 and worst of 100; and an Overall quality of life impression Poor to Excellent.
c. LOAD: Liverpool Osteoarthritis in Dogs.\(^2\) The questionnaire asks owners to scale (0-5 worst) 5 areas of mobility Generally (general, lameness disability, activity, affect of cold/damp weather on lameness, stiffness after lying down) and 8 areas of mobility at Exercise (how active in exercise, how keen, ability, affect on lameness, how often stopping/resting, effect of cold/damp weather, stiffness after lying down, effect of lameness). The maximum best score is 0, maximum worst/most affect score is 65.
d. COAST: Canine Osteoarthritis Staging Tool.\(^2\) This novel CMI not only gives an OA “score” but defines the stages of OA for assessment and monitoring of dogs either ‘at risk’ or with clinical signs of the disease. It consists of two key steps (grading and staging), performed by both owner and veterinarian, which are repeated at monitoring intervals tailored to the requirements of the individual dog. Unique to COAST, it has a key focus on “at risk” dogs (e.g. breed, conformation, body condition score predispositions, history of joint injury, etc.) and not merely symptomatic patients, which minimizes the risk of underdiagnosing OA, and allows for prospectively earlier diagnosis of OA. A two-pronged approach to grading (‘grade the dog’ and then ‘grade the joint’) ensures that the impact of OA on the joints and on the dog as a whole is evaluated. The resulting grades are consolidated to provide an overall measure of disease severity. This correlates with the stage of OA which is useful for guiding treatment and monitoring disease progression. The individual grades may also provide useful supplementary information.

And in cats:

a. FMPLI: Feline Musculoskeletal Pain Index\(^2\) www.painfreecats.org
b. MICAT: Montreal Instrument for Cat Arthritis Testing\(^2\)

SUMMARY

Post-surgical pain scoring systems should be simple yet accounting account for the multi-dimensional experience and individual variability of pain expression. To minimize intra- and inter-observer variability a pain scoring system should evaluate new behaviors related to pain as well as normal behaviors not being exhibited, through the casual observation followed by interaction with the patient, asking it to move, and palpation of the surgical site.

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