

XVIII Congreso de Especialidades Veterinarias

26-27 de Abril de 2019 - Palacio de Congresos - ZARAGOZA



NUEVAS IDEAS PARA EVALUAR EL DOLOR EN TUS PACIENTES

(Novel concepts in pain evaluation - composite measures pain scales and facial expression scales)

Daniel SJ Pang
Université de Montréal
1500 Avenue des Vétérinaires, Saint-Hyacinthe, Québec, Canada J2S 7C6

Despite recent improvements, pain continues to be under-recognised and under-treated in dogs and cats (Hunt et al. 2015, Hewson et al. 2006, Hugonnard et al. 2004, Joubert 2001, Joubert 2006, Lascelles et al. 1999, Watson et al. 1996, Williams et al. 2005). Acute pain is regularly under-treated and this appears to apply across nationalities, spanning differences in culture and veterinary training (Hewson et al., 2006, Hugonnard et al., 2004, Joubert, 2001, Joubert, 2006, Lascelles et al., 1999, Watson et al., 1996, Williams et al., 2005). A wide variety of reasons have been suggested for this under-treatment of pain, including the number of animal health technicians working in a practice, concerns regarding analgesic side effects, perception of pain associated with different procedures, limited understanding of drug pharmacology, year of veterinary graduation, ability to assess pain and lack of a validated pain score (Hewson et al., 2006, Lascelles et al., 1999, Joubert, 2006, Hugonnard et al., 2004, Watson et al., 1996). With regards to the latter, validated composite measure pain scales are now available for both dogs and cats (Brondani et al., 2011, Calvo et al. 2014, Morton et al., 2005, Reid et al. 2007, 2017).

This lecture will review the psychometric principles underlying scale validation in order to understand the strengths and weaknesses surrounding scale application. Clinical cases will be used to highlight different scales in use and the use of facial expression scales in different species will be introduced.

Validity is most simply defined as “does a scale measure what it claims to measure?” (Oliver et al. 2014, Streiner and Norman 2008). There are several ways to address this question, including an assessment of whether the items included in a scale are necessary and important (face and content validity), if a scale can identify important changes in what is being measured (construct validity) and how a scale compares to a gold standard, if one exists (criterion validity). In veterinary medicine, criterion validity is often difficult if not impossible to assess as there is usually an assumption regarding an animal’s experience. When it is performed, a novel pain scale may be compared to the best currently available pain scale (criterion standard) or compared against a subjective expert evaluation (Calvo et al. 2014, Morton et al. 2005, Reid et al. 2017). Therefore the focus during scale validation in domestic species is on face/content validity and construct validity. Face/ content validity is commonly achieved through consensus discussion, resulting in a proposed list of items that they believe to reflect some part of what is being measured. For example, in developing the Glasgow feline pain scale, a mixed group of 30 individuals (13 veterinarians, 10 veterinary nurses, 2 breeders, 2 rescue workers, 3 owners) proposed an initial list of 115 words that they felt were applicable to cats in acute pain (Calvo et al. 2014). This list was then shortened to 40 words by a panel of experts in veterinary pain, subdivided in to six categories: vocalisation, activity/posture, attention to wound, response to people, response to touch, demeanour. The ranking of words within each category (corresponding to an increasing level of pain) was decided based on the survey responses of 630 English-speaking veterinarians in 23 countries. Construct validity is commonly assessed using hypothesis testing. There are numerous approaches to achieve this including the ability to identify changes in levels of pain depending on the presence/ absence of a condition that is believed to be painful and identifying a change in pain scale score in response to analgesic administration. For example, Brondani et al. (2013) compared changes in pain scale scores before and after analgesic administration and between different analgesics following ovariohysterectomy surgery in cats, whereas Morton et al. (2005) assessed whether the pain scale reflected the predicted peri-operative time course of pain in dogs. The process of pain scale validation is time consuming and labour intensive. Unfortunately, this means that there are very few studies performed confirming the original findings.

A common misconception is that scale validation guarantees a certain level of performance in a wide range of experimental and clinical situations (Streiner and Norman 2008). This is an oversimplification, based on the assumption that scale performance is a fixed property. In adopting and using measurement scales, such as pain assessment scales, it is critically important that users consider the details of the initial validation study. For example, if a pain scale is validated in friendly female cats undergoing ovariohysterectomy surgery with a fixed anaesthetic protocol, this should be considered when applying the scale to a different population, surgery/procedure and anaesthetic protocol (Buisman et al. 2016, Buisman et al. 2017). Recent evidence has shown that pain scales can be confounded by the choice of anaesthetic drug and behaviour (Buisman et al. 2016, Buisman et al. 2017).

Two additional, important yet frequently overlooked aspects of scale performance are reliability and practicality. Reliability is the amount of error associated with a measurement scale. The error should be less than the desired range of observations; where the error component is large it becomes difficult to identify meaningful changes. Reliability is usually assessed between individual observers (inter-rater reliability) and within the same observer (intra-rater reliability). Importantly, even if inter-rater reliability is reported as high, reliability should ideally be assessed when the scale is being applied by different observers as reliability can be affected by observer experience and training (Brondani et al. 2013, Zhang et al. 2019). This applies to clinic use when more than one observer (such as a combination of veterinarians and nurses/technicians) may be assessing the same animal at different times to assess pain and determine appropriate analgesic management. There has been a tendency to assume that observer experience and training does not need to be considered when applying pain scales; however, there is increasing evidence that training is an important component of scale application (Zhang et al. 2019). High intra-rater reliability assures consistency in scale application over time. This can be a useful measure of how often re-training may be required (Zhang et al. 2019).

Practicality is seldom discussed but is an important component in the adoption of pain assessment scales: if a scale cannot be completed quickly without specialised equipment it is unlikely to be used outside a research setting.

Facial expression (“grimace”) scales have gained popularity in recent years since the introduction of the Mouse Grimace Scale in 2010 and scales are now available for numerous species, including cats (Langford et al. 2010, Reid et al. 2017). The appeal of grimace scales is that they do not require physical interaction, are quick to perform when applied in real-time and harness the tendency of humans to look at animal faces (Leach et al. 2011, Leung et al. 2016). The same procedures for validation and reliability testing apply to grimace scales as described above for composite measure pain scales, but despite their popularity, there have been few studies assessing the performance of grimace scales in different environments and the potential for confounding factors to interfere with their performance (Miller et al 2016, Zhang et al. 2019).

References:

Brondani et al. Validation of the English version of the UNESP-Botucatu multidimensional composite pain scale for assessing postoperative pain in cats. *BMC Vet Res* 2013; 9:143.

Buisman et al. Effects of ketamine and alfaxalone on application of a feline pain assessment scale. *J Fel Med Surg* 2016 ;18:643-651.

Buisman et al. The influence of demeanor on scores from two validated feline pain assessment scales during the perioperative period. *Vet Anaesth Analg* 2017 ;44:646-655.

Calvo et al. Development of a behaviour-based measurement tool with defined intervention level for assessing acute pain in cats. *J Sm Anim Pract* 2014; 55:622-629.

Hewson et al. Perioperative use of analgesics in dogs and cats by Canadian veterinarians in 2001. *Can Vet J*. 2006; 47:352-359.

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Hugonnard et al. Attitudes and concerns of French veterinarians towards pain and analgesia in dogs and cats. *Vet Anaesth Analg*. 2004; 31:154-163.

Joubert. The use of analgesic drugs by South African veterinarians. *J S Afr Vet Assoc*. 2001; 72:57-60.

Joubert. Anaesthesia and analgesia for dogs and cats in South Africa undergoing sterilisation and with osteoarthritis--an update from 2000. *J S Afr Vet Assoc*. 2006; 77:224-228.

Langford et al. Coding of facial expressions of pain in the laboratory mouse. *Nat Methods* 2010; 7:447-449.

Lascelles et al. Current British veterinary attitudes to perioperative analgesia for cats and small animals. *Vet Rec*. 1999; 145:601-604.

Leach et al. Are we looking in the wrong place? Implications for behavioural-based pain assessment in rabbits (*Oryctolagus cuniculi*) and beyond? *PLoS One* 2011; 6:e13447.

Leung et al. Real-time application of the Rat Grimace Scale as a welfare refinement in laboratory rats. *Sci Reports* 2016; 6:31667.

Miller et al. The influence of isoflurane anaesthesia on the Rat Grimace Scale. *PLoS One* 2016; 11:e0166652.

Morton et al. Application of a scaling model to establish and validate an interval level pain scale for assessment of acute pain in dogs. *Am J Vet Res* 2005; 66:2154-2166.

Oliver et al. Psychometric assessment of the Rat Grimace Scale and development of an analgesic intervention score. *PLoS One* 2014; 9:e97882.

Reid et al. Development of the short-form Glasgow Composite Measure Pain Scale (CMPS-SF) and derivation of an analgesic intervention score. *Anim Welfare* 2007; 16:97-104.

Reid et al. Definitive Glasgow acute pain scale for cats: validation and intervention level. *Vet Rec* 2017 doi: 10.1136/vr.104208

Streiner DL, Norman GR. Health Measurement Scales: a practical guide to their development and use. Oxford, UK: Oxford University Press. 2008

Watson et al. Use of anti-inflammatory and analgesic drugs in dogs and cats. *Aust Vet J*. 1996; 74: 203-210.

Williams et al. Current attitudes to, and use of, peri-operative analgesia in dogs and cats by veterinarians in New Zealand. *N Z Vet J*. 2005; 53:193-202.

Hunt et al. Prescription or perioperative analgesics by UK small animal veterinary surgeons in 2013. *Vet Rec* 2015 doi:10.1136/vr.102834

Zhang et al. Influence of rater training on inter- and intrarater reliability when using the Rat Grimace Scale. *J Am Assoc Lab Anim Sci* 2019; 58:178-183.