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Analgesia from a veterinary perspective

P. Flecknell*

Comparative Biology Centre, The Medical School, University of Newcastle, Newcastle-upon-Tyne NE2 4HH, UK

**E-mail: p.a.flecknell@ncl.ac.uk*

The last decade has seen continued progress in both the recognition and management of animal pain. This upsurge in the use of analgesics in animals is welcome, but the main areas of use continue to be the control of postoperative or post-trauma pain, and the management of musculoskeletal pain, in companion animals and horses. The management of pain associated with other conditions, such as soft-tissue inflammation or cancer, is still relatively neglected. Pain management in farm animals, and in animals used in biomedical research could also be improved further. Apart from providing some interesting parallels with pain management in people, development of veterinary pain management has potentially much greater significance. For many years, animal pain management has benefited from the use of analgesics used in man. In the future, it may be that a better understanding of animal pain, and in particular chronic pain states, may lead to translation of therapies in the opposite direction.

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The development of pain management in animals has many parallels with the development of pain management in human infants, with the treatment of pain being a relatively rare event historically. In some situations doubts were expressed as to whether animals experienced pain to any significant extent, and discussions of analgesic use were dominated by concerns related to the possibility of undesirable side-effects. During the last two to three decades there has been a gradual evolution of new veterinary attitudes to animal pain. The use of analgesics has become more widespread,[3 5 19 27] but is still relatively low overall. This increased use of analgesics has been accompanied by improvements in our ability to assess pain in animals, and by the introduction of a range of analgesic compounds marketed specifically for veterinary use. Although this upsurge in the use of analgesics in animals is welcome, the main areas of use continue to be the control of postoperative or post-trauma pain, and the management of musculoskeletal pain, in companion animals and horses. The management of pain associated with other conditions, such as soft-tissue inflammation or cancer, is still relatively neglected. Use of analgesics for animals used in biomedical research is relatively low overall,[28] with some marked variation between the species. Pain management in farm animals is also relatively low.[14]

Factors influencing analgesic use

A range of concerns continue to restrict the use of analgesics in animals. Their relative importance varies depending upon the type of animal—for example analgesics may not be used in laboratory species because the analgesic used might interfere with the goals of a particular research project. In farm animal practice, economic considerations may be a significant factor.[14] Analgesic may be withheld from wild or exotic species owing to the uncertainty of their appropriate dose rates, and also dosing regimens might limit their use. In all groups however, a major factor influencing the use of analgesics remains our relatively poor ability to assess pain in animals.

It is generally accepted that all vertebrates possess the necessary sensory mechanisms to detect and process noxious stimuli; hence, it is reasonable to assume that a procedure that would cause pain in man would evoke a similar experience in animals. The behaviours expressed by many species however, will differ greatly from those observed in people, and in some circumstances may be masked completely by the animals' response to being observed. This lack of easily identifiable responses to pain can lead to the assumption that significant pain cannot be present. This obstacle to effective pain management can only be overcome by the development of robust pain scoring systems. It is not sufficient to simply 'give the animal the benefit of the doubt' and administer an analgesic, as without a method of pain assessment it is neither possible to determine whether the dose given was effective, nor is it possible to determine when therapy should be repeated or discontinued. Until recently, pain assessment in animals was based primarily on clinical opinion—often with no reliable validation of the measures used. Initial

attempts to develop pain scoring tools were limited by poor study design; the assessment criteria used were frequently highly subjective, the studies did not include placebo control groups, and little consideration was given to the effects of anaesthesia and analgesic administration on the behaviour and clinical appearance of otherwise normal animals. Appropriate controls are particularly important. Many pain scoring schemes rely on assesing changes in normal behaviour, and this can be markedly altered by anaesthetic and analgesic agents, introducing major confounding effects.[29] Including untreated control groups when studying post-surgical or post-procedure pain raises significant ethical concerns to those undertaking pain assessment studies. Many studies in companion and farm animals are carried out in veterinary schools in which students are taught that animals experience pain, and that analgesics should therefore be administered. Deliberately withholding analgesics in circumstances thought likely to result in pain may therefore be considered unacceptable. This problem is addressed in studies of pain in human subjects by implementing an intervention analgesia protocol. If the subject is assessed as experiencing pain above a certain level, they are removed from the study and given an analgesic. This assessment can be carried out by someone not directly involved in the study, and the approach has been used successfully in a number of veterinary clinical studies.[9 18]

Despite these problems, more recent studies have resulted in the development of reasonably well-validated pain scales for the assessment of some types of post-surgical pain in dogs,[15] cats,[31] and laboratory rodents.[30 36] Pain assessment methods have also been developed to determine the relative degrees of pain caused by a number of routine farming practices, such as dehorning of cattle and castration and tail-docking of lambs.[21 24] Application of these behaviour-based pain measurement tools has enabled comparisons of the efficacy of different types of analgesics, determination of their dose rates, and the appropriate durations of analgesic therapy. Further development of practical assessment schemes for routine clinical use should enable adjustment of analgesic regimens to meet the needs of individual animals.

Pain assessment methods have also been developed for the evaluation of musculoskeletal pain, such as that caused by arthritis in dogs. Both clinical scoring of lameness and more objective measures using force-plate analysis have been applied to assess the relative efficacy of different analgesic treatments.[11 33]

Clinically applicable pain scoring methods that can be used in animals with other potentially painful conditions have not been developed. As a consequence, although cancer pain is recognized in animals,[2] our ability to manage it is very limited. Analgesics are also relatively underused to control pain associated with a range of other inflammatory conditions such as otitis and ocular disease.

Although considerable progress has been made in the development of pain scoring systems, problems still remain. The scoring schemes currently available for clinical use require 10–30 min to undertake effectively. Allocating this period of time to assess an animal may not seem significant, but to allow effective pain management, assessments may need repeating at least hourly. In a busy veterinary clinic, with limited resources, this can be difficult. When dealing with laboratory animals, it is common for 20 or more animals to undergo surgery over a 2–3 h period, putting even greater pressure on resources. Similar problems can be encountered when dealing with farm animals. This problem may be overcome as the importance of pain management becomes more widely appreciated. As in man, post-surgical pain in animals has a series of undesirable consequences, including an increased surgical stress response, impairment of normal gastro-intestinal and urinary function, inhibition of normal activity and behaviours, such as eating, drinking, and grooming. When dealing with companion animals, these consequences of unalleviated pain can slow down recovery. In a laboratory animal setting, they can interact significantly with the aims of specific research protocols, and confound research results.

Other problems become apparent when parallels are made with pain assessment schemes that are used in man. The linearity of animal pain scoring schemes is often questionable. Even more difficult to assess is what degree of pain reduction is perceived as being beneficial by the individual animal. Addressing these issues requires both further development of assessment systems, and a major advance in our understanding of the nature of pain in animals.

Animal pain, or animal nociception?

For many years, there has been a debate about the nature of animal pain. The International Association for the Study of Pain (IASP) definition[17] which highlights that pain is both a sensory and emotional experience, has in some circumstances led to the view that 'animal pain' is a different experience from that in man. Animal pain was similar to the pain in lobotomized humans,[22] or downgraded and considered solely as nociception. This controversy arises primarily because of the uncertainty as to whether animals have the conscious emotional states needed to experience pain in a similar manner to humans. Recent developments in animal cognition, and in imaging technology, are now beginning to address this difficult issue. On reflection, one major block to acceptance that animals have conscious emotional experiences relates to our equating consciousness with self-consciousness, or self-awareness. This difficulty can be overcome by accepting that consciousness developed gradually during evolution, and that different species will have different degrees or qualities of consciousness.[1 7] Experiencing emotional states is not dependent on higher level consciousness (as

found in man and possibly some animal species such as the great apes), but on more basic forms of consciousness. Possession of these forms of consciousness is thought necessary for certain types of ability and behaviours, and it is therefore possible to determine which species of animals possess these characteristics. It is also possible to demonstrate that nociceptive stimuli activate areas of the brain associated with the emotional component of pain in man.[13] Recent new approaches to assessing the affective state of animals, for example by examining cognitive biases, offer the prospect of assessing the influence of noxious stimuli on emotional state in animals.[10 25] Further work in these areas may lead to a major improvement in our understanding of emotional states in animals, and of the affective nature and quality of animal pain.

Pain management in animals

Although debates as to the nature of animal pain may eventually inform our attitudes and approaches to alleviating pain in veterinary practice, most veterinary anaesthetists simply assume animals experince pain and seek to manage it effectively. A wide range of clinical techniques have been developed, largely by extrapolation from clinical experience in man and based on the comparative aspects of the pathophysiology of pain in man and animals.[35] In small animal and equine practice in the UK, systemic administration of non-steroidal anti-inflammatory drugs (NSAIDs) and opioids form the most frequently used means of managing postoperative pain. However, as mentioned earlier, routine use of analgesia is not yet uniform.[8 16 26] As many veterinary patients are discharged within a short period of undergoing surgery, longer acting analgesics have become widely used, notably buprenorphine. The respiratory depressant effects of opioids used for postoperative analgesia in the mammals that are encountered in small animal practice seem significantly less than in humans. As a result, discharging an animal shortly after administering a long-acting opioid very rarely results in any clinically significant side-effects.

Preventive analgesia and multimodal approaches to pain management are extensively advocated by specialist veterinary anaesthetists, but it is difficult to determine how widespread or successful this approach is in general practice.[12] Similarly, in specialist practice, particularly in veterinary schools and referral centres, other techniques such as the use of N-methyl-D-aspartate antagonists (e.g. ketamine),[32] and a range of local anaesthetic techniques have all been advocated.[6] Management of chronic pain is also developing—use of NSAIDs, including selective COX-2 inhibitors for the treatment of musculoskeletal pain is well established,[20] and there are also recent reports of the identification and management of neuropathic pain.[4]

This increased enthusiasm for pain management has been reflected in the establishment of the International Academy of Veterinary Pain Management, the renaming of the journal 'Veterinary Anaesthesia' to 'Veterinary Anaesthesia and Analgesia', reflecting its new content, and the establishment of a special interest group of the IASP focused on pain in non-human species.

Animal pain and human pain—the relevance of comparative medicine

Apart from providing an interesting insight into the challenges facing veterinary surgeons, the preceding review of veterinary pain management has potentially much greater significance. Current animal models designed to further our understanding of pain in man, and specifically to develop new treatment modalities have been recognized to have significant deficits.[23 34] More clinically relevant information may be obtained by the study of naturally occuring models in animals. A more sophisticated understanding of an animal's response to pain, and in particular to the influence of pain on affective state, should allow the development of models that enable the emotional, and the sensory components of pain to be assessed. This may be of critical importance in the development of therapies for chronic and neuropathic pain. For many years, animal pain management has benefited from the use of analgesics used in man. In the future, a better understanding of animal pain might lead to translation of therapies in the opposite direction.

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