The following pain management protocol is tiered to ensure a global relevance, recognizing that not all analgesic modalities are available to veterinary practitioners and vary from region to region around the world. Its implementation will be guided by the various analgesic modalities available along with the needs of the individual patient requiring treatment. This protocol is reproduced from the WSAVA Pain Committee guidelines, a succinct yet comprehensive review of pain assessment, various pain modalities, and the treatment of various clinically painful scenarios in both dogs and cats. The WSAVA Pain Committee Guidelines are published in the Journal of Small Animal Practice and is available for open access at the Pain Committee pages of **www.wsava.org.**

PAEDIATRIC PAIN

Studies in human neonates show that when anaesthesia or analgesia are withheld (e.g. during circumcision), altered pain sensitivity increases with subsequent painful experiences (e.g. vaccination), when compared to those receiving analgesia. This suggests that infants retain a 'memory' of a painful experience with subsequent altered response to a painful stimulus. These phenomena also occur in animals. What has been learned about pain, and its management in human neonates can be applied to animals.

Recently, the American Association of Feline Practitioner/American Animal Hospital Association Life Stage Guidelines have simplified the terminology for different life stages. The subdivisions of age are now described as: kitten (birth up to 1 year of age), young adult (1-6 years), mature adult (6-10 years) and senior (10 years and older) . Dog breeds may vary in longevity but similar life stages could be applied. However, it is still acceptable to consider kittens or puppies of up to 12 weeks as paediatric patients.

There tends to be apprehension in administering analgesic drugs to young animals due to the often cited 'decreased ability for drug metabolism and elevated risk of overdose'. While this may be a potential concern, there are few published studies in puppies or kittens to guide the clinician and dosing remains a challenge. Reduced clearance of many drugs occurs in young animals when compared with older individuals largely because of:

- Their greater body water content leading to a higher volume of distribution
- A larger fraction of body mass that consists of highly perfused tissues
- Incomplete maturation of the hepatic-enzymes systems
- Decreased glomerular filtration rate and renal excretion

The hepatorenal system continues to develop during early life stages; this may result in reduced metabolism and excretion, which may require alterations in dosing and dosing intervals. Drugs that act in the CNS (e.g. opioids, sedatives, tranquilisers, anaesthetic agents), may reach a higher concentration in the neonatal brain due to differences in the blood brain barrier and immaturity of efflux transport systems.

Opioids
Lower doses of fentanyl and morphine are required for analgesia in the neonatal puppy (0–2 weeks) when compared to 5-week-old puppies. Puppies and kittens are also more sensitive to the sedative and respiratory depressant effects of morphine than adults. Fentanyl may be a more suitable opioid in paediatrics; however, as it is short-acting continuous IV access and titration are required. Buprenorphine may be an alternative and associated with minimal respiratory depression. In each case, the clinical response to treatment should guide dosing. Opioids can be reversed with titration of naloxone should there be clinical evidence of overdosing (e.g. respiratory depression and marked somnolence).

Non-steroidal anti-inflammatory drugs
NSAIDs rarely have market authorisation in small animals less than 12-16 weeks of age, however meloxicam has approval in some countries for use in dogs and cats ≥ 6 weeks of age. This does not mean they cannot be used in young populations; rather, it reflects the lack of preclinical trials in all age groups. Non-steroidal anti-inflammatory agents are used in dogs and cats undergoing neutering at a young age. Prepubertal kittens (N = 380, aged 8-12 weeks) undergoing ovariohysterectomy or castration received carprofen or meloxicam before surgery with no reported adverse effects. The clinician should ensure the patient is an appropriate candidate for NSAID use, e.g. they are not hypovolemic or hypotensive.

Local anaesthetics

Topical local anaesthetics: topical anaesthetics include a eutectic mixture of 2.5% lidocaine and 2.5% prilocaine, and liposome encapsulated formulations of 4% lidocaine, which can be used to desensitise the skin. This technique is suitable for venipuncture, IV catheter placement, and other minor superficial procedures. The skin over the area is clipped, cleansed and the anaesthetic cream is used to cover the area, then an occlusive dressing (e.g. a thin film of plastic) is placed and secured using a multi-purpose cohesive bandage. Onset of action is variable but occurs between 15-20 minutes.

Injectable local anaesthetic: local anaesthetic techniques should be used whenever possible. Neonatal organ maturation and body composition should be taken in consideration when choosing appropriate doses. Repeated injections or continuous infusions (e.g. IV lidocaine) may lead to accumulation and should be avoided or used with caution. If repeated, successive doses or CRI rates should be reduced compared to adults, and the patient watched carefully for signs of toxicity.

In the conscious patient, injection associated pain can be ameliorated by using small gauge needles (27-30 G), injecting slowly, buffering with sodium bicarbonate, and warming the solution to body temperature.

Alpha$_2$-adrenoceptor agonist drugs

Cardiac output is heart rate dependent in neonates and due to the bradycardia associated with alpha$_2$-adrenoceptor agonists, these drugs are not recommended. However, many paediatric neutering anaesthetic protocols include a combination of an alpha$_2$-adrenoceptor agonist (e.g. medetomidine or dexmedetomidine), ketamine and an opioid used as a total injectable technique, with success.

Nonpharmacologic techniques

Good nursing care and low stress handling are important in all patients. Techniques to consider include suckling, swaddling, body contact with the dam (or a human) and warmth.

For additional pharmaceutical dosing information, see the dosing tables in the WSAVA Pain Committee Treatise at www.wsava.org

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Monteiro, B.P., Lascelles, B.D.X., Murrell, J., Robertson, S., Steagall, P.V.M. and Wright, B. (2023), 2022 WSAVA guidelines for the recognition, assessment and treatment of pain. J Small Anim Pract, 64: 177-254. https://doi.org/10.1111/jsap.13566