Dexmedetomidine, like clonidine is an alpha-2 agonist, but is highly selective for the receptors in the locus coeruleus to provide sedation and analgesia by binding to alpha-2 receptors in the spinal cord sufficient to treat mild to moderate pain.1,2 It was approved by the FDA for use in adult ventilated patients in 1999 and for procedural sedation in 2007. It is not labeled for use in patients under 18 years of age, however there are over 200 publications per Pub Med in patients from birth to 2 years of age.3,4 It has received significant use in critical care for post-operative sedation, post-operative emergence agitation, procedural sedation as well as part of a multi-modal anesthesia approach.3  Among the drug’s advantageous effects, is its ability to provide a desired level of sedation without affecting respiratory drive or gastric motility, reduction of post cardiac surgical tachydysrhythmias and demonstrated post-operative opioid sparing effect, in addition to its hypnotic, anxiolytic and analgesic effects.5-8 The majority of safety and dosing research in infants is being conducted following cardiac surgery9-11 and therefore further research is needed to explore other post-operative uses such as the prevention of withdrawal from other sedatives and reduction of other analgesics and sedatives.4,12,14  A typical initial starting dose is 0.2 mcg/kg/hr with a range up to 1 mcg/kg/hour to achieve desired level of sedation. In children, bolus doses up to 2 mcg/kg have been used, however bolus doses and/or loading doses are avoided in infants due to concern for risk of hypotension and bradycardia with a rapid 10 minute infusion4,13,14. Plasma levels associated with sedation are lower than those associated with analgesia, which would suggest that in the presence of pain, dexmedetomidine is not sufficient to use as a sole therapy as an analgesic.15-17

The recent FDA communication alert advised practitioners that repeated or lengthy exposure to anesthetics and sedatives have the potential to adversely affect neurodevelopment.18 In other literature, early life stress and exposure to chronic pain can also have long term adverse neurodevelopmental effects that can last into adulthood.19 Many anesthetics, sedatives (benzodiazepines) and opiates act via NMDA (N-methyl-D-aspartate) receptor agonism, GABAA (gamma amino butyric acid) agonism or both. In animal models, it has been demonstrated that neuroapoptosis and subsequent cognitive impairments occur due to these drug-receptor interations.20 Dexmedetomidine has demonstrated potential neuroprotective effects due to lack of identified neuroapoptosis and mitigated neuronal deficits when used with agents that act as NMDA and GABAA agonists.3 The challenge we have is to translate these animal model findings to humans. Until further research is available, it seems reasonable to use opiates when pain is evident and avoid their use when pain is no longer present. We can strive to reduce the use and duration of sedatives when possible and work to develop non-pharmacologic modalities to provide comfort as well as use pharmacology mechanistically and creatively to reduce overall duration of medication exposure where possible.

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