PAEDIATRIC INTENSIVE CARE – CLINCIAL PRACTICE GUIDELINE

Analgesia and Sedation Guideline

Introduction

Analgesia and sedation describe a state produced by the proper administration of pharmacologic agents that allows the patient to tolerate unpleasant procedures.

Aim: The purpose of the guideline is to assist Clinicians to provide their patient the benefit of sedation/analgesia while minimizing the associated risks.

Definition of Terms
Sedation: reduce the state of awareness but does not relieve pain
Analgesic: reduce the perception of pain

Basic Principles

1) Choose appropriate drugs for analgesic or sedation based on the type of procedure and duration .Muscle relaxant does not prevent pain or awareness

2) Avoid giving more then two drugs at a time. Give a Sedative and Analgesic together though at times one may suffice, as in sedating for echocardiogram.

3) Administer a loading dose to achieve appropriate analgesic or sedation dose before giving infusion.

4) Newborns are sensitive to all central nervous system depressants. The use of single agents like morphine or fentanyl is sufficient to achieve both analgesic and sedation.

5)Tolerance and withdrawal will often occur after sedative drugs have been used for a long time .Formal sedation scoring may be useful on titrating for patients needing prolonged sedation.

6)Sedation should be titrated to the lowest possible dose to achieved the desired sedative effect to avoid the harmful effect of overdosing.

7)Plan for withdrawal of drugs to allow extubation .This is very important in situation where drug excretion may be slow.

8) All sedation and analgesia cause both respiratory and cardiovascular depression. They should be used with extreme caution in children with sepsis or any cause of hypovolemia. Ketamine is a myocardial depressant and can result in systemic hypotension in children.

1. ANALGESIA

Pain Assessment

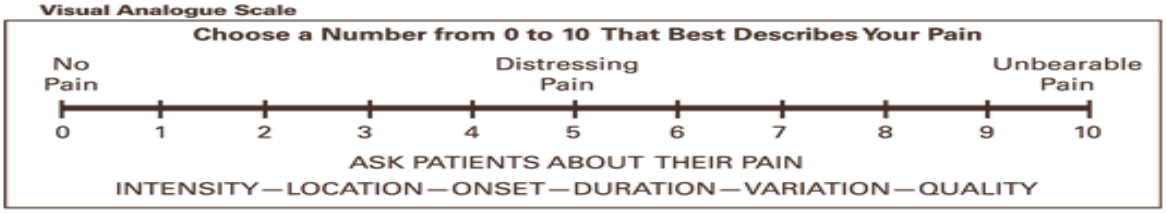
The Main Purpose for pain Assessment is to ensure that appropriate Analgesic is provided for the child. The Pain Assessment in children is done through use of Pain Scales, two of which are mentioned here:

1. FLACC Scale used in 0 to 3 years.[Face,Leg.Activity,Cry,Consolability]]

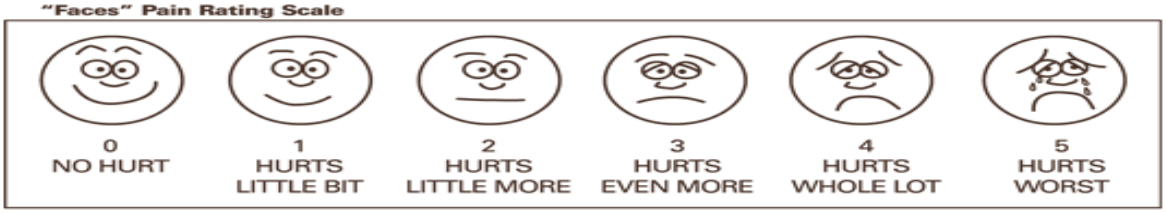
2. Wong –Baker Faces Pain Rating Scales used in 3 years and older in non emergency situation.

Figures: Tools Commonly Used to Rate Pain

Visual Analogue Scale



"Faces" Pain Rating Scale



Behavioral Observation Pain Rating Scale

Categories	Scoring		
	0	1	2
Face	No particular expression or smile; disinterested	Occasional grimace or frown, withdrawn	Frequent to constant frown, clenched jaw, quivering chin
Legs	No position or relaxed	Uneasy, restless, tense	Kicking, or legs drawn up
Activity	Lying quietly, normal position, moves easily	Squirming, shifting back and forth, tense	Arched, rigid, or jerking
Cry	No crying (awake or asleep)	Moans or whimpers, occasional complaint	Crying steadily, screams or sobs, frequent complaints
Consolability	Content, relaxed	Reassured by occasional touching, hugging, or talking to. Distractable	Difficult to console or comfort
Each of the five categories (F) Face; (L) Legs; (A) Activity; (C) Cry; (C) Consolability is scored from 0-2, which results in a total score between 0 and 10.			

1) **Non Pharmacological**

a. Behavioral Management , child friendly environment .consider including parents during procedure .This alleviates anxiety in a child

b. Distractive strategies, blowing bubbles balloons, can read story or watch movies

c. Straddling, this method is useful for younger children less then 3 years.

2**) Pharmacological refer to the drug dosage below.**
In general paracetamol and non steroidal anti-inflammatory drugs (NSAIDS) should be used for first line in treating mild (Score 3-4) to moderate (Score 5-7).They are also useful as an adjunct to opiates for control of background pain . For severe pain (Score >8), morphine is the drug of choices.

11. Sedation

Pre sedation Assessment.

1. Equipment. Ensure that the resuscitation equipment is ready for use.

2. Personnel - minimum one nurse and doctor. The doctor must be competent in airway management including ability to intubate.

3. Fasting**.**

	#Solid or Non clear fluids	**Clear fluids**
Children>36 months	6-8 hours	2-3 hours
Children 6- 36 months	6 hours	2-3 hours
Children Below 6 months	4 hours	2 hours

#this includes milk formula, and breast milk (high fat content may delay gastric emptying)

4. Monitoring

Pre-sedation HR, RR, BP and oxygen saturation and continue monitoring every 15 minutes during and after the procedure, until the child is fully awake. The doctor must be on site until the child is fully awake and able to take a drink.

Drug Dosage

Drug	Dose (mg/kg)	Route	Maximum dose	Duration of action	Precautions
Aspirin	10-15mg/kg /dose Q4-6hr Total 60-80mg/kg/24hr	PO/PR	4gm/24hrs	Peak in 2 hr	-Bleeding disorder -Renal and Liver Failure -GI upset -Not indicated for Viral infection
Choral Hydrate Hypnotic Sedation Sedative for procedures For Intensive Care Unit	 25-50mg /kg /24hr divided into 6-8 doses 8mgkg Q6-8 hours . 25-100mg/kg /dose Sedation 50-100mg/kg	 PO,PR PO/PR PO/PR	500mg/dose 1g/dose (infant), 2g/dose (child), 5gm	On set 15-30min duration 2-3 hours	-Use with lasix cause Vasodilatation -Potentiate Warfarin effect -Causes renal failure -Myocardial and respiratory depression
Codeine phosphate Child 2-6 yrs 6-12yr ≥12yr	 0.5mg/kg/dose 2.5-5 mg/kg Q4-6hr 5-10mg/k/dose,. 10-20mg/kg dose Q4-6hr,	IMI,SC or PO	Max dose 60mg/dose Max dose 30mg//24hr. Max dose 60mg/24hrs Max 120mg/24hr.	Peak 3-4 hr	No IV preparation - not for children <2 years -Cardiac and CNS depression, hypotension and renal impairment
Diazepam Sedative	0.04-0.2mg/kg/ doseQ2-4hr	/IV	0.6mg/kg within 8 hour	-IV 1-5 min	-Do not mix with other IV fluids Causes -Hypotension and

Drug	Dose (mg/kg)	Route	Maximum dose	Duration of action	Precautions
Muscle relaxant Child	0.12-0.8mg/kg/24hr 0.5mg/kg/dose followed by 0.25mg/kg/dose every 10minutes	PO Rectal dose (Using IV form)	period.	-Duration 15mins – 1 hr Peak 30mins – 1hr	respiratory Depression -caution with shock depression -Enhance effect CNS depression valporic acid,
Ibuprofen	5 – 10 mg/kg 4 – 6hr	PO	200 – 400mg/dose		Avoid in asthmatics and thrombocytopenia
Ketamine Sedation Analgesic Infusion Anesthesia	5mg/kg, 0.25-0.5mg/kg, 1.5-2mg/kg 2-4mg/kg 4mcg/kg/min 5mg/kg 5-10mg/kg 1-2 mg/kg infusion 30mg/kg in 50ml of D5% at 1-4ml/hr 10-40 mcg	PO IV IMI IMI IV PO IMI IV		Half life 2.5 – 3 hours	Avoid in Elevated ICP Psychotic Disorder, hypotension and respiratory.

Drug	Dose (mg/kg)	Route	Maximum dose	Duration of action	Precautions
Lignocaine 2.5% and Prilocaine (EMLA)	1.5g/10centimeter Sq	Topical Occlusive dressing		Effective 15-30min half life 1.5-2 hrs	minimal
Lignocaine 1% solution Local anaesthetic	Nerve block infiltration Lignocaine 1% used without adrenalin 4.5mg/kg/dose (0.4ml/kg of 1%) With Adrenaline to prolong sensory block 7mg/kg/dose (0.7ml/kg of 1%)	IMI	300mg 500mg repeat after 2 two hr	Rapid and intense sensory block onset in 2 minutes and effective for 2 hours	-Avoid Digital Blocks With adrenaline -stokes Adam attacks - cardiac arrhythmia -Cause respiratory depression hypotension and seizures -Adjust for liver failures
Midazolam Sedative 6mo-5yrs 6-12yr 12—16 yrs to adult	0.05-1mg/kg over2-3min May repeat dose PRN in 2- 3min interval 0.025-0.05mg/ kg/dose over 2-3min May repeat dose PRN 2-3min interval 0.5-2mg/kg /dose over 2min May repeat PRN 2-3min interval until desired effect	IV	Total dose 6mg (Necessary desired effect 0.6mg/kg) total dose 10mg (Necessary 0.4mg/kg for desired effect) Usual total dose 2.5-5mg Max total dose 10mg	Half life 1.6-8 hrs Fast and short acting	Causes Hypotension a with respiratory and Cardiovascular suppression -Neurological complication esp. in Neonate Contraindicated in shock and glaucoma

Drug	Dose (mg/kg)	Route	Maximum dose	Duration of action	Precautions
Infusion Neonate <32 weeks Gestation >32 weeks > Infant and child Sedation and Mechanical Ventilation	5mcg/kg/min 1mcg/kg/min 1-2mcg /kg/min infant and child 0.05mg/kg/dose Q1-2hrs PRN Mixture for infusion) 3mg/kg in 50ml D5% at 1-4 ml/hr (1-4 mcg/kg/min . Can add morphine 1mg/kg into same syringe				
Morphine Analgesia Neonate Infant and child Continuous infusion	 0.05mg-0.2mg/kg/dose IMI 0.2-0.5mg/kg /dose (immediate . 1-0.2mg/kg /dose Q2-4hr PRN 0.01mg/kg/hr	IMI /IV PO IV, IMI, SC	 Max dose 15mg/dose	IV rapid peak SC IMI peak 20 min Oral peak 30mn half life 2-4 hours	*-Use in caution under 3months. HaveOxygen and resuscitation equipment ready.* -Causes CNS and respiratory depression and Nausea ,vomiting and Hypotension

Drug	Dose (mg/kg)	Route	Maximum dose	Duration of action	Precautions
Neonate Infant and child Post operative Infusion (1mg/kg in50ml D5%) neonate	0.01mg/k/hr Infusion Mixture IV 0.5-1.5ml/hr (10-30mcg/kg/hr) 1-4ml/hr 20-80mcg/kg/hr				
Naloxone (Narcotic reversal) including for opiate overdose Infusion	0.01mg/kg/dose repeat PRN Q2-3min 0.3mg/kg in 30 ml Dext 5% @ rate 1m/hr (0.01mg/kg/hr)	IV/IMI /SC/ETT IV/IMI/ SC/ETT IV	0.4mg/kg	Act within 1min last up to 45mins	-Caution in Cardiac patients and Hypertension -cause tachycardia

Drug	Dose (mg/kg)	Route	Maximum dose	Duration of action	Precautions
Paracetamol Neonate Paediatric	*10-15mg/kg /doseQ6-8 hr* *20mg/kg stat then 15mg/kg q 4h* *40mg/kg stat then 30mg/kg q 6hrs*	PO/PR PO PR PO/PR	*4g/day or Usual daily max for child:90mg/kg x 48hr, then 60mg/kg* .	Half life 1-4 hr Peak less then 1 hr	*-over dose acetylcysteine and avoid in liver failure* *-adjust for renal dose*

Reference:

1) American Society of Anesthesiology Journals April 2002, Volume 96 Page 1004-17.

2) Malaysia Protocol for sedation for Diagnostic and therapeutic procures page 345 -347 ?? Year of

4) APLS Manual 4th Edition,2005 Appendix F Management of Pain in children

5) Common Drugs in Paediatric S Ramesh 11th Edition

6) Drug Dosage Book Frank Shann 14th Edition, 2008

7) Harriet lane Handbook 17th Edition

8) Lautoka PICU Protocol Guidelines, 2008

9) American Society of Anesthesiologists, 1995 (1)

Scope and Application	This CPG is intended for use by all health care workers in their daily care of paediatric patients
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