



PAIN MANAGEMENT IN PAEDIATRICS

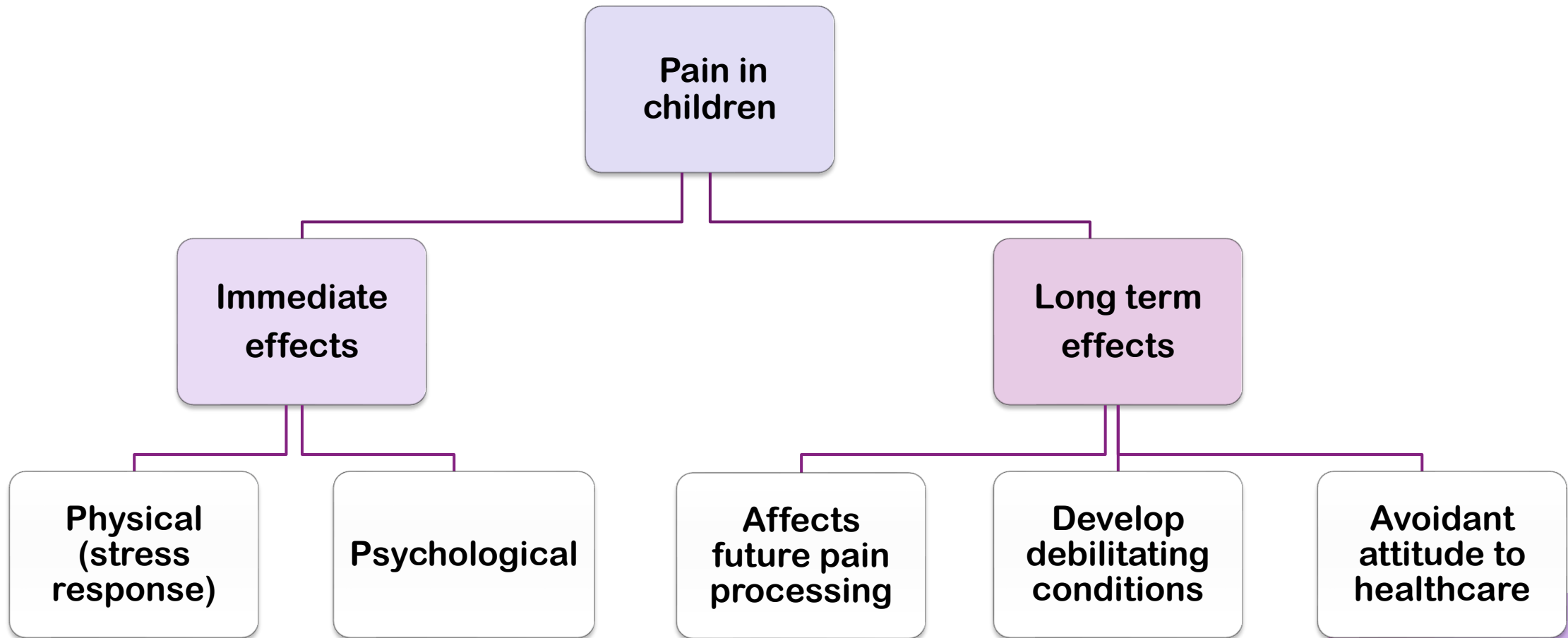


PAIN FREE PROGRAMME | KEMENTERIAN KESIHATAN MALAYSIA | UNIT AUDIT KLINIKAL

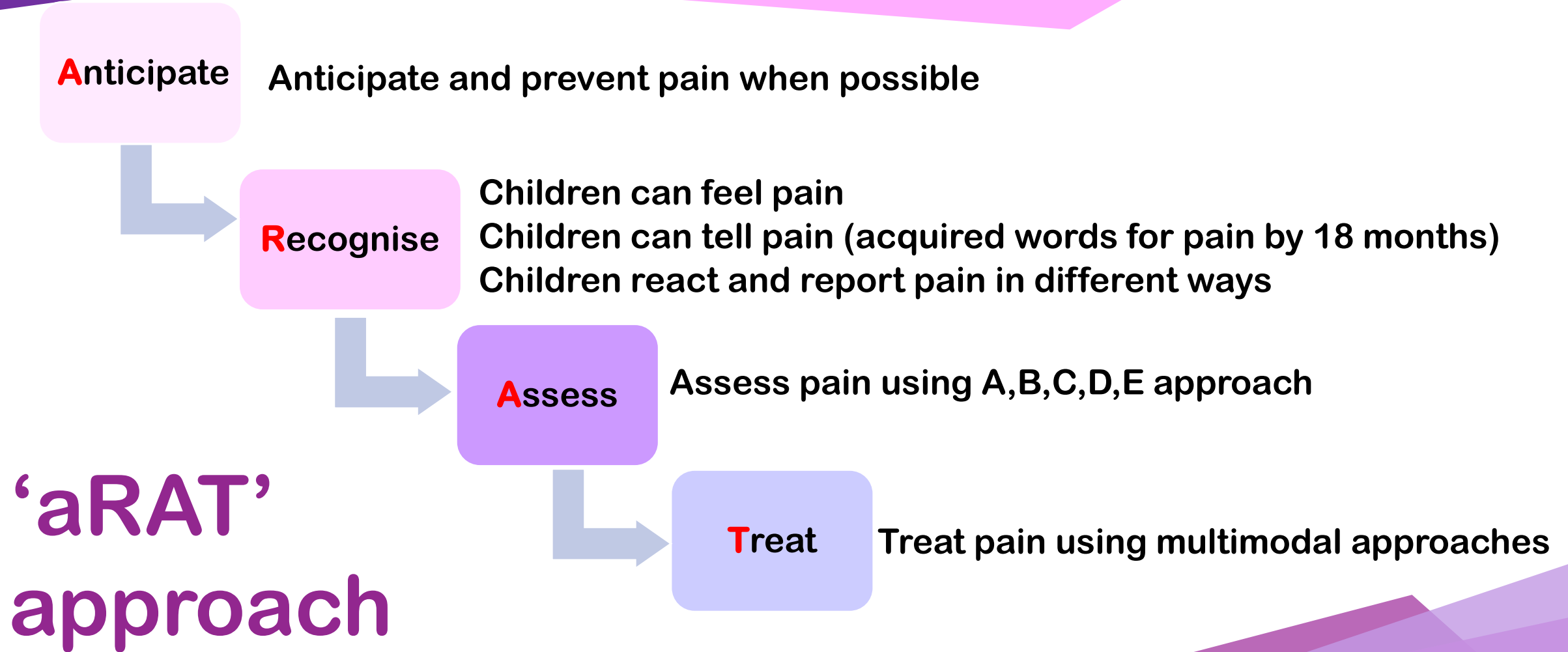
FACTS ABOUT PAIN IN CHILDREN

- Neonates and even premature babies **CAN** and **DO** feel pain
- Pain experienced by children is **NO** less and may even be more than that experienced by adults
- Inadequately addressed pain has both short and long-term negative consequences
- Pain in children is still under-recognised and under treated
- There are still lots of unwarranted fears on the use of pain medication in children especially opioids

IMPACT OF INADEQUATELY ADDRESSED PAIN IN CHILDREN



PAIN MANAGEMENT IN CHILDREN - aRAT approach



ABC OF PAIN ASSESSMENT IN CHILDREN

A	A sk the child and A ssess pain score
B	Use B ehavioural and B iological measures
C	Find the C ause
D	D ecide and D eliver treatment in a timely manner
E	E valuate outcome

Pain assessment is more than just getting a pain score!

A

ASK THE CHILD & ASSESS PAIN SCORE

i) Ask the child

- Start by asking the child and always believe what they say, as every child is different
- If the child is unable or unwilling, then ask the parents or caregiver
- Start with *“Does anything hurt”*, if yes, take history as below:

P	Place or site of pain	• “Where does it hurt?”
A	Aggravating factors	• “What make the pain worse?”
I	Intensity	• “How bad is the pain?”
N	Nature or neutralizing factors	• “What does it feel like” (a body chart might help children describe their pain) • “What makes the pain better?”

A

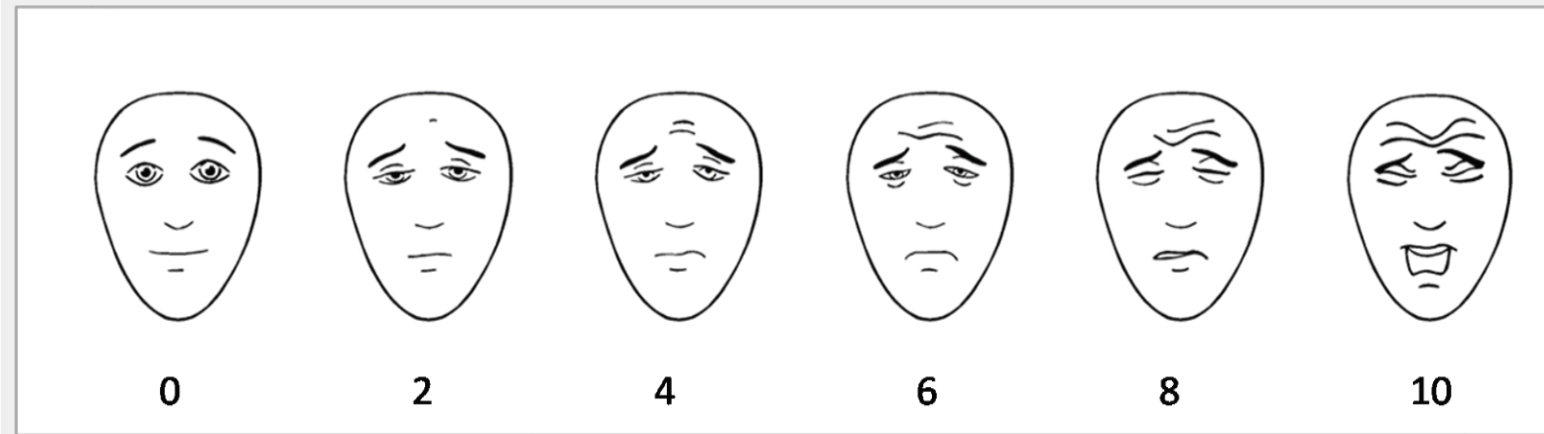
ASK THE CHILD & ASSESS PAIN SCORE

ii) Assess pain score

- Children as young as 4 years of age can reliably report their pain using 'self-report tools'.
- The choice of the pain reporting scale or tool must be
 - individualised for each child
 - not just based on chronological age but also the child's developmental age, personality and clinical condition
- Pain scores should never be interpreted singly
 - always done in conjunction with child & parent's report of pain & physician assessment

SELF-REPORTING TOOLS IN CHILDREN

4-7 years : FACES pain scale - revised



FPS-R : FACES pain scale revised, 2001

- In the following instructions, say 'Hurt' or 'Pain' whichever seems right for a particular child: **"These faces show how much something can hurt. This face (point to the left most face) shows no pain. The faces show more and more pain (point to each from left to right) up to this one. (point to the right most face). It shows very much pain. Point to the face that shows how much you hurt (right now)"**
- Do not use words like 'happy' or 'sad'. This scale is intended to measure how children feel inside, not how their face looks.

SELF-REPORTING TOOLS IN CHILDREN

≥ 7 years : Numerical scale



Ask the child to report their pain severity based on numbers where '0' is no pain and '10' is the worst pain experienced.

B

USE BEHAVIOURAL AND BIOLOGICAL MEASURES

- Used as **proxy** measures for pain in younger children , infants and neonates who are not able to self report
- These measures should **never** be used **singly**

	Examples	Comments
Behavioural	<ul style="list-style-type: none">• Facial expression• Crying• Body posture• Activity• Appearance	<ul style="list-style-type: none">• Changes in behaviour may indicate changes in pain intensity.• Beware that some children may not exhibit pain by crying but by being unduly quiet or withdrawn
Biological/ Physiological	<ul style="list-style-type: none">• Heart rate• Respiratory rate• Blood pressure• Oxygen saturation• Palmar sweating	<ul style="list-style-type: none">• Can be affected by other causes and thus should never be used singly as a measure of pain

BEHAVIOURAL MEASURES

1 month - 4 years : FLACC

Category	Scoring		
	0	1	2
Face	No particular expression or smile	Occasional grimace or frown, withdrawn, disinterested	Frequent to constant quivering chin, clenched jaw
Legs	Normal 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 cry (awake or sleep)	Moans or whimpers; occasional complaint	Crying steadily, screams or sobs, frequent complaints
Consolability	Content, relaxed	Reassured by occasional touching, hugging or being talked to, distractable	Difficult to console

This is a behavioural observer rated pain scale

- Observe for 2 to 5 min or longer (if asleep minimum 5 minutes)
- Observe body and legs uncovered
- Reposition patient (if possible, when asleep) or observe activity
- Assess body for tenseness and tone (if asleep, touch to assess tone)
- Each category is scored 0-2, giving a total of 10

BEHAVIOURAL MEASURES

NEONATES UP TO 1 MONTH: NIPS

Neonatal/Infant Pain Scale (NIPS) ⁴ A score greater than 3 indicates pain		Score
Facial expression		
0 - Relaxed muscles	Restful face, neutral expression	
1 - Grimace	Tight facial muscles, furrowed brow, jaw, chin (negative facial expression – nose, mouth and brow)	
Cry		
0 - No cry	Quiet, not crying	
1 – Whimper	Mild moaning, intermittent.	
2 – Vigorous cry	Loud scream, rising, shrill continuous (note, silent cry may be scored if baby is intubated as evidenced by obvious mouth and facial movements).	
Breathing Patterns		
0 – Relaxed	Usual pattern for this infant	
1 – Change in breathing	In drawing, irregular, faster than usual, gagging and breath holding.	

Neonatal/Infant Pain Scale (NIPS) ⁴ A score greater than 3 indicates pain		Score
Arms		
0 – Relaxed/Restrained	No muscular rigidity, occasional random movements of arms.	
1 – Flexed/Extended	Tense straight legs, rigid and/or rapid extension, flexion.	
Legs		
0 – Relaxed/Restrained	No muscular rigidity, occasional random movements of arms.	
1 – Flexed/Extended	Tense straight legs, rigid and/or rapid extension, flexion.	
State of Arousal		
0 - Sleeping/awake	Quiet, peaceful sleeping or alert random leg movement.	
1 - Fussy	Alert, restless and thrashing	

C

FIND THE CAUSE

- Always consider the possible cause/s of pain before starting any treatment
- Search for any possible simple reversible causes of pain
 - e.g. A tissued line , a full bladder
- Anxiety may also be a cause of ‘pain’
 - sometimes a child might cry due to separation anxiety and not pain

D

DECIDE AND DELIVER TREATMENT IN A TIMELY MANNER

- Every complaint of pain should be assessed
- If pain is present, discuss with the child/caregiver if any intervention is required.
 - *Do you want me to do something to help ?*
 - *Do you think we need to do something to relieve the pain? (parents)*
- Interventions can be both pharmacological or non-pharmacological methods
- Sometimes, just reassurance might suffice that
 1. the pain is accounted for
 2. does not signify anything more serious might suffice

E

EVALUATE OUTCOME

- Always reassess for response after any intervention
- Decide on further steps of pain management

METHODS OF PAIN RELIEF

PHARMACOLOGICAL	NON-PHARMACOLOGICAL
<ul style="list-style-type: none">▪ Topical analgesia<ul style="list-style-type: none">◦ Cream e.g. EMLA◦ Spray e.g. Ethyl chloride◦ Local infiltration e.g. Lignocaine▪ Systemic<ul style="list-style-type: none">◦ Oral◦ Intravenous : bolus, infusion, PCA◦ Inhalation e.g Nitrous oxide▪ Peripheral nerve block/ regional anaesthesia (epidural / spinal)	<ul style="list-style-type: none">▪ Physical<ul style="list-style-type: none">◦ Comfort positioning◦ Touch : stroking, massage, vibration, TENS◦ Heat or Cold application◦ Acupuncture▪ Cognitive-behavioural<ul style="list-style-type: none">◦ Distraction◦ Deep breathing◦ Hypnosis◦ Progressive muscle relaxation◦ Biofeedback

1. NON-PHARMACOLOGICAL

- May not alleviate immediate distress but have important long-term effects for future experiences
- Alter the perception, meaning and affect associated with the pain
- Facilitates competent coping and enhance self esteem

DISTRACTION

- Proven effective in reducing pain and distress especially in needle procedures
- Works by refocusing the attention from negative to something more positive
- Recommended for all age groups
- Must be employed before a child is too distressed
- Can be done by anybody, does not require special training



Toys



Electronic gadgets



Story books



Movies/cartoon



Blowing spinners



Blowing bubbles



Stress balls



Hidden pictures

Examples of distractors

“For everybody , by anybody, at anytime”

COMFORT POSITIONING - “HUGGING HOLD”

Provide comfort, security and sense of control
Provides close physical contact for the child
Adults provide positive assistance, not negative restraint



Back to front bear hug



Front to front bear hug



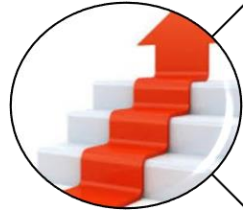
Frog hold



Side support hold

2. PHARMACOLOGICAL

Key concepts in pharmacological management



By the ladder : Prescribe analgesics according to the analgesic ladder



By the clock : Give analgesics regularly to ensure a steady blood concentration



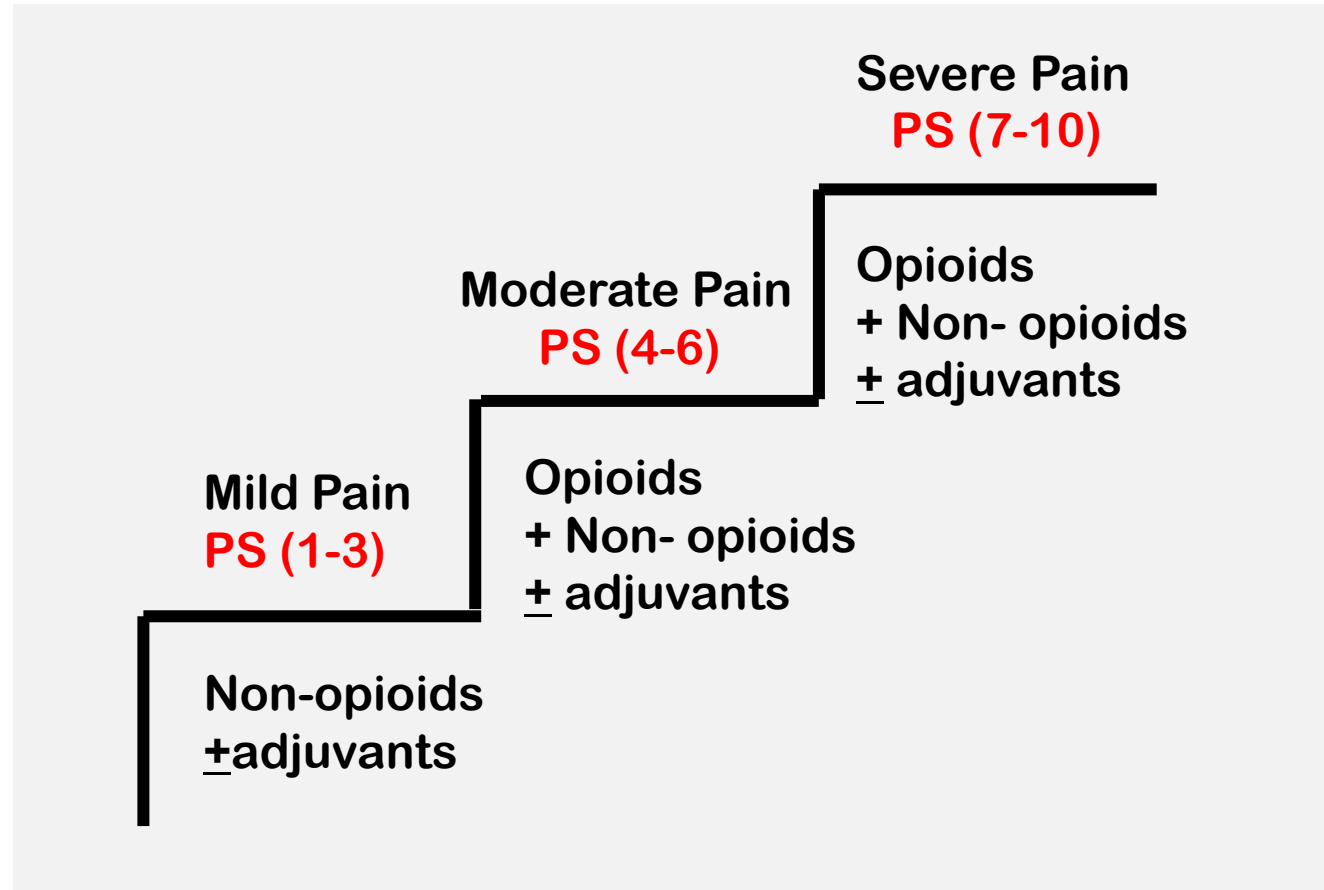
By the mouth : Always try and use the least invasive route



By the child : Treatment individualised according to a child's pain and response

2. PHARMACOLOGICAL

Modified analgesic ladder for paediatrics



Non opioids

- Paracetamol
- NSAIDs
 - Ibuprofen, Naproxen, Diclofenac, Meloxicam

Opioids

- Weak opioid
 - Tramadol
- Strong opioid
 - Morphine, Fentanyl, Oxycodone

Adjuvants

- Amitriptylline
- Gabapentin
- Ketamine
- Clonidine

EMLA



1. Squeeze EMLA

2. Apply to site



3. Apply occlusive dressing

4. Keep EMLA for 60 minutes

- Use only on **intact skin**
- For best effect, keep EMLA on for **60 minutes** before any procedure
- Duration of action : 2-4 hours
- Expected response : Transient local blanching followed by erythema
- Possible adverse reactions:
 - Severe erythema
 - Itching
 - Blistering
- Caution:
 - Infants < 3/12
 - G6PD deficiency
 - Allergy to EMLA

LIGNOCAINE INFILTRATION

LOCAL INFILTRATION OF ANALGESIC AGENT

- Infiltrate into skin or subcutaneous tissue
- Used in minor surgical and dental procedures
- Drugs:
Lignocaine – most common
Prilocaine
Mepivacaine
- Dose:
Lignocaine (1%, 0.5%) : maximum dose is 4mg/kg. If used with vasoconstrictor, max 7mg/kg
- Complication:
Systemic toxicity if analgesia enters circulation from site of administration

Lignocaine toxicity

CNS

- Minor: tongue and perioral numbness, paraesthesias, restlessness, tinnitus, muscle fasciculations and tremors
- Major: Seizures, Global CNS depression, decrease conscious level, apnoea

Cardiovascular

- Early: Hypertension, tachycardia
- Late: Hypotension, arrhythmias, cardiac arrest

PARACETAMOL

- The most commonly used analgesic in children
- Excellent safety profile and lack of significant side effects
- Indication : mild to moderate pain
For more severe pain, can be combined with an opioid analgesic
- Contra-indications:
 - Known sensitivity to paracetamol
 - Severe liver disease
- Risk factors for paracetamol hepatotoxicity include:
 - fasting/ vomiting/ dehydration, systemic sepsis, pre-existing liver disease, chronic under-nutrition and prior paracetamol intake

Oral

Dose : 15mg/kg/dose

Total daily not to exceed

- 75 mg/kg/day in children
- 60 mg/kg/day in infants
- 30 mg/kg/day in preterm 28-32 wks

CGA

Avoid more frequent than 4 hourly dosing

Rectal

Inferior to oral

Loading doses: 40mg/kg

Dose: 20 mg/kg every 6-8 hours

Suppositories should not be used in neutropenic or severely immunocompromised patients.

Non Steroidal Anti-Inflammatory Drugs (NSAIDs)

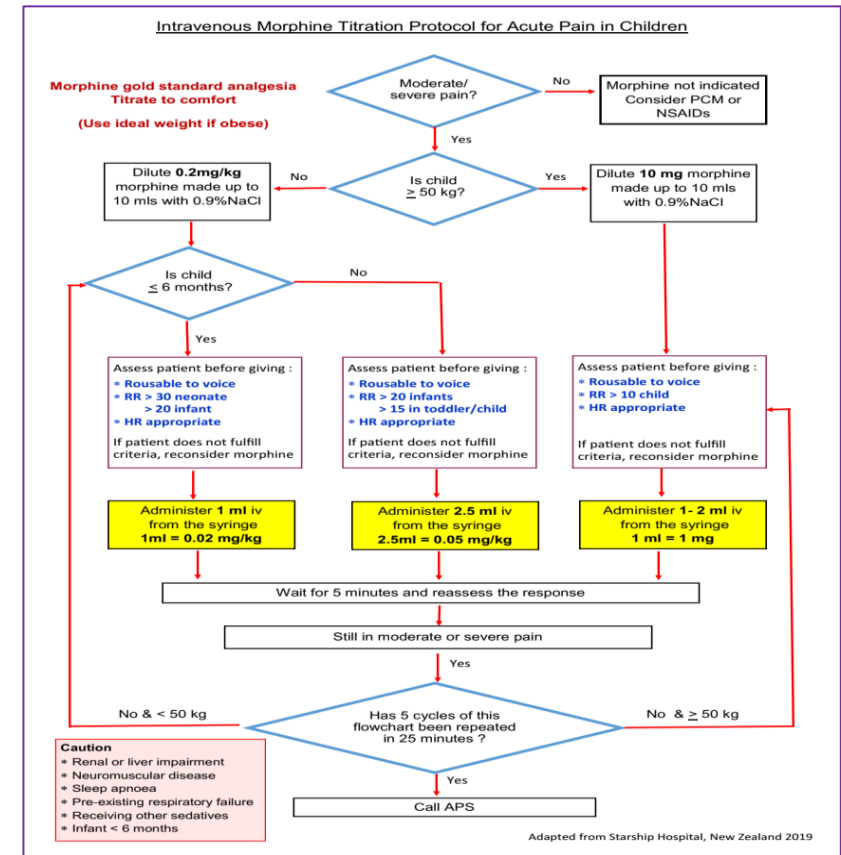
- NSAIDs are effective for mild to moderate pain especially if inflammatory pain
- Commonest is Ibuprofen
 - 5-10 mg/kg per dose (max 400 mg per dose) PRN q6-8 hourly
 - max 30-40 mg/kg per day or 1.2 gm per day
 - Not recommended < 3 months, caution < 6 months (refer specific dosages)
- Diclofenac suppository – used commonly post operative
 - Rectal = 3 mg/kg per day PRN divided q8-12 hourly
 - (max 3 mg/kg/day or 150 mg/d whichever is less)
 - Consent for suppositories required, usually in patients > 10 kg
- Careful attention to hydration and concomitant use of nephrotoxic drugs
- Children appear to have a lower incidence of renal and gastrointestinal side effects when compared to adults even with chronic administration

OPIOIDS

- Very useful for treatment of pain in patients of all ages
- Provide excellent analgesia with a wide margin of safety for a vast majority of children
- Routes of administration: oral , IV, rectal, transdermal or transmucosal
- Oral and IV route preferable (refer Morphine titration protocol for acute pain in children)
- Avoid intramuscular injections unless absolutely necessary as children will deny they are in pain to avoid a shot.
- Weak opioid : Tramadol
- Strong opioid : Morphine, Fentanyl, Oxycodone

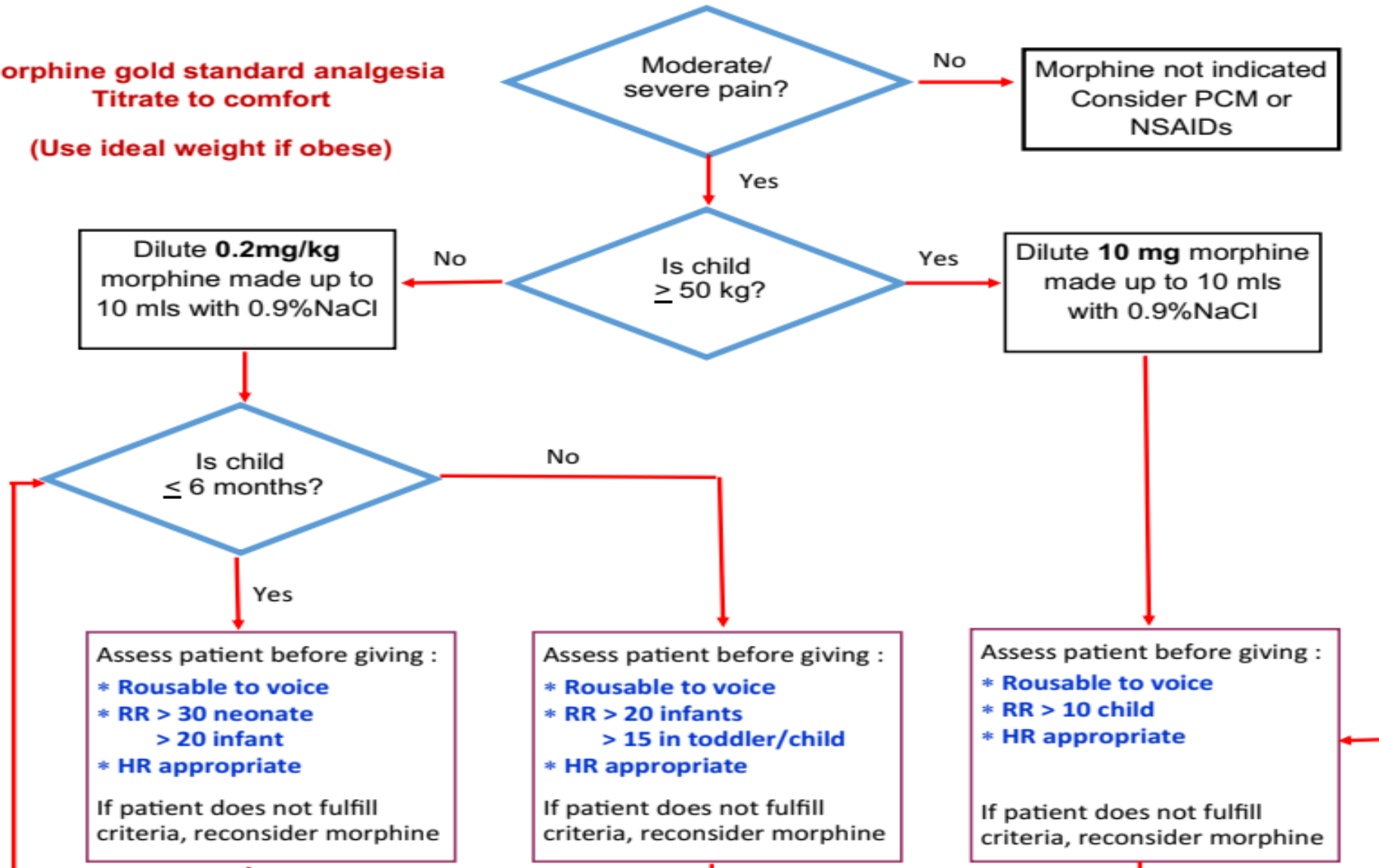
Morphine titration for Acute pain in children

- Titrate to comfort
- Give iv boluses of morphine and titrate every 5 minutes until analgesia is achieved



Intravenous Morphine Titration Protocol for Acute Pain in Children

Morphine gold standard analgesia
Titrate to comfort
(Use ideal weight if obese)



Assess patient before giving :

- * Rousable to voice
- * RR > 30 neonate
> 20 infant
- * HR appropriate

If patient does not fulfill criteria, reconsider morphine

Administer 1 ml iv
from the syringe
1ml = 0.02 mg/kg

Assess patient before giving :

- * Rousable to voice
- * RR > 20 infants
> 15 in toddler/child
- * HR appropriate

If patient does not fulfill criteria, reconsider morphine

Administer 2.5 ml iv
from the syringe
2.5ml = 0.05 mg/kg

Assess patient before giving :

- * Rousable to voice
- * RR > 10 child
- * HR appropriate

If patient does not fulfill criteria, reconsider morphine

Administer 1- 2 ml iv
from the syringe
1 ml = 1 mg

Wait for 5 minutes and reassess the response

Still in moderate or severe pain

Yes

No & < 50 kg

Has 5 cycles of this
flowchart been repeated
in 25 minutes ?

No & \geq 50 kg

Yes

Call APS

Caution

- * Renal or liver impairment
- * Neuromuscular disease
- * Sleep apnoea
- * Pre-existing respiratory failure
- * Receiving other sedatives
- * Infant < 6 months

Adapted from Starship Hospital, New Zealand 2019

SUCROSE

Who	<ul style="list-style-type: none">▪ Works well for infants < 12 months, and up to 18 months▪ Most effective for preterm and term infants during the neonatal period
When	<ol style="list-style-type: none">1. Sole analgesic for minor procedures e.g. venipuncture, IV line, dressings, removal of ECG leads2. Adjunct to strong analgesia and topical anaesthetics e.g. chest drain insertion, laser treatment, ROP examination
How	<ul style="list-style-type: none">▪ Start administration 1-2 minutes before a painful stimulus▪ May be repeated during a painful procedure if necessary up to maximum dose per event▪ It can be given using a pacifier or directly dripped (one drop at a time) on to the tongue using a syringe▪ The number of applications is decided according to the child's response.
Caution	<ul style="list-style-type: none">▪ Useful for single attempt painful procedures▪ Not appropriate for continuing pain▪ Not effective if given via nasogastric tube directly to the stomach

KETAMINE

- Should only be used by trained or experienced personnel /specialist
- Often used for procedural sedation and analgesia (may be used in combination with Midazolam or Fentanyl)
- Can produce profound analgesia with somewhat preservation of pharyngeal/laryngeal reflexes and stimulation of respiratory and cardiovascular system
- Can result in hallucinations and emergence phenomenon if used as a sole agent for anaesthesia.
- Dose :
 - Analgesia : 0.2-0.5 mg/kg/dose iv
 - Procedural sedation and analgesia : 1-1.5 mg/kg/dose iv

Contraindications

- Severe systemic hypertension.
- Raised intra-ocular pressure.
- Recent history of epilepsy.
- Recent history of psychosis.
- History of hypersensitivity to Ketamine
- Hepatic impairment
- Thyrotoxicosis

Precautions

- Cardiac arrhythmia and hypertension
- Raised intracranial pressure
- Concurrent respiratory infection (increased secretions)

SPECIAL CONSIDERATIONS



PROCEDURAL PAIN MANAGEMENT IN CHILDREN

ANTICIPATE pain and distress

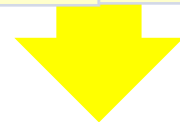
Decrease anxiety before procedures



PREPARE child and caregiver

Provide a sense of mastery of stressful conditions, promote coping behaviours

Encourage active and positive involvement of parents



Combination of pain management strategies

Provide significant pain control

Create a pleasant experience

PERI-OPERATIVE PAIN MANAGEMENT IN CHILDREN

1

ANTICIPATE pain and distress

- Discuss with parents regarding post-operative pain control

2

PREPARE child and caregiver

- Provide a comprehensive explanation of the surgical procedure and pain management
- Encourage active involvement of parents in pain control measures

3

Utilise a **MULTIMODAL** and **PRE-EMPTIVE** Approach

- Provide significant rapid pain control – analgesia via oral, iv, epidural or PCA
- Prevent painful & traumatising experience

PAIN IN CRITICALLY ILL CHILDREN

- Critically ill children experience more moderate to severe pain
- They are also subjected to more painful procedures
- Challenges in pain management for critically ill children include
 - Overlap between pain and non pain distress
 - Diverse population
 - Fluctuating condition
- When possible use self-report e.g. via facial expressions (FACES) or numerical scale (MOH Pain Ruler)
- If mechanically ventilated and sedated, can use a combination of FLACC and COMFORT-B

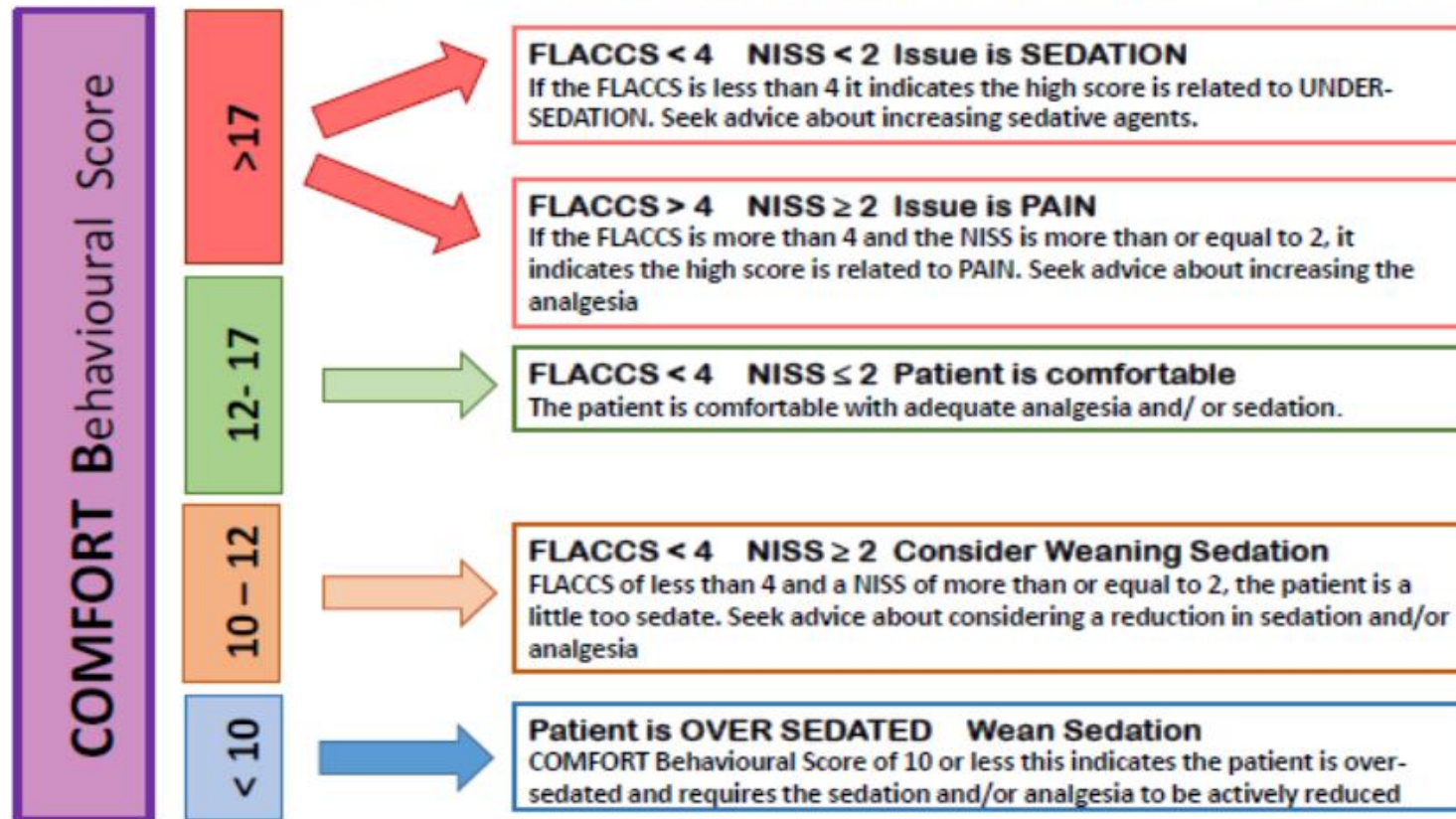
ASSESSING PAIN AND SEDATION IN CRITICALLY ILL CHILDREN AND ITS INTERPRETATION



COMFORT Behavioural Score Titration Guide



First assess the COMFORT B Score then assess the FLACCS and the NISS.



COMFORT B

- Alertness
- Calmness-Agitation
- Respiratory response
- Crying
- Physical Movement
- Muscle Tone
- Facial Tension



PAIN IN NEUROLOGICAL IMPAIRED CHILDREN

Revised FLACC

- Children with neurological impairment can experience moderate to severe pain despite being non communicative
- Can have both nociceptive and neuropathic pain
- Pain assessment can be very difficult in this population
- Use Revised FLACC where specific individual pain behaviours for a particular child is assessed

ASSESSMENTS	SCORES		
Individualised Behaviour	0	1	2
FACE Individualised behaviour :	No particular expression or smile	Occasional grimace or frown, withdrawn or disinterested; appears sad or worried	Consistent grimace or frown; frequent/constant quivering chin; clenched jaw; distressed-looking face; expression of fright or panic
LEGS Individualised behaviour :	Normal position or relaxed; usual tone & motion to limbs	Uneasy, restless, tense; occasional tremors	Kicking, or legs drawn up; marked increase in spasticity, constant tremors or jerking
ACTIVITY Individualised behaviour :	Lying quietly, normal position, moves easily, regular & rhythmic respirations	Squirming, shifting back/forth, tense or guarded movements, mildly agitated, shallow splinting respirations, intermittent sighs	Arched, rigid or jerking, severe agitation, head banging, shivering, breath holding, gasping or sharp intake of breaths, severe splinting
CRY Individualised behaviour :	No cry/verbalization	Moans or whimpers, occasional complaint, occasional verbal outburst or grunt	Crying steadily, screams or sobs, frequent complaints, repeated outbursts, constant grunting
CONSOLABILITY Individualised behaviour :	Content or relaxed	Reassured by occasional touching, hugging or being talked to, distractible	Difficult to console or comfort, pushing away caregiver, resisting care or comfort measures

PAEDIATRIC PAIN MANAGEMENT FLOWCHART

Greet patient
and parent

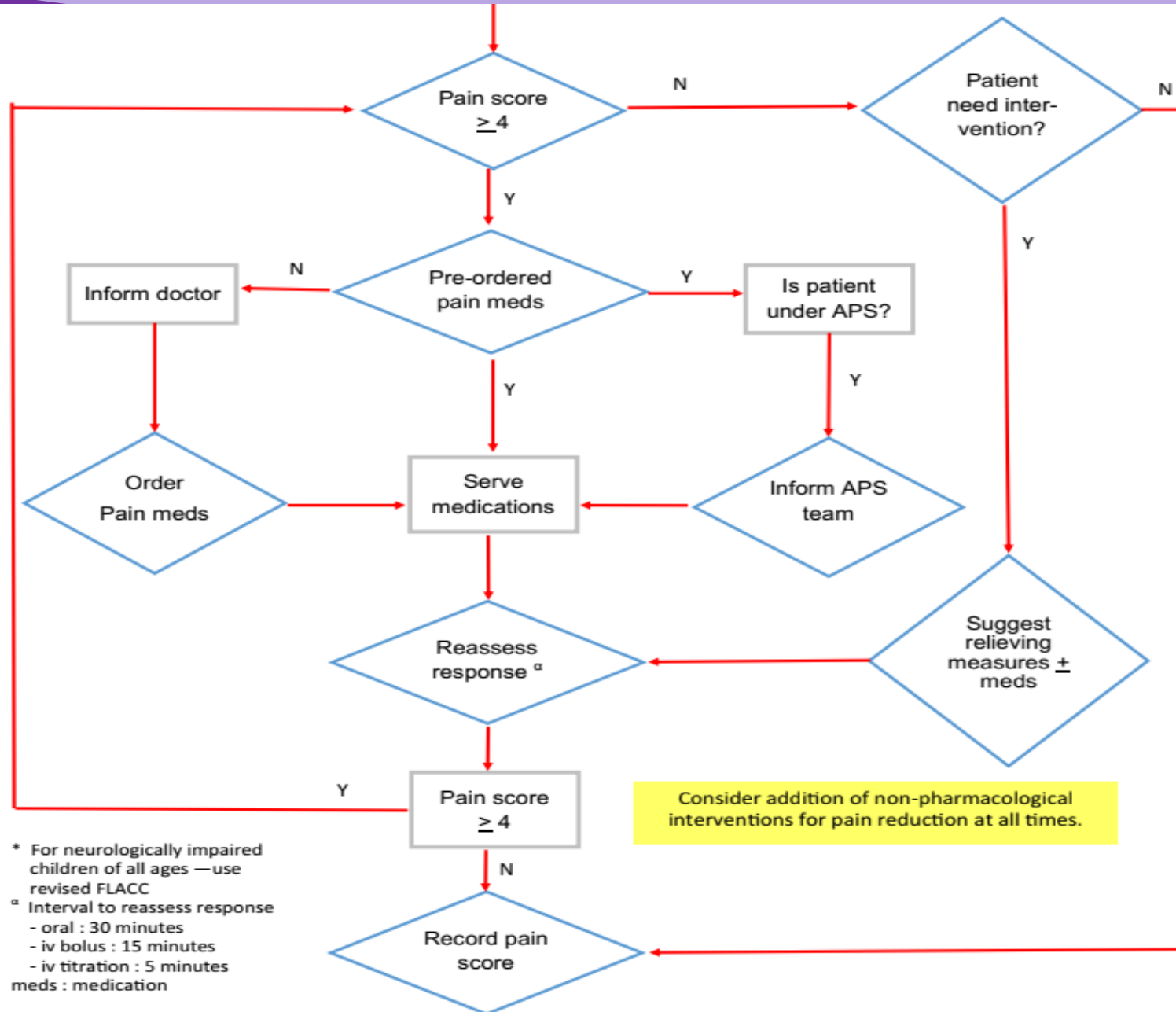
Assess pain using A,B,C,D,E

1. Take pain history and find cause
2. Select age appropriate tool * and assess pain.
3. Teach pain tool where relevant

1/12	1/12 -	4-7 years	≥7 years
NIPS	FLACC	FACES (IASP)	Numerical

Pain assessment in children

- A** - **A**sk the child and **A**ssess pain score
- B** - Use **B**ehavioural and **B**iological measures
- C** - Find the **C**ause
- D** - **D**ecide and **D**eliver treatment in a timely manner
- E** - **E**valuate outcome



CONCLUSION

- Infants and young children can and do feel pain
- Untreated pain has negative short and long-term consequences
- Therefore, pain in children needs to be recognised and managed.
- Multimodal pain management is the key
- It is no longer ethical to withhold pain relief in children, so treat children more humanely



THANK YOU



PAIN FREE PROGRAMME | KEMENTERIAN KESIHATAN MALAYSIA | UNIT AUDIT KLINIKAL