Effective Pain Management in Children
Understanding Pain on a Better Scale

All of us have dealt with children in pain. Trying to comfort a child who is in pain and upset is challenging and at times even distressing to a healthcare worker. The parents’ or caregivers’ input and assistance is very useful in helping the child. A multi-modal approach combining both non-pharmacological and pharmacological therapies often work much better than using each therapy in isolation. The goal of treatment is to keep the child within “the analgesic corridor” in order to optimise efficacy whilst minimising adverse effects.

To guide appropriate pain treatment, a proper evaluation of the pain is essential. Unfortunately, studies have shown that even in acute hospitals, pain is often assessed infrequently or inadequately. Pain assessment in children, especially in infants and in the cognitively-impaired children, can be extremely challenging even for practitioners in experienced centres.

Telling Pain in Children
Self-reported pain assessment tools can be used in children as young as 4 years of age. However, choice of assessment tool is dependent on the cognitive and emotional maturity of the child. Important factors that need consideration, apart from age, include: ability to differentiate levels of intensity of pain as well as ability to differentiate emotional and physical aspects of pain. Staff familiarity and ease of use is also essential in determining success in implementing the selected pain assessment tool.

From 4 to 5 years of age, most children can differentiate “more”, “less” or “the same as” and should be able to use pain scales with limited options such as the Faces Pain Scale. Proper explanation of the pain scales should be given preferably prior to a painful stimulus or procedure. However, inaccuracies in reporting may exist as they tend to choose extremes of scales. Tools anchored with smiling or crying faces such as the Wong-Baker Faces Rating Scale, may lead children to confuse pain with emotional states such as happiness, sadness, or distress, and as a result, under- or over-rate pain score. These children often exhibit stranger anxiety which affects or even impede pain assessment.

Useful Tools to Report Pain
From 7 to 10 years of age, children acquire skills of measurement and ability to arrange items in ascending or descending orders. There is better translation of pain experience to a grade on either Faces Pain Scale or even the Visual Analog Scale. After the age of 10 to 12 years old, the verbally competent adolescent should be able to understand pain intensity and affective emotional component of pain; and may even respond to comprehensive pain assessment tools such as McGill Pain Questionnaire.

Two systematic reviews have found six self-report tools; Pieces of Hurt tool; Faces Pain Scale and Faces Pain Scale - Revised; Oucher; Wong - Baker Faces and Visual Analogue Scale (VAS), to have well-established evidence of reliability and validity in acute pain assessment in children between the ages of 3-18 years.

A rough guide based on age will be to use Pieces of Hurt for ages 3-4, Faces Pain Scale-Revised for ages 4-12 and VAS score for 8 years and above. However, pain reporting as in adults will be affected by emotional or cognitive state of the child. Observational assessments as well as parental or care-giver’s input are usually very useful.
<table>
<thead>
<tr>
<th>CATEGORY</th>
<th>SCORING</th>
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<tbody>
<tr>
<td>Face</td>
<td>0</td>
</tr>
<tr>
<td>No particular expression or smile</td>
<td>Occasional grimace or frown, withdrawn, disinterested</td>
</tr>
<tr>
<td>Legs</td>
<td>Normal position or relaxed</td>
</tr>
<tr>
<td>Activity</td>
<td>Lying quietly, normal position, moves easily</td>
</tr>
<tr>
<td>Cry</td>
<td>No cry (awake or asleep)</td>
</tr>
<tr>
<td>Consolability</td>
<td>Content, relaxed</td>
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For children less than 4 years of age and cognitively-impaired patients, self-report tools are generally inappropriate. Composite behavioral or physiological scores either directly, or based on observation by parents, are used instead. Examples of validated scores include CRIES (Children's Revised Impact of Events Scale), FLACC (Faces, Legs, Activity, Cry and Consolability) and CHEOPS (Children's Hospital of Eastern Ontario Pain Scale).

**Pain Management Techniques**

Pain perception is affected by cognitive, emotional, social and behavioral factors. Although pharmacological agents offer the most immediate and effective method of pain relief, they often do not address the associated anxiety and emotional distress that contribute to the pain experience. Non-pharmacological approaches when used appropriately, can have excellent results in infants, children or adolescents. These approaches can be divided broadly into cognitive and behavioral methods, biophysical techniques and complementary medicine therapies.

Cognitive and behavioral methods aim to reduce fear, anxiety and emotional distress. Cognitive strategies centre on changing the way the patient perceive pain while behavioral interventions focus on changing the patient's response to pain. Cognitive approaches are most effective above the age of 8; younger children will need a coach, usually a parent. For the technique to be effective, the child needs to be a willing participant and have the energy and concentration to learn the strategies.

Age-appropriate preparation is a commonly used intervention to reduce anxiety for children undergoing a painful or operative procedure. As the fear of the unknown is often greater than the known, providing the child with information should decrease the fear and anxiety leading to a change in perception of pain. Four types of information seem to be most helpful:

1. Reason to perform the procedure;
2. Description of the procedure;
3. Expected sensations or feelings;
4. Suggestions for how the child may cope with the procedure.

**Managing Pain the Non-Pharmacological Way**

Distraction is commonly used by parents instinctively to manage noxious or painful stimulus. By engaging the child in an activity that helps the child refocus attention on something other than the painful stimulus, it reduces pain perception and increases pain tolerance. Distracting activity needs to be appropriate to age, developmental level and interest. Possible options include viewing videos, reading to the child, color pictures, singing to the child, counting, telling stories or playing video games. Music therapy involving singing, playing, listening or moving to the music, provides distraction, relaxation and anxiety and pain reduction.

Relaxation and imagery reduces fear and anxiety, increasing pain tolerance. Relaxation can be achieved by simply holding or rocking a young child. Older children may benefit from rhythmic deep breathing, progressive muscle contraction-relaxation exercise and imagery. Imagery dulls the awareness of reality by encouraging the child to use his or her imagination to focus on something familiar or pleasant and unrelated to the pain. It can be used in children as young as 3 years old. Relaxation and guided imagery can induce a hypnotic state, during which the patient's attention is intensity focused, and he or she becomes highly receptive to suggestions. Hypnosis has been used for managing procedural and cancer pain in children. Biophysical techniques used in pain management range from simple techniques such as cutaneous stimulation, transcutaneous electrical nerve stimulation (TENS), cold and heat therapy, and massage, to comprehensive physical therapy regimes. The goal of physical therapy includes pain relief as well as restoration and maintenance of musculoskeletal function.

Complementary therapies such as acupuncture are commonly used locally. It is relatively safe, acceptable to most patients and is effective in management of acute and chronic pain as well as nausea and vomiting.

Specific non-pharmacological techniques are also effective for infants. Non-nutritive sucking on pacifier or nipple, sucrose (12-24%) or breastfeeding.
effectively attenuates pain response. Physical actions such as swaddling, holding, stroking or massaging head and back comforts and relaxes the infant. Rocking settles the infant and promotes sleep after a painful stimulus.

Managing Pain the Pharmacological Way
Implementation of non-pharmacological should not prevent the use of pharmacological agents when indicated. Topical agents such as Eutectic Mixture of Local Anaesthetic (EMLA®) is effective in decreasing needle-related procedural pain such as heel stick and venipuncture, and should be used whenever available. Regional anaesthesia and analgesia can be used, but rarely in children who are awake.

Systemic analgesic agents can be divided into conventional analgesics and adjuvants. Conventional analgesics include paracetamol, non-steroidal anti-inflammatory agents (NSAIDs) or cyclo-oxygenase 2 (COX-2) selective agents and opioids. Adjuvants can be useful when the pain has neuropathic features. Examples of adjuvants commonly used in outpatient settings include: anticonvulsants such as Gabapentin, local anaesthetics such as lidocaine, and antidepressants such as amitryptiline.

Paracetamol is very safe and can be administered in infants as young as 30 weeks post-conception age when the dose is adjusted appropriately. It can be given in oral, rectal or intravenous form for management of mild to moderate pain. Up to 90mg/kg/day given orally in divided doses is safe in infants more than 6 months of age for 2-3 days.

NSAIDs are generally more efficacious than paracetamol. Though safety for children less than 2 years old are not rigorously established in trials, clinical experience suggests that it is safe for infants as young as 6 months old. Aspirin should be avoided to minimise risk of Reye’s Syndrome. The choice of ibuprofen, diclofenac and ketorolac depends on available formulation and route of administration. The use of COX-2 selective agents in children is off label. Though based on clinical experience, their efficacy is comparable to conventional NSAIDs. Complications of NSAIDs and COX-2s in children are similar to adults and a limit should be set for duration of therapy, to be extended only after further review.

Opioid usage is commonly limited to inpatient use following surgery or acute medical conditions such as muscositis or sickle cell crisis. Tramadol is recommended for use for adolescents at least 16 years old, although clinically, 1-2mg/kg 6hourly have been efficacious without major adverse effects. Other opioids such as morphine, pethidine, fentanyl and oxycodone have been used and found to be safe in appropriate doses, even in young infants. Opioid adverse effects such as nausea, vomiting, sedation and constipation are common and should be treated aggressively during opioid therapy.

Gabapentin, at starting doses of 10mg/kg/day and titrated up to 35mg/kg/day in divided doses, is useful for the treatment of neuropathic pain for patients beyond age of 2 years old. Pregabalin has been shown to have possible benefit for neuropathic pain; however, clinical experience is still limited. Amitryptiline at 1-2mg/kg/day can also be use in addition or as an alternative for treatment for neuropathic pain.

Lidocaine appears in a few preparations which are useful. EMLA® applied on unbroken skin is a safe modality to decrease procedural pain. Lidocaine gargle and gel can be used for relieve pain from broken or inflamed mucosal membranes. Lidocaine 5% patch is effective against neuropathic pain although clinical experience with children is limited.

Managing pain starts with pain assessment using inputs from both child and caregivers. A combination of pharmacological and non-pharmacological methods, together with the collaboration of a multidisciplinary team, the caregivers and the child, will often bring the pain under control.

Upcoming GP Symposium
Watch out for the ongoing series of GP Symposiums on Pain Topics organized by the NUH Pain Management Unit.

Dr Tay Kwang Hui is a Consultant and the Director of the Pain Management Unit at the Department of Anaesthesia, National University Hospital (NUH). He provides both pharmacotherapy and interventional pain therapy for acute, chronic and cancer pain management services to paediatric and adult inpatients as well as outpatients.