

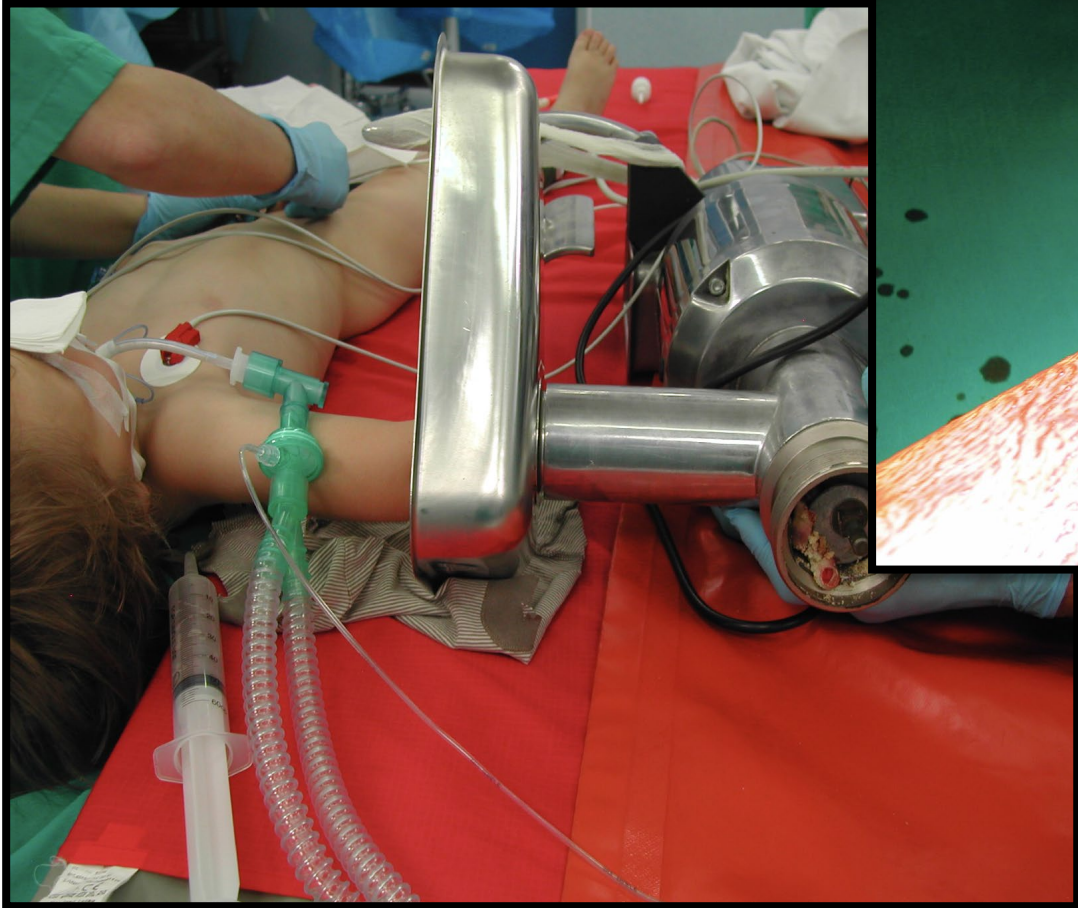


ESRA Italian Chapter
XXVIII
CONGRESSO
NAZIONALE

ALR in sala rossa

Solo analgesia endovenosa nel paziente pediatrico?

Valeria Mossetti
Ospedale Infantile Regina Margherita
Torino



In the pediatric population, pain is frequently under-recognized and inadequately treated.

If pain is not treated quickly and effectively in children, it can cause long-term physical and psychological sequelae.

Body system	Change
Cardiovascular	<ul style="list-style-type: none">● Increased heart rate and blood pressure● Increased need for oxygen● Water retention, potential fluid overload
Respiratory	<ul style="list-style-type: none">● Increased respiratory rate● Shallow breathing● Increased risk of infection
Immune	<ul style="list-style-type: none">● Increased susceptibility to infection● Increased or decreased sensitivity to pain● Activation of HPA axis
Endocrine	<ul style="list-style-type: none">● Increased blood glucose● Increased cortisol production
Gastrointestinal	<ul style="list-style-type: none">● Reduced gastric emptying and intestinal motility● Nausea and vomiting● Constipation
Urinary	<ul style="list-style-type: none">● Urge to urinate/incontinence
Musculoskeletal	<ul style="list-style-type: none">● Tense muscles local to injury● Shaking or shivering● Pilo-erection (goose bumps)
Nervous	<ul style="list-style-type: none">● Changes in pain processing● Risk of pain becoming chronic
Brain	<ul style="list-style-type: none">● Anxiety/fear● Depression



HOW TO MANAGE PAIN EFFECTIVELY?



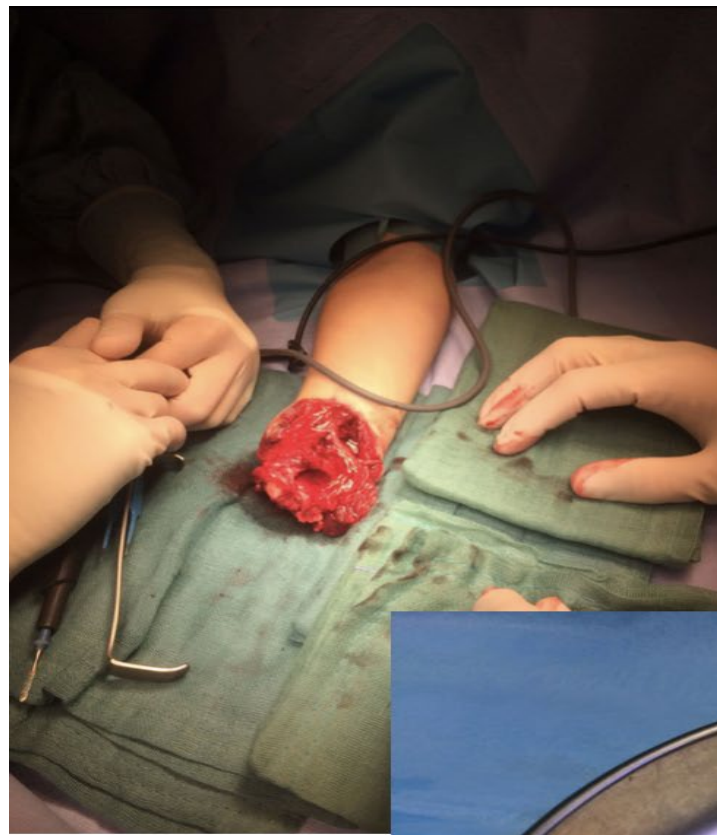
INTRAVENOUS ANALGESIA



REGIONAL ANESTHESIA

- MORE EFFECTIVE PAIN CONTROL
- REDUCTION OF OPIOID USAGE
- INCREASE OF REGIONAL BLOOD FLOW

Trauma with subsequent hand amputation





Intravenous anesthesia is always required prior to performing any nerve block in children!

Supraclavicular brachial plexus block :
single shot + perineural catheter positioning



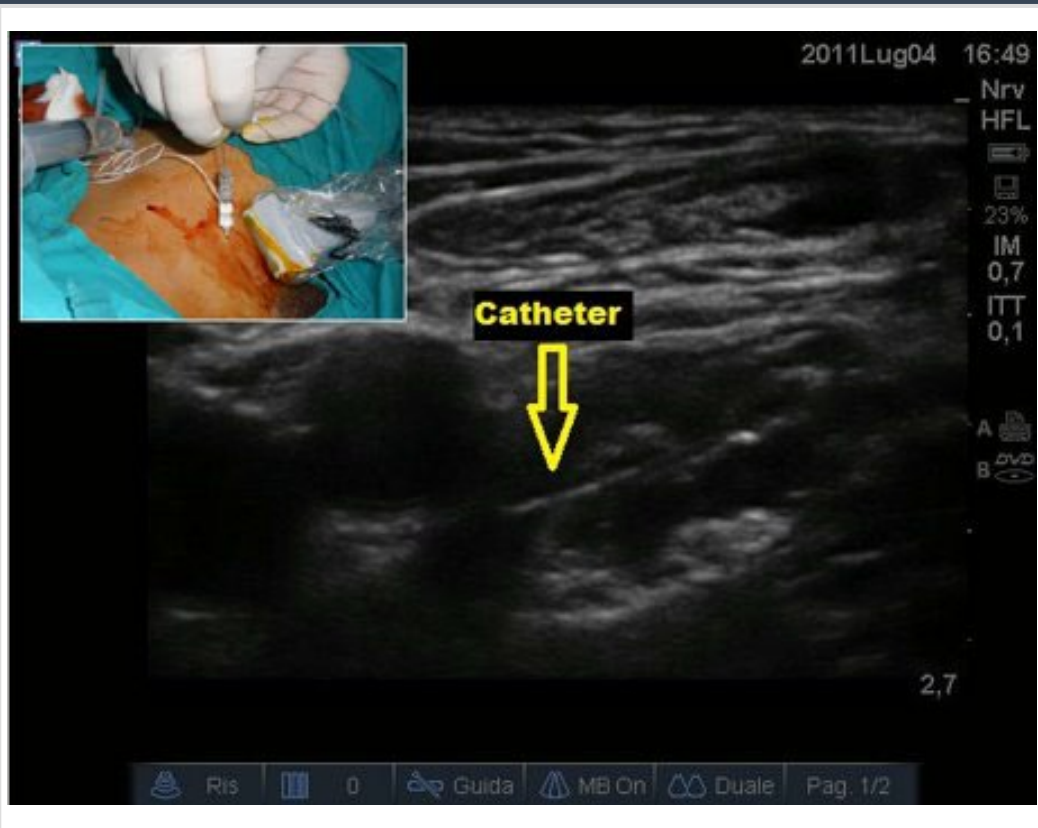
- US-guided positioning: better pain management guaranteed
- Maintenance of low level of endovenous analgesia (opioid sparing)

LONG BONE FRACTURES

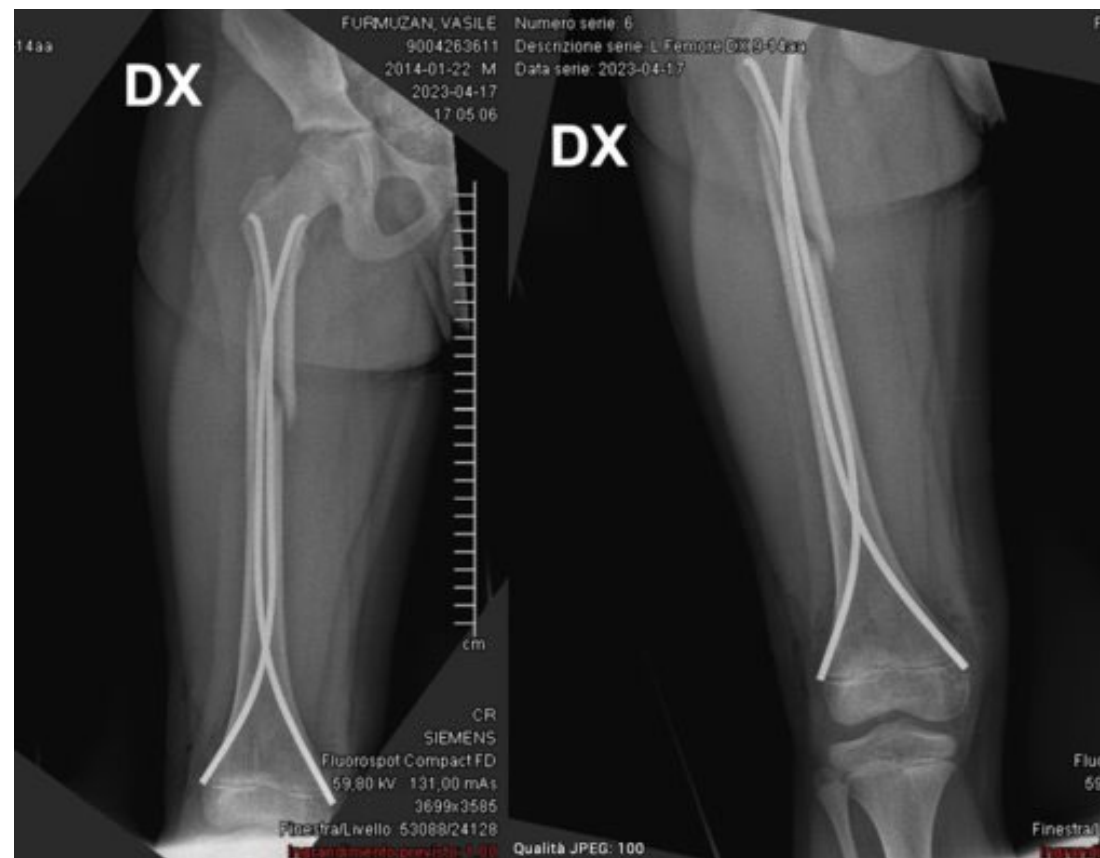
Main issues:

- ❑ Pain management
- ❑ Mioreolution for fracture reduction
- ❑ Traction maintenance





Possible further usage to perform analgesia in the O.R.!



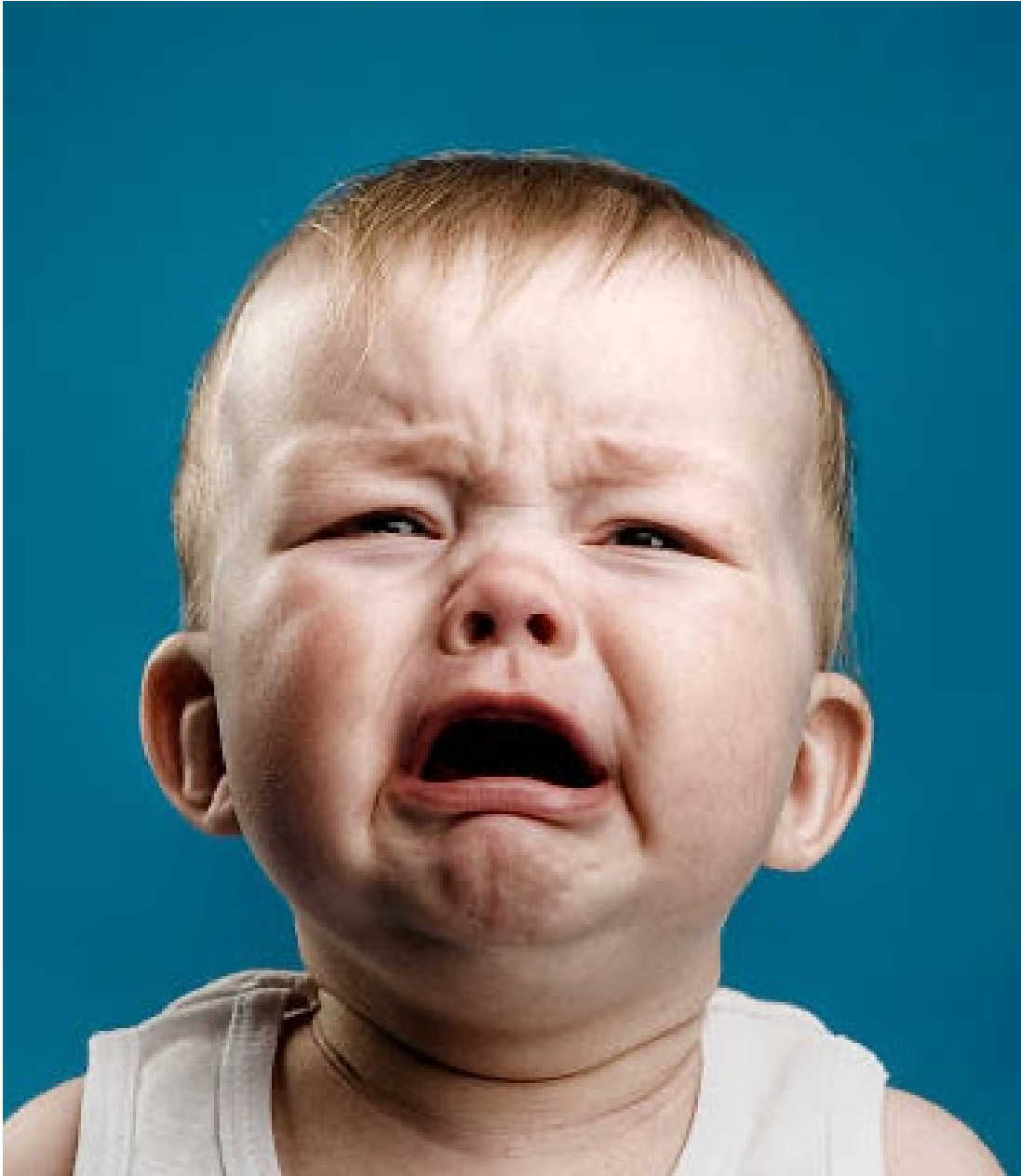
Femoral nerve block +
perineural catheter positioning
for continuous nerve block

POLYTRAUMA

- General anesthesia and intubation required for altered consciousness.
- ESP block performed to treat pain related to multiple rib fractures.
 - Single shot technique + perineural catheter

Reduced dose of IV anesthesia required, with advantages in terms of hemodynamic stability, drug metabolism and subsequent weaning.










- Traumatic injuries are among the most common causes of admission to pediatric ED, especially due to accidental falls and motor vehicle accidents.
- Among traumatic bone fractures, almost 65% of them involve upper extremities, while 20% of them involve lower extremities.

Given the great impact that pediatric trauma has in the everyday clinical practice, it is fundamental to identify correct strategies for an **efficient and early management of pain.**

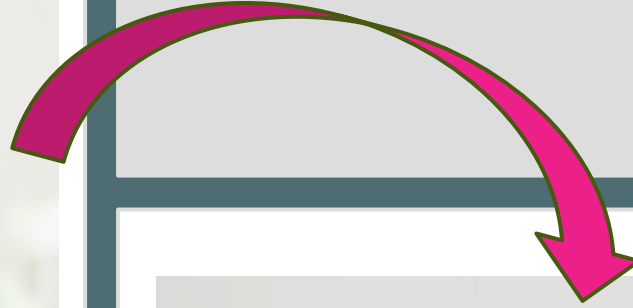


				
Ray	IV Insertion	Reduction of Fracture	Casting	Discharge
<p>Median pain score: <u>4 out of 10</u></p> <p>IQR=4 to 6</p> <p>• Proportion of patients reporting severe pain: <u>18.7%</u></p> <p>CI=10.6% to 27.0%</p> <p>n=8</p>	<p>Median pain score: <u>6 out of 10</u></p> <p>IQR=4 to 6</p> <p>• Proportion of patients reporting severe pain: <u>24.4%</u></p> <p>CI=13.8% to 39.6%</p> <p>n=45</p>	<p>Median pain score: <u>4 out of 10</u></p> <p>IQR=2 to 8</p> <p>• Proportion of patients reporting severe pain: <u>26.0%</u></p> <p>CI=17.1% to 37.5%</p> <p>n=73</p>	<p>• Median pain score: <u>4 out of 10</u></p> <p>IQR=2 to 6</p> <p>• Proportion of patients reporting severe pain: <u>18.7%</u></p> <p>CI=13.4% to 25.4%</p> <p>n=166</p>	<p>• Median pain score: <u>4 out of 10</u></p> <p>IQR=2 to 6</p> <p>• Proportion of patients reporting severe pain: <u>11.8%</u></p> <p>CI=9.8% to 14.3%</p> <p>n=803</p>

Clapp A.D.M. et al.: Patient-reported pain outcomes for children attending an emergency department with limb injury *Pediatric Emergency Care* 2020 36:6 (277-282).

Pain and non-pharmacological techniques





The usage of non-pharmacological pain management techniques, adequate to patient age, can help reduce pain, stress and anxiety.

Environmental Control

Skin-to-skin care

Swaddling

Facilitated tucking

Therapeutic touch/massage

Musical therapy

Feeding Methods

Non-nutritive sucking

Breastfeeding

Other Interventions

Acupuncture

Sucrose/glucose solutions



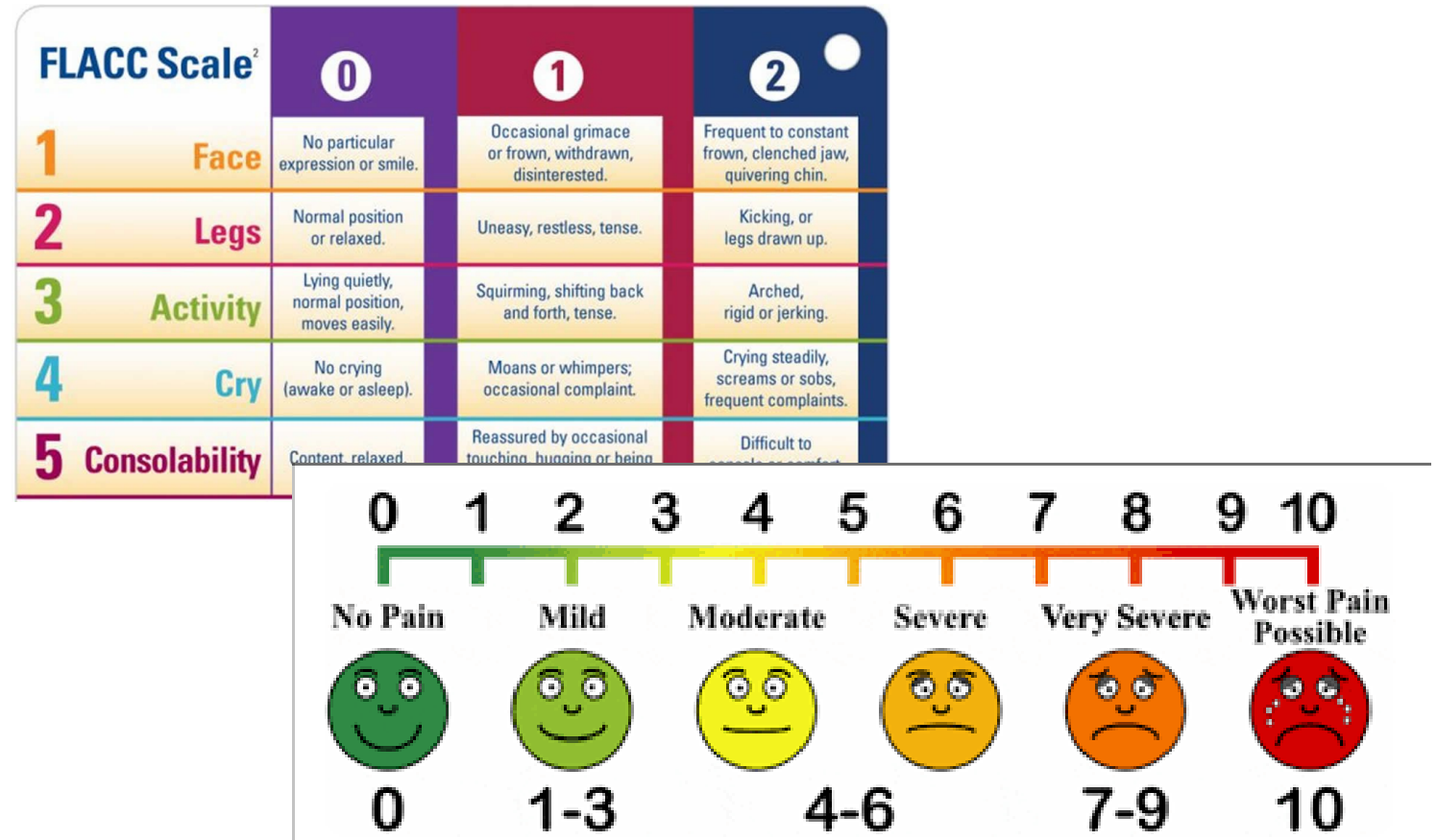
A Review of Non-Pharmacological Treatments for Pain Management in Newborn Infants, Avneet K. et al. Children; 2018.



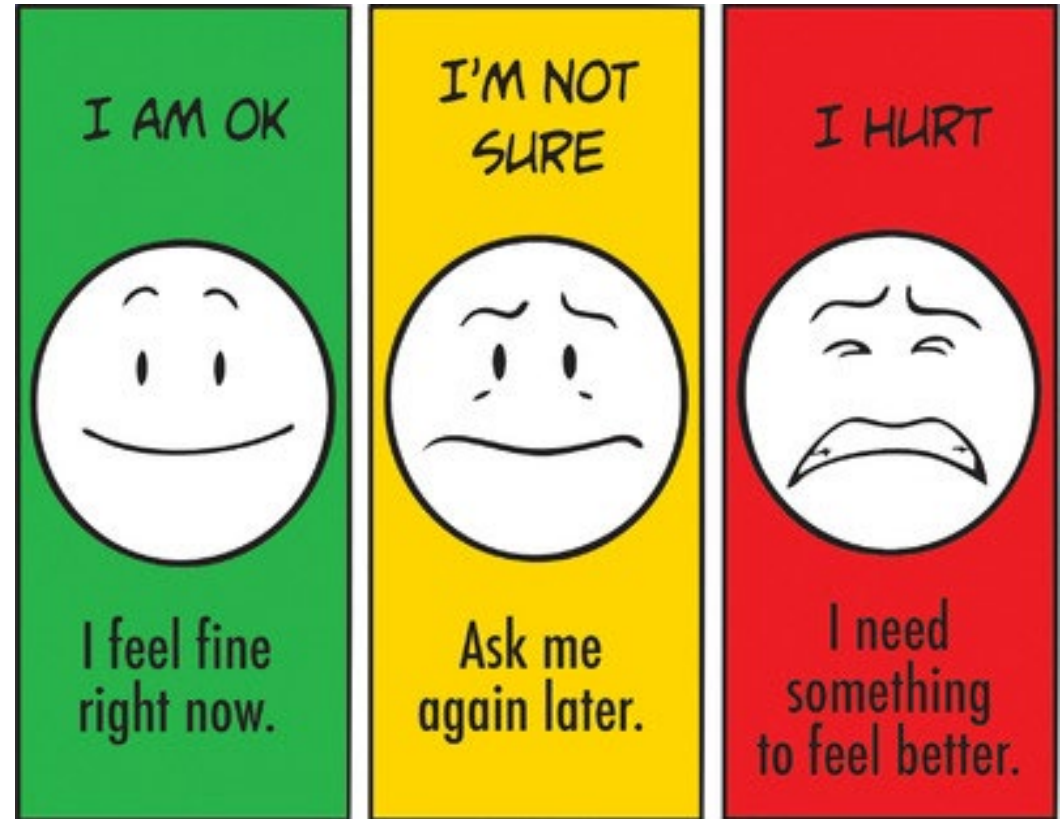
DON'T FORGET PERIODIC MONITORING OF PAIN!

Multiple well-validated pain evaluation scales are nowadays used in clinical practice.

They vary according to patient **age** and its ability to **auto-evaluate** and **express** the quality and intensity of pain.



IN AN EMERGENCY
CONTEXT, IT IS
FUNDAMENTAL TO
IDENTIFY AN
EVALUATION SCALE
THAT CAN BE **EFFECTIVE**
AND **EASY TO INTERPRET.**



Stop-light Pain Scale

Not just intravenous drugs...



- Odorless, colorless gas with potent analgesic, anxiolytic, and amnestic properties.
- Approximately 30% to 50% concentrations can be used for mild to moderate pain and escalate to a 70% concentration in severe pain.
- Benefits include **fast onset** within 30 seconds with peak effect in 5 minutes and rapid return to baseline, as well as **minimal effects on respiration**.

- Prior to nonemergent procedures (venipuncture, small abscess drainage, lumbar puncture, or wound closure).
- **EMLA cream** (lidocaine 2.5% and prilocaine 2.5%) is effective at numbing the tissue below intact skin to a depth of 6–7mm if left on for 30–60 min.
- **LAT** (lidocaine, adrenaline, tetracaine) works within 20–30 min when applied to open wounds.



- **Intranasal fentanyl** can be an effective analgesic for children aged 3 years and above with acute moderate-to severe pain.
- In children as young as 6 months, studies demonstrated equivalent pain control when compared to iv morphine, oral morphine, or iv fentanyl.
- Intranasal fentanyl (1.5 mcg/kg) provided the same pain severity reduction as 1mg/kg of **intranasal ketamine**.



Regional anesthesia in PED: main recommendations



**CHOOSE PERIPHERAL NERVE BLOCKS
OVER CENTRAL BLOCKS**

Among PNBs, choose safer blocks:

- Axillary brachial plexus block
- Forearm nerve blocks
- Femoral nerve block
- Fascia plane blocks (TAP, rectus sheath, ESP)

Regional anesthesia in PED: main recommendations

KEEP YOUR CART WELL-FURNISHED

- Sedatives and local anesthetics
- Needles for single shot blocks
- Perineural catheters
- Ultrasound/wireless probe
- Sterile field and gauzes
- **INTRALIPID!!!**



Ultimately, a skilled and
experienced anesthesiology
team is required!

Ultrasound-Guided Forearm Nerve Blocks in Kids

A Novel Method for Pain Control in the Treatment of Hand-Injured Pediatric Patients in the Emergency Department

Oron Frenkel, MD, MS, Otto Liebmann, MD,† and Jason W. Fischer, MD, MSc‡*



Pediatric Emergency Care 31(4):p 255-259, April 2015.

"...Patients who met the inclusion criteria and consented to participate in the study had 4% lidocaine cream (LMX) applied at triage to the forearm of the affected hand for a period of at least 10 minutes before the forearm nerve block...Each patient received nerve blocks of all of the 3 forearm nerves in accordance with the protocol previously mentioned regardless of injury location..."

...A single **emergency medicine physician** (J.F.) performed all of the nerve blocks. That physician routinely used forearm nerve blocks in his adult and pediatric practice and **had completed approximately 30 forearm nerve blocks at the time of the study...**"

Ultrasound-Guided Regional Anesthesia of the Femoral Nerve in the Pediatric Emergency Department




Michael A. Heffler, MD, Julia A. Brant, MD,† Amar Singh, MD,‡ Amanda G. Toney, MD,§
Maya Harel-Sterling, MD,|| Charlotte Grandjean-Blanchet, MD,|| Antonio Riera, MD,¶ Paul A. Khalil, MD,‡
Rebecca L. Starr-Seal, DO,‡ and Zachary W. Binder, MD#*

Pediatric Emergency Care ():10.1097; June 6, 2023.

"...Regional anesthesia targeting the femoral nerve is practiced commonly by anesthesiologists in the perioperative period. More recently, **nerve blocks have been performed at the bedside by emergency physicians** (EPs) in pediatric emergency departments (PEDs) to augment pain control..."

Regional Anesthesia in the Emergency Department: an Overview of Common Nerve Block Techniques and Recent Literature

Adrienne Malik¹  · Stephanie Thom¹ · Brian Haber^{2,3} · Nima Sarani¹ · Jakob Ottenhoff⁴ · Bradley Jackson¹ · Logan Rance⁵ · Robert Ehrman^{2,3}

Current Emergency and Hospital Medicine Reports (2022); 10:54–66.

"...The body of literature supporting RA administration by emergency physicians (EPs) is large enough that the American College of Emergency Physicians (ACEP) released a policy statement strongly supporting the use of ultrasound-guided RA (UGRA) in the ED..."

Conclusions

- **Pain management** is a crucial point in the care of a patient in PED; multiple evaluations can prevent undertreatment and related pathophysiological responses.
- **Intravenous analgesia is not the only method** to effectively treat pain in the pediatric ED: whenever possible, it would be advisable to complement it with other techniques (e.g. regional analgesia) to obtain a better pain control.
- To do so, the presence of a **skilled and well-trained anaesthesiologic team** is required, as long as an efficient collaboration with the ED staff. **Dedicated and well-furnished carts** for RA techniques should be always available in the ED.



Thank you!