



Lo stato dell'arte dell'accesso venoso neonatale

Sedazione e analgesia nel neonato/lattante candidato al posizionamento di accessi vascolari

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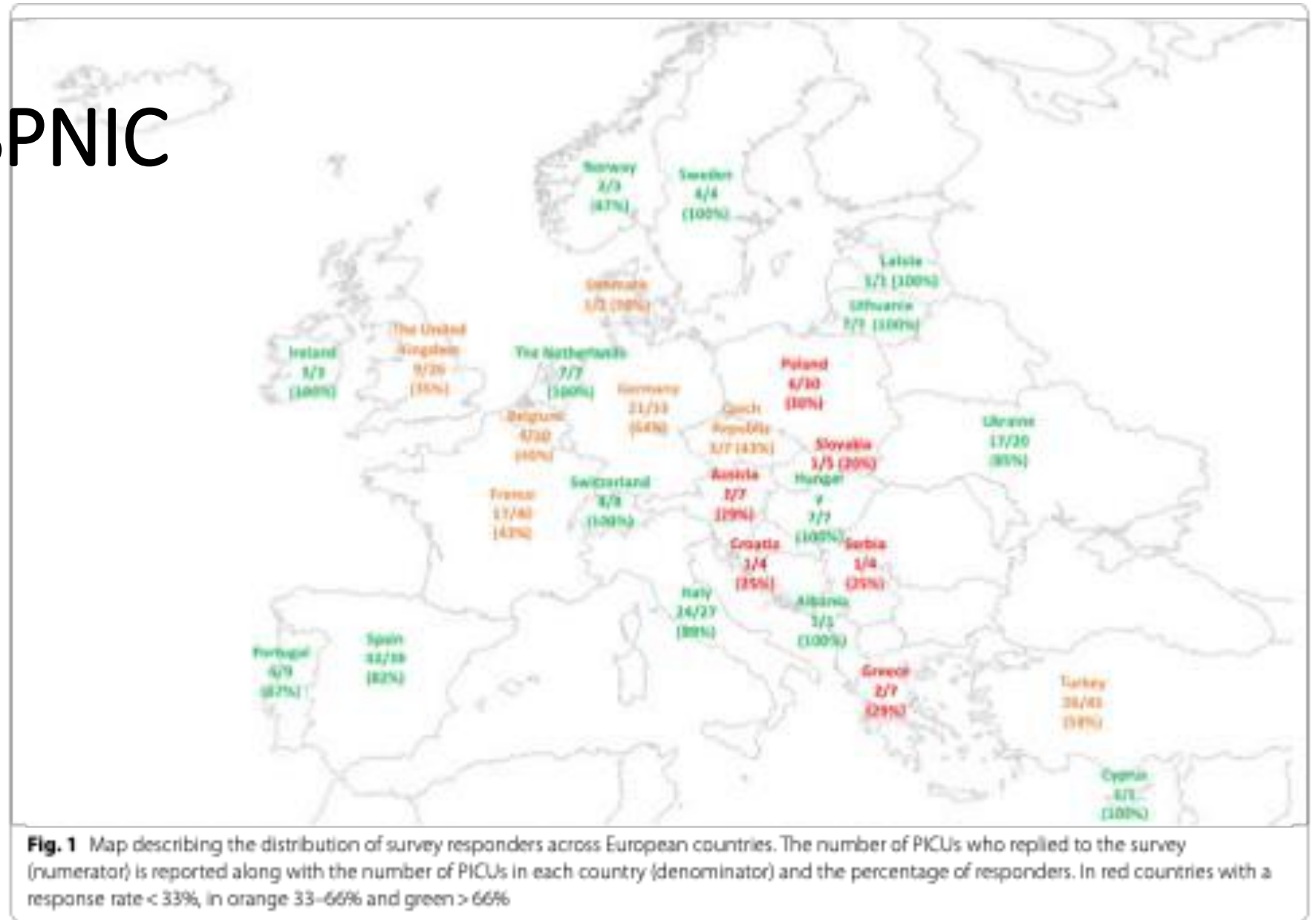
Milano, 13 Maggio 2025



Raccontate la vostra esperienza di analgo-sedazione procedurale....



La survey ESPNIC



La survey ESPNIC

Table 2 Analgesia, sedation and paralysis drug of choice comparing PICUs according to yearly admission volume

Characteristics	Total responders n = 215	PICUs < 450 admissions/ year n = 117	PICUs ≥ 450 admissions/ year n = 98	p value
<i>Drug used as first choice for continuous analgosedation*</i>				
Opioids				
→ a. Fentanyl	110 (51)	64 (55)	46 (47)	0.257
b. Morphine	62 (29)	32 (27)	30 (31)	0.599
c. Sufentanil	32 (15)	16 (14)	16 (16)	0.586
d. Remifentanyl	3 (1)	2 (2)	1 (1)	1.000
e. Oxycodone	1 (1)	1 (1)	0 (0)	1.000
Benzodiazepines				
→ a. Midazolam	153 (71)	90 (77)	63 (65)	0.042
b. Lorazepam	–	–	–	–
Alpha 2 agonists				
a. Dexmedetomidine	24 (11)	12 (10)	12 (12)	0.645
b. Clonidine	14 (7)	8 (7)	6 (6)	0.832
Others				
a. Ketamine	18 (8)	2 (2)	16 (16)	0.000
b. Propofol	5 (2)	3 (3)	2 (2)	1.000
c. Thiopentone	2 (1)	1 (1)	1 (1)	1.000
d. Chloral Hydrate	1 (1)	1 (1)	0 (0)	1.000

Posizionare un accesso venoso richiede una qualche procedura di analgo-sedazione?

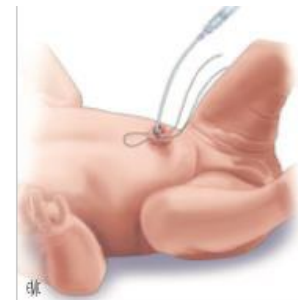
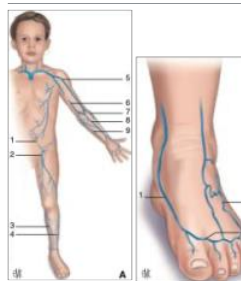
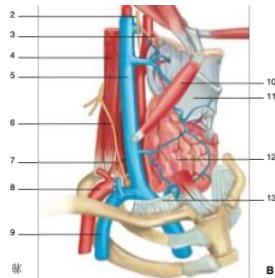
...e se SI... da che dipende?



Tipologia di accesso venoso

- Accesso venoso periferico o centrale
- Accesso venoso centrale a partenza periferica (ECC-PICC)
- Accesso venoso centrale a partenza da vene centrali (CICC-FICC)
- Accesso venoso centrale ombelicale (CVO)

Voi che approccio avreste di analgo-sedazione? Uguale/diverso



Tipologia di paziente

- Pretermine
- A termine
- Lattante

Cambia qualcosa o nulla?



Situazione

- Catetere da inserire in emergenza
- Catetere da inserire in elezione



Condizione del paziente

- Respiratorio (intubato-NIV-CPAP-respiro spontaneo)
- Emodinamico (disidratato-ipoteso-shock)
- Neurologica (vigile-obnubilato-comatoso) – AVPU o Scala di Glasgow Ped



Come fare e come somministrare la analgo-sedazione

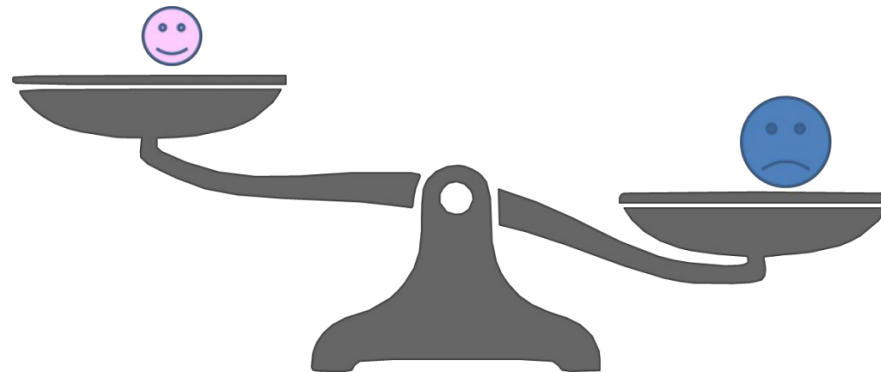
- Misure non farmacologiche (quali sono e da fare sempre?)
- Misure farmacologiche (singolo farmaco o cocktail di farmaci)
 - Ho già una vena?
 - Non ho una vena!
 - Uso i gas anestetici?
- Misure di analgesia locali o loco-regionale (hanno un ruolo?)

Guiding Principles



- Maximize comfort and minimize pain and distress.
- Use non-pharmacologic interventions as an adjunct to pharmacologic interventions.
- Prepare the patient and caregivers.
- Assure provider competency in performing procedures and sedation.
- Use appropriate monitoring to assure safety. Sedation should be administered in a monitored setting with resuscitative drugs and equipment available.
- In procedures requiring moderate and deep sedation two licensed independent practitioners must be present: typically one to perform the procedure and one to administer medications and monitor the patient.

Bilanciare effetti negativi del dolore VS effetti negativi dei farmaci utilizzati contro il dolore



Sviluppo cerebrale e
performance cognitive

Patient evaluation

Obtain a comprehensive history to include:

- Age of patient
- Underlying medical conditions (e.g., syndromes, sleep apnea)
- Allergies
- Neurologic/Mental status
- Previous reactions/responses to sedation
- Previous experience with painful conditions
- Current prescriptions, over-the-counter and herbal medications/supplements
- Body mass index (BMI) - if feasible
- History of prematurity for children
- Pregnancy status if applicable
- History of tobacco, alcohol, or substance use if applicable

Rischio pre analgo-sedazione

Table 1. ASA Physical Status Classification (3,4)		
ASA CLASS	DESCRIPTION	EXAMPLE
Class I	Normal, healthy patient	
Class II	Patient w/ mild systemic disease	Controlled asthma
Class III	Patient w/ severe systemic disease	Patient who is actively wheezing
Class IV	Patient w/ severe systemic disease that is a constant threat to life	Patient with status asthmaticus
Class V	A moribund patient who is not expected to survive without the procedure	Patient with severe cardiomyopathy requiring heart transplantation

Anesthesiology consultation is recommended for the patient presenting with the following:

- ASA Class III to V (exception for patients in intensive care units)
- A **severe** problem/injury
- Complex medical condition(s)
- Potentially difficult airway (e.g., short neck, small mandible, large tongue, tracheomalacia, laryngomalacia, a history of difficult intubation, congenital anomalies, craniofacial injuries, hydrocephalus, moderate-to-severe tonsillar hypertrophy)

Table 2. Levels of Sedation (4-7)

Minimal Sedation (anxiolysis)

Patient responds normally to verbal commands.
Cognitive function may be impaired.
Respiratory and cardiovascular systems unaffected.
Decreases anxiety and/or facilitates coping skills.

Moderate Sedation (previously called conscious sedation)

Patient responds to verbal commands but may not respond to light or tactile stimulation.
Cognitive function is impaired.
Respiratory function adequate; cardiovascular unaffected.
Level of consciousness is moderately depressed.

Deep Sedation

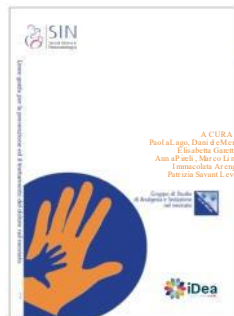
Patient cannot be easily aroused except with repeated or painful stimuli.
Ability to maintain airway may be impaired.
Spontaneous ventilation may be impaired; cardiovascular function is maintained.
May require assistance with maintaining a patent airway.

General Anesthesia

Loss of consciousness, patient cannot be aroused with painful stimuli.
Airway cannot be maintained adequately and ventilation is impaired.
Cardiovascular function may be impaired.

Strategie di analgo-sedazione non-farmacologiche

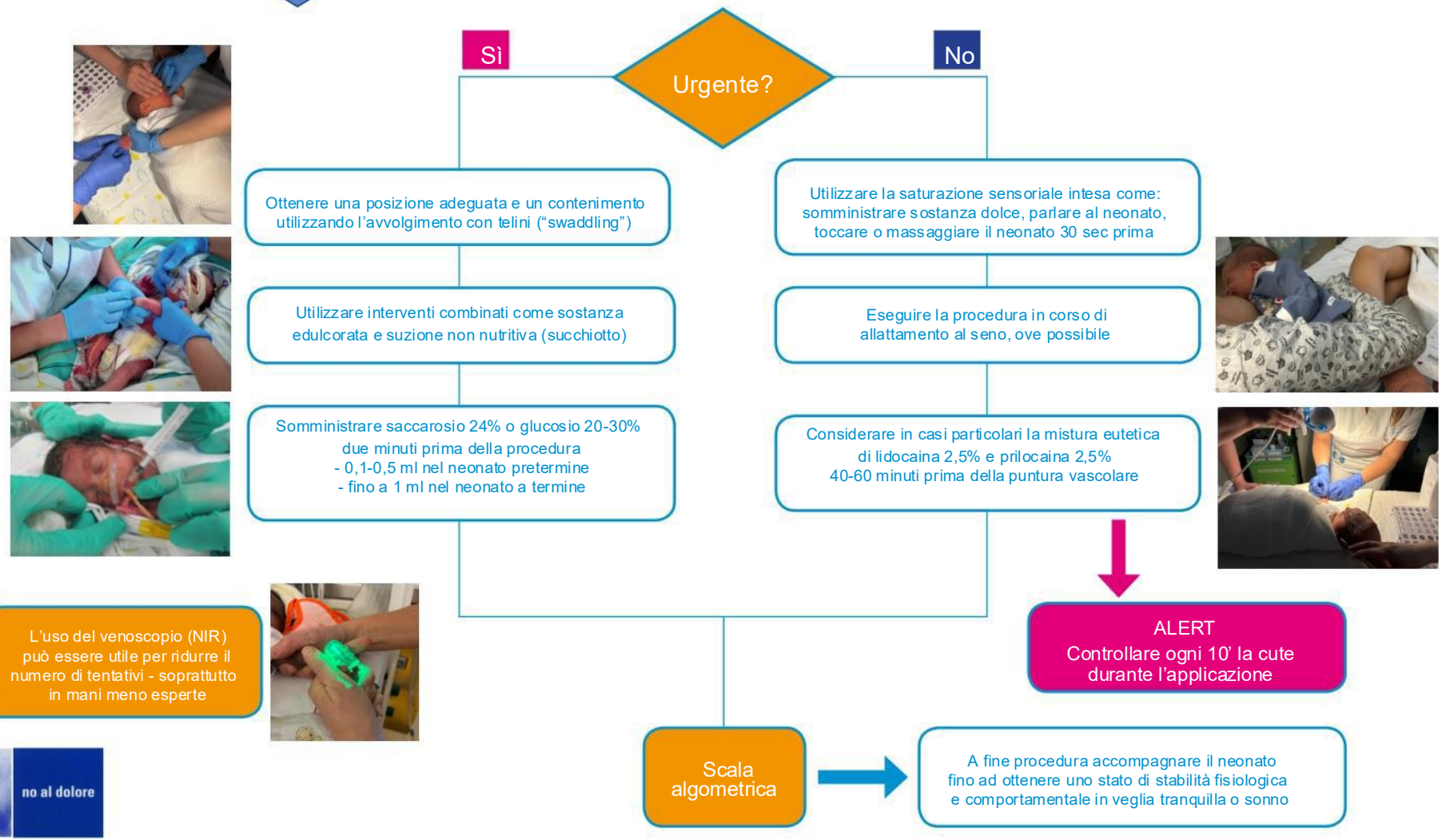
- Swaddling
- Saturazione sensoriale
- Allattamento al seno
- Suzione non nutritive
- Sostanza edulcorate (Sucrose 24%/Glucosio 10-30%)



PUNTURA VASCOLARE

Ambiente caldo, tranquillo, bassi livelli di luci e suoni

Eeguire la procedura nel momento più idoneo
Coinvolgere i genitori
Favorire passaggio graduale da sonno a veglia



EMLA

Mistura eutetica di lidocaina al 2,5% e prilocaina al 2,5%

Cute integra: no ferite, no mucosa

Onset in 45-60 min

Durata 2-6 ore

Profondità di azione 6 mm max

ATTENZIONE: vasocostrizione, metaemoglobinemia

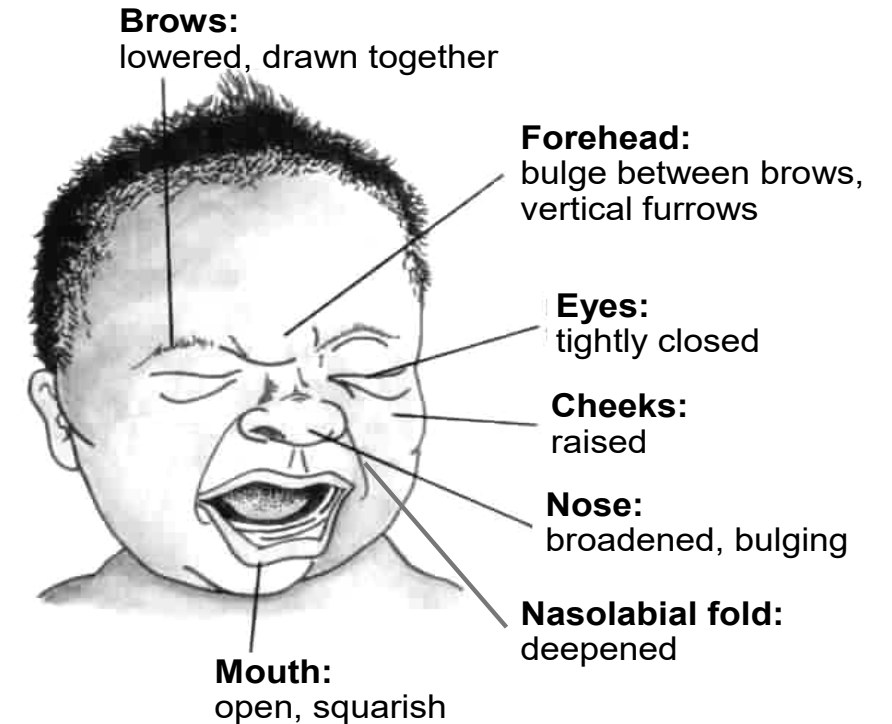


LE SCALE ALGOMETRICHE

- Premature Infant Pain Profile-Revised (PIPP-R)
- Neonatal Pain, Agitation, and Sedation Scale (N-PASS)

The Premature Infant Pain Profile: Revised

Infant Indicator	Indicator Score				Infant Indicator Score
	0	+1	+2	+3	
Change in Heart Rate (bpm) Baseline: _____	0 - 4	5 - 14	15 - 24	>24	
Decrease in Oxygen Saturation (%) Baseline: _____	0 - 2	3 - 5	6 - 8	>8 or Increase in O ₂	
Brow Bulge (Sec)	None (<3)	Minimal (3 - 10)	Moderate (11 - 20)	Maximal (>20)	
Eye Squeeze (Sec)	None (<3)	Minimal (3 - 10)	Moderate (11 - 20)	Maximal (>20)	
Naso-Labial Furrow (Sec)	None (<3)	Minimal (3 - 10)	Moderate (11 - 20)	Maximal (>20)	
* Sub-total Score:					
Gestational Age (Wks + Days)	>36 wks	32 wks - 35 wks, 6d	28 wks - 31wks, 6d	<28wks	
Baseline Behavioural State	Active and Awake	Quiet and Awake	Active and Asleep	Quiet and Asleep	
** Total Score:					



Facial expression of physical distress and pain in the infant

Reproduced with permission from Wong DL, Hess CS: Wong and Whaley's Clinical Manual of Pediatric Nursing, Ed. 5, 2000, Mosby, St. Louis

LIMITI: copertura totale del neonato per asepsi

Analgo-sedazione farmacologica: Quali farmaci?

Table 2 Indications and side effects of reported drugs

Drug	Indications	Side effects
Dexmedetomidine	Procedural sedation (MRI)	- Bradycardia - Arrhythmia - Desaturation
Fentanyl	Intubation, ECC, LP Palliative care ROP screening	- Local irritation - Apnoea, desaturation - Chest wall rigidity - Bradycardia
Ketamine	Oculistic procedures Intubation	- Nausea, vomiting - Increased respiratory secretions - Laryngospasm, agitation, apnoea
Midazolam	Procedural sedation (MRI) Intubation Oculistic procedures Seizures	- Nasal mucosa irritation - Respiratory depression - Apnoea - Mild negative inotropic effects - Hyperactivity, inconsolable crying

ECC epicutaneo-caval catheter, *LP* lumbar puncture, *MRI* magnetic resonance imaging, *ROP* retinopathy of prematurity.

Safety and efficacy of propofol administered by paediatricians during procedural sedation in children

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Propofol

Key notes

- Some guidelines state that paediatrician-administered propofol is appropriate for procedural sedation in children, but only a few studies have assessed its effectiveness and safety for paediatric procedural sedation in very large series.
- This study looked at 36 516 procedural sedations, performed over a 12-year period in three Italian hospitals.
- It highlights the efficacy and the safety profile of paediatrician-administered propofol in children and the importance of appropriate training for paediatricians.

Table 3 Clinical and demographic characteristics of patients enrolled in the study

	Upper endoscopy	Colonoscopy	Lumbar puncture	Bone marrow aspiration	Biopsy	Other	Total
Gender							
Male	1899	827	5174	3978	561	5502	17 941
Female	2906	849	5239	3679	514	5388	18 575
Age							
<1 year	86	34	156	160	57	474	967
1–3 years	501	89	976	717	129	1526	3 938
3–5 years	603	95	1876	1093	152	2044	5 863
5–10 years	1390	298	3918	2659	261	3847	12 373
>10 years	2225	1160	3487	3028	476	2999	13 375
Total							36 516

Table 5 Minor complications observed in patients enrolled in the study

	Emergency call (n)	Laryngospasm (n)	Bronchospasm (n)	Assisted ventilation (n)	Hypotension (n)	Unsuccessful procedures (n)
Padua	1	21	13	19	19	8
Rome	0	18	0	37	0	0
Trieste	5	39	2	72	0	6
Total	6 (0.02%)	78 (0.21%)	15 (0.04%)	128 (0.35%)	19 (0.05%)	14 (0.04%)

Anestetici inalatori (sevoflurano)

- Chi li usa? Come si trova?

Problematiche:

- Sistemi di smaltimento dei gas
- Ipertemia maligna
- Possibile neurotossicità nei neonati



Analgo-sedazione farmacologica: la via Nasale

	Advantages - Ease of use - Quick administration - Rapid onset of effect - Avoidance of first pass metabolism - Alternative as non-invasive route	Limitations - Limited volumes, size of the nostrils - Variability in drug absorption - Risk of local injury to nasal epithelium - Burning and irritation on the nose or bitter taste in the mouth
Potential indications - Intubation or LISA - PICC-line placement, chest tube, lumbar puncture - Acute pain management without IV access - Diagnostic procedures as MRI, CT-SCAN, ROP screening	 Results of the review - Significant reduction in pain and sedation markers → Clinical scales → Skin conductance → Heart rate → Crying time - Higher completion of diagnostic procedures - Few adverse effects, mainly apnoea or desaturation, hypotension and paradoxical reactions	Questions - Interference with nasal-CPAP? - Intranasal atomizer device for preterm? - Better drugs without sides effects? - Adequate doses?

Analgo-sedazione farmacologica: la via Nasale

Table 1 Pharmacokinetics, indications, and side effects of reported drugs

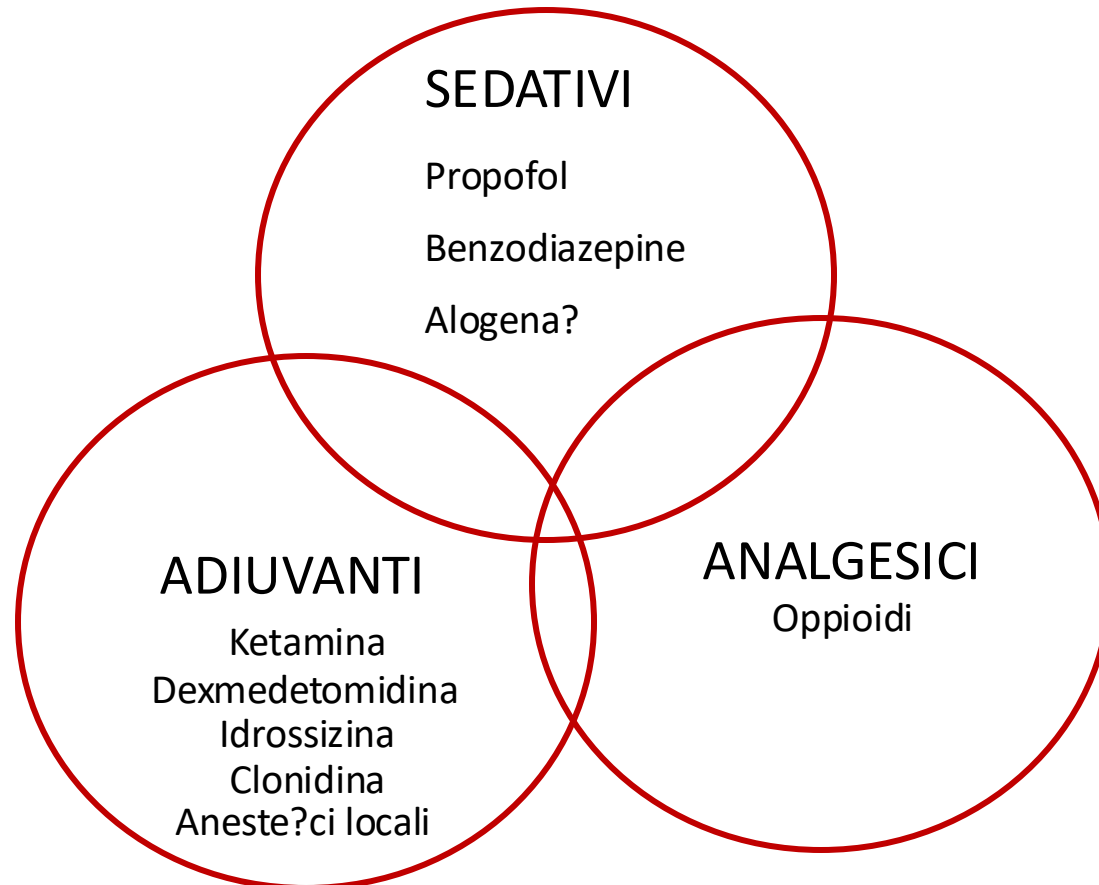
Drug	GA, weeks	IN dose ^a	IV dose ^a	Onset (min)	Bioavailability (%)	Half-life (h)
Dexmedetomidine	>28	2–3	0.5–1	10	35–93	2–3
Fentanyl	>24	0.5–2	0.5–3	5	>70	0.5–2
Ketamine	>24	500–2000 (0.5–2)	500–2000	1–10	35–50	3
Midazolam	>32	200–500 (0.2–0.5)	50–200	5–10	50–83	4–6

GA gestational age, *h* hours, *IN* intranasal, *IV* intravenous, *min* minutes

^aIN and IV doses are presented as mcg/kg/dose (mg/kg/dose).

Quale farmaco utilizzare nella pratica clinica?

COMBINAZIONE TRA DIVERSE CLASSI DI FARMACI



Nell'accesso vascolare dipende...

- Dal tipo di accesso venoso (ECC, CVO, CICC, etc)
- Cosa vogliamo ottenere (livello di sedo-analgesia)
- Ruolo dell'anestesia loco-regionale nel ridurre il dolore (Lidocaina, etc)
- Attenzione al time of onset, picco e durata d'azione dei farmaci
- Attenzione agli effetti della coda residua dei farmaci

Combination of ketamine and fentanyl (KetaFent) for safe insertion of ultrasound-guided central venous catheters in infants

Vito D'Andrea^{1*}, Giorgia Prontera¹, Giovanni Barone²
and Giovanni Vento¹

TABLE 2 Study outcomes of enrolled infants.

	Invasive ventilation 37	Non-invasive ventilation Spontaneous respiration 35
Primary outcome		
Success rate of CIOC insertion	100%	100%
Duration of procedure minutes (min-max)	23 (17–32)	25 (20–41)
Secondary outcome		
Dose of Ketamine median (Q1–Q3)	2 (1–2)	3 (1–3)
Infants achieving maximum dose of ketamine n (%)	2 (5.4)	5 (14.2)
Δ HR mean (min-max)	4 (2–5)	5 (2–10)
Δ BT mean (min-max)	0.6 (0–1.1)	0.7 (0–1.2)
Need for supplemental oxygen n	6	5
Apnea n	–	2
Need for intubation	–	–

n, number; HR, heart rate; BT, body temperature.

TABLE 1 Baseline characteristics of enrolled infants (72 cases).

	72 cases
Gestational age at birth means ± SD (min-max)	32.1 ± 5 (24–41)
Birth weight means ± SD	1762 ± 1000
Weight at insertion means ± SD (min-max)	2526.4 ± 1000 (630–5180)
Day of life at the insertion median (Q1–Q3)	52 (6–84)
Invasive ventilation n (%)	37 (51.4)
Non-invasive ventilation n (%)	6 (8.3)
Spontaneous respiration n (%)	29 (40.3)
Indication n (%)	
Surgical disease	21 (29)
HIE	20 (27.8)
Prolonged parenteral nutrition	16 (22.2)
Infection	6 (8.3)
others	9 (12.5)
CIOC insertion site n (%)	
rBCV	55 (76.4)
lBCV	17 (23.6)
CIOC size n (%)	
3 Fr	67 (93)
4 Fr	5 (7)

Gestational age: weeks; Birth weight and weight at insertion: grams; n, numbers; HIE, hypoxia-ischemia encephalopathy; rBCV, right brachycephalic vein; lBCV, left brachycephalic vein.

Intranasal midazolam and fentanyl for procedural sedation and analgesia in infants in the neonatal intensive care unit

Table 1
 Demographics and clinical characteristics for infants at time of procedure

Infant	Birth weight (g)	Birth GA (w)	Medication	Indication	Respiratory support at time of dose	Age at dose (days)	Dose (mg/kg)	Number of doses	Adverse events	Management
1	3510	38	Fentanyl	Dressing change	Room air	7	0.001	1	None	
2	1495	32	Fentanyl	Intubation	Mechanical ventilation	21	0.002	1	None	
3	2985	38	Midazolam	PICC	Room air	5	0.2	1	None	
4	3940	41	Midazolam	MRI	Room air	7	0.2	1	None	
5	790	24	Midazolam	PICC	Room air	0	0.2	2	None	
6	640	24	Midazolam	Intubation	Nasal cannula	80	0.2	1	None	
7	890	26	Midazolam	Intubation	Bilevel positive airway pressure	36	0.1	2	None	
			Midazolam	Re-intubation	Mechanical ventilation	42	0.1	1	None	
			Midazolam	MRI	Room air	149	0.1	2	None	
8	3050	35	Midazolam	PICC	Nasal cannula	32	0.1	1	None	
9	530	23	Midazolam	MRI	Room air	181	0.1	1	None	
10	1965	33	Midazolam	MRI	Nasal cannula	61	0.2	1	None	
11	755	25	Midazolam	MRI	Nasal cannula	0	0.1	4	None	
12	1550	33	Midazolam	MRI	Room air	0	0.1	1	None	
13	2940	37	Midazolam	MRI	Nasal cannula	11	0.1	1	None	
14	580	24	Midazolam	ROP surgery	Room air	99	0.2	1	None	
15	644	28	Midazolam	ROP surgery	Room air	62	0.1	1	Respiratory distress	Escalated to nasal cannula
16	570	24	Midazolam	ROP surgery	Room air	88	0.1	1	None	
17	589	23	Midazolam	ROP surgery	Nasal cannula	75	0.2	1	None	

MRI, magnetic resonance imaging; PICC, peripherally inserted central catheter; ROP, retinopathy of prematurity.



Guidelines for Monitoring and Management of Pediatric Patients Before, During, and After Sedation for Diagnostic and Therapeutic Procedures

- These practice recommendations are proffered with the awareness that, regardless of the intended level of sedation or route of drug administration, **the sedation of a pediatric patient represents a continuum and may result in:**
 - respiratory depression,
 - laryngospasm,
 - impaired airway patency,
 - apnea,
 - loss of the patient's protective airway reflexes,
 - and cardiovascular instability.†



Ruolo del team e del mantenimento delle competenze specifiche di rianimazione

- Rescue techniques require specific training and skills.^{63,74,215,216} The maintenance of the skills needed to rescue a child with apnea, laryngospasm, and/or airway obstruction include the ability to open the airway, suction secretions, provide continuous positive airway pressure (CPAP), perform successful bag-valve-mask ventilation, insert an oral airway, a nasopharyngeal airway, or a laryngeal mask airway (LMA), and, rarely, perform tracheal intubation. These skills are likely best maintained with frequent simulation and team training for the management of rare events.^{128,130,217–220}
- Competency with emergency airway management procedure algorithms is fundamental for safe sedation practice and successful patient rescue

LE VIE AEREE DIFFICILI



VALUTAZIONE DELLE VIE AEREE

Look

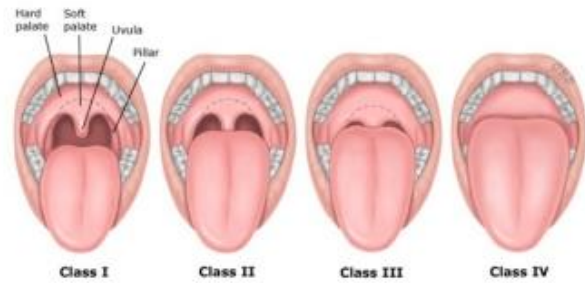
Evaluate

Mallampa+

Obstruction

Neck mobility

The modified Mallampati classification for difficult laryngoscopy and intubation



The 3-3-2 rule for identifying a difficult airway



DIGIUNO

TABLE 1 Appropriate Intake of Food and Liquids Before Elective Sedation

Ingested Material	Minimum Fasting Period, h
Clear liquids: water, fruit juices without pulp, carbonated beverages, clear tea, black coffee	2
Human milk	4
Infant formula	6
Nonhuman milk: because nonhuman milk is similar to solids in gastric emptying time, the amount ingested must be considered when determining an appropriate fasting period.	6
Light meal: a light meal typically consists of toast and clear liquids. Meals that include fried or fatty foods or meat may prolong gastric emptying time. Both the amount and type of foods ingested must be considered when determining an appropriate fasting period.	6

Source: American Society of Anesthesiologists. Practice guidelines for preoperative fasting and the use of pharmacologic agents to reduce the risk of pulmonary aspiration: application to healthy patients undergoing elective procedures. An updated report by the American Society of Anesthesiologists Committee on Standards and Practice Parameters. Available at: <https://www.asahq.org/For-Members/Practice-Management/Practice-Parameters.aspx>. For emergent sedation, the practitioner must balance the depth of sedation versus the risk of possible aspiration; see also Mace et al.¹⁷² and Green et al.¹⁷³

Gli antidoti

Table 4. Rescue medications

	Dose range and route	Comments
Atropine	0.02 mg/kg IV (maximum 0.5 mg)	May repeat dose once (maximum total dose 1 mg for child; 3 mg for adolescent)
Epinephrine (0.1 mg/mL)	0.01 mg/kg IV (maximum 1 mg)	May repeat dose every 3 to 5 minutes
Flumazenil (benzodiazepine reversal)	0.01 mg/kg IV (maximum 0.2 mg)	May repeat every 1 minute to a maximum total cumulative dose of 0.05 mg/kg or 1 mg total, whichever is less Contraindicated in patients with underlying seizure disorder
Naloxone (opioid reversal)	0.1 mg/kg IV (maximum 2 mg)	Dilute and titrate to effect May repeat every 2 to 3 minutes Contraindicated in patients with chronic opioid exposure
Succinylcholine	1 to 2 mg/kg IV (maximum 150 mg) 2 to 4 mg/kg IM	Essential rescue medication that should be drawn up for the treatment of severe laryngospasm and to facilitate rapid intubation, when needed. Repeat doses increase risk for bradycardia

Table 3. Emergency equipment (SOAPME)

S = suction catheters and apparatus

O = oxygen supply and delivery equipment (e.g., flow meters, tubing, prongs)

A = airway equipment (e.g., face masks, nasopharyngeal/oropharyngeal airways, laryngoscope handles and blades, endotracheal tubes, stylets)

P = positive-pressure delivery system (i.e., bag-valve-mask ventilation)

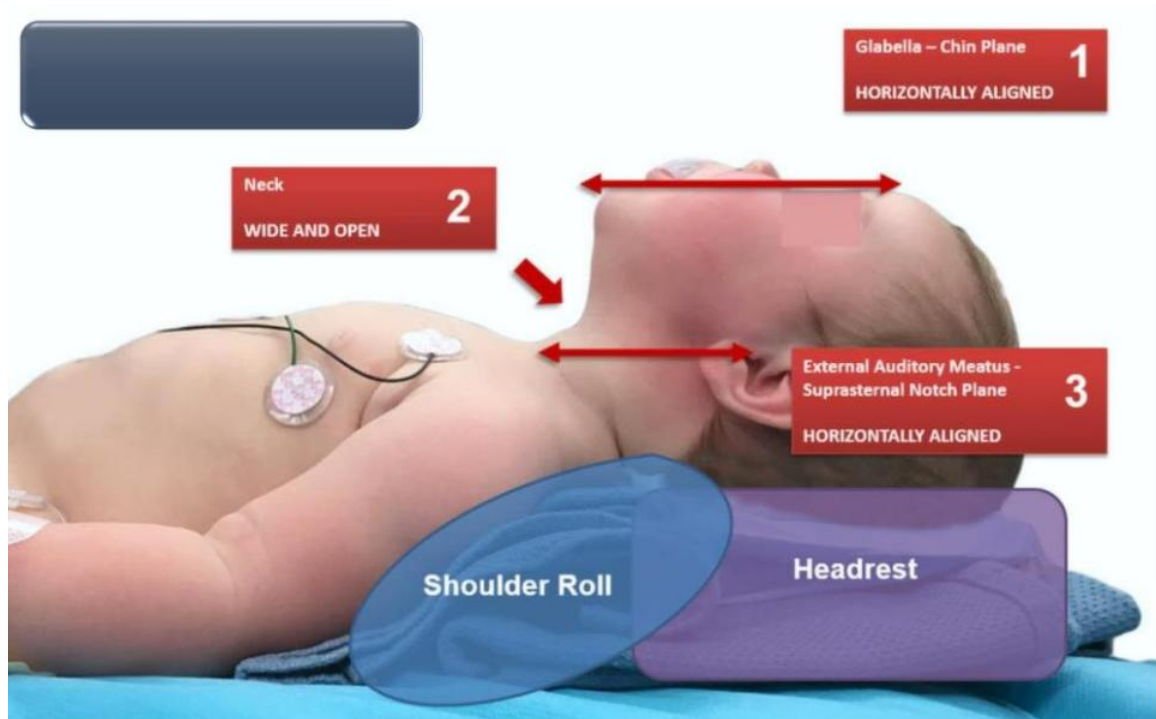
M = monitors (e.g., pulse oximetry, end-tidal carbon dioxide, ECG leads, noninvasive blood pressure)

E = emergency cart with alternate airways (e.g., laryngeal mask airway), supplies for vascular access, and resuscitation drugs



Importanza della posizione del neonato al fine della buona esecuzione della procedura e riduzione delle complicanze legate alla analgo-sedazione

POSIZIONE



Applicare una pressione positiva preventiva



Modified Aldrete Scoring System

Table 4. Modified Aldrete Scoring System		Sedation Score
Activity	Able to move 4 extremities	2
	Able to move 2 extremities	1
	Able to move 0	0
Respiration	Regular, able to deep breathe/cough freely	2
	Dyspnea, limited & obstructed breathing	1
	Apneic	0
Circulation	B/P +/- 0-20 mmHG pre procedure level	2
	B/P +/- 0-25 mmHG pre procedure level	1
	B/P +/- greater than 25 mmHG pre procedure level	0
Level of Consciousness	Fully awake	2
	Arousable on calling	1
	Not responding	0
O ₂ Saturation	Able to maintain O ₂ saturation > 92% on room air	2
	Needs O ₂ inhalation to maintain O ₂ saturation >90%	1
	O ₂ saturation <90% even with O ₂ supplementation	0

Per il recovery

TUNNELIZZAZIONE

«... tecnica chirurgica di superficie che consiste nel trascinare nel tessuto sottocutaneo un tratto di un catetere...»

- Diminuzione infezione catetere correlata
- Diminuzione trombosi
- Gestione ottimale del dispositivo
- Aumento comfort paziente
- Tecnica semplice
- Basso costo
- Tempo di esecuzione molto veloce
- Rare complicanze procedurali maggiori
- Facile Rimozione del catetere
- Facilità di gestione e miglior comfort
- Catetere a breve-medio termine diventa a lungo termine



Allontanare sito di inserzione endovasale da sito di inserzione percutanea

IDRODISSEZIONE



TUNNELIZZAZIONE

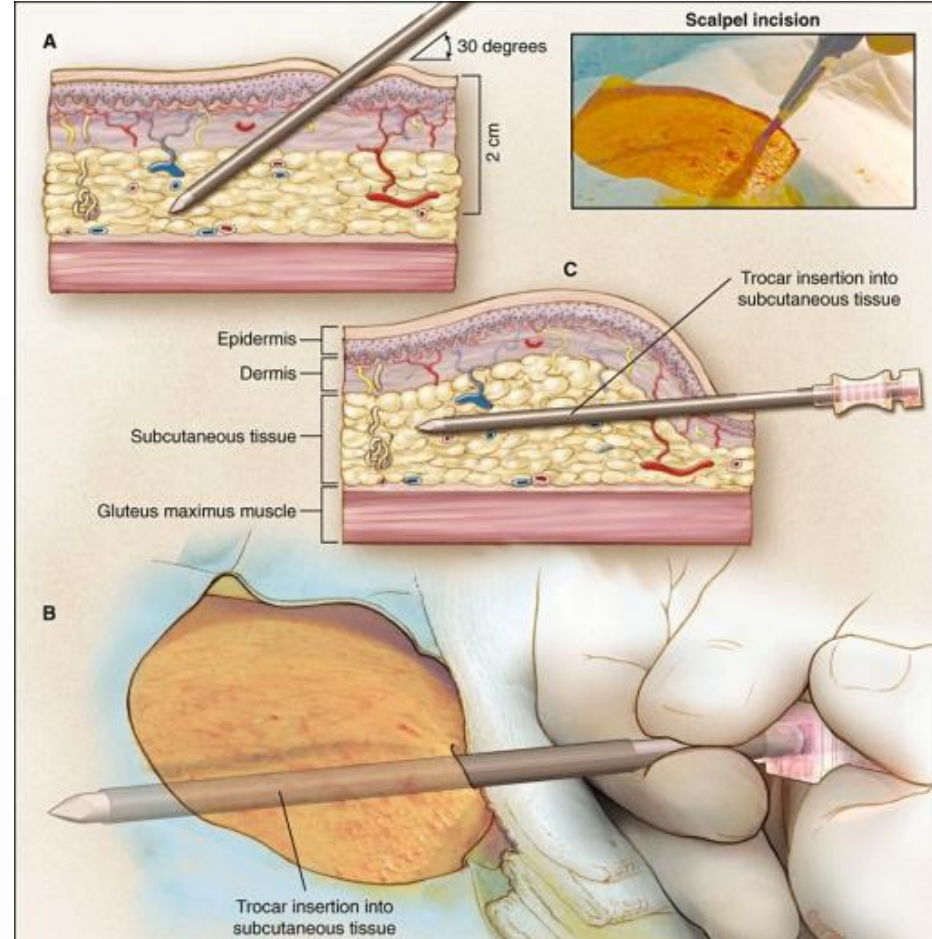


TABLE 3 Commonly Used Local Anesthetic Agents for Nerve Block or Infiltration: Doses, Duration, and Calculations

Local Anesthetic	Maximum Dose With Epinephrine, ^a mg/kg		Maximum Dose Without Epinephrine, mg/kg		Duration of Action, ^b min
	Medical	Dental	Medical	Dental	
Esters					
Procaine	10.0	8	7	8	60–90
Chlorprocaine	20.0	12	15	12	30–60
Tetracaine	1.5	1	1	1	180–600
Amides					
Lidocaine	7.0	4.4	4	4.4	90–200
Mepivacaine	7.0	4.4	5	4.4	120–240
Bupivacaine	3.0	1.3	2.5	1.3	180–600
Levobupivacaine ^c	3.0	2	2	2	180–600
Ropivacaine	3.0	2	2	2	180–600
Articaine ^d	—	7	—	7	60–230

Maximum recommended doses and durations of action are shown. Note that lower doses should be used in very vascular areas.

^a These are maximum doses of local anesthetics combined with epinephrine; lower doses are recommended when used without epinephrine. Doses of amides should be decreased by 30% in infants younger than 6 mo. When lidocaine is being administered intravascularly (eg, during intravenous regional anesthesia), the dose should be decreased to 3 to 5 mg/kg; long-acting local anesthetic agents should not be used for intravenous regional anesthesia.

^b Duration of action is dependent on concentration, total dose, and site of administration; use of epinephrine; and the patient's age.

^c Levobupivacaine is not available in the United States.

^d Use in pediatric patients under 4 years of age is not recommended.

TABLE 4 Local Anesthetic Conversion Chart

Concentration, %	mg/ mL
4.0	40
3.0	30
2.5	25
2.0	20
1.0	10
0.5	5
0.25	2.5
0.125	1.25

Ruolo dei genitori



Ruolo della realtà virtuale



Gradi della sedazione digitale





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Grazie!