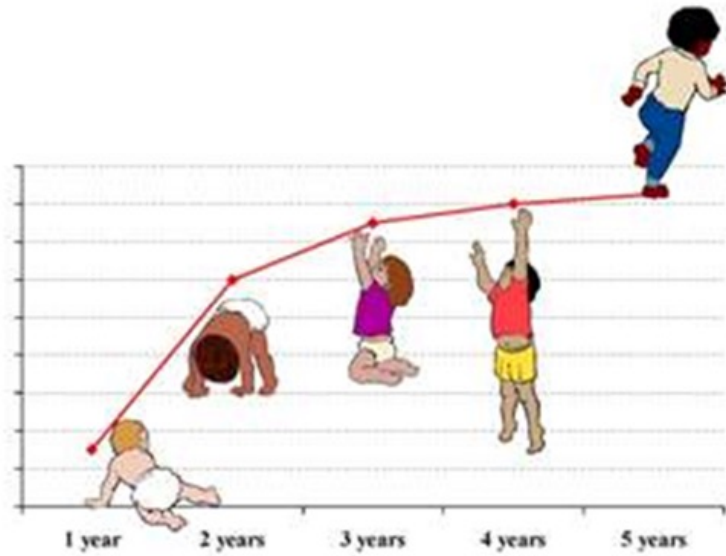


Kid`s sedation all fake...

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- Is deep sedation really SEDATION ?
- Do sedation protocols work in pediatric intensive care?

What is pediatric sedation?

Pediatric sedation is a method of using different sedatives, anxiolytics, and/or anesthetics to induce a level of sedation/comfort based on the requested test, scan or procedure.

Pediatric sedation IS NOT anesthesia it is a separate division from general anesthesia. The CHOP pediatric sedation team utilizes medications and one of three levels of sedation for your child based on age, developmental stage, and/or type (and duration) of scan, test or procedure.

There are several levels of sedation:

- **Minimal sedation:** Child is in a relaxed state in which they are awake and able to respond normally to questions.
- **Moderate sedation:** Child is in and out of consciousness and can be awakened by sound or touch.
- **Deep sedation:** Child is unconscious and does not respond to sound or touch.

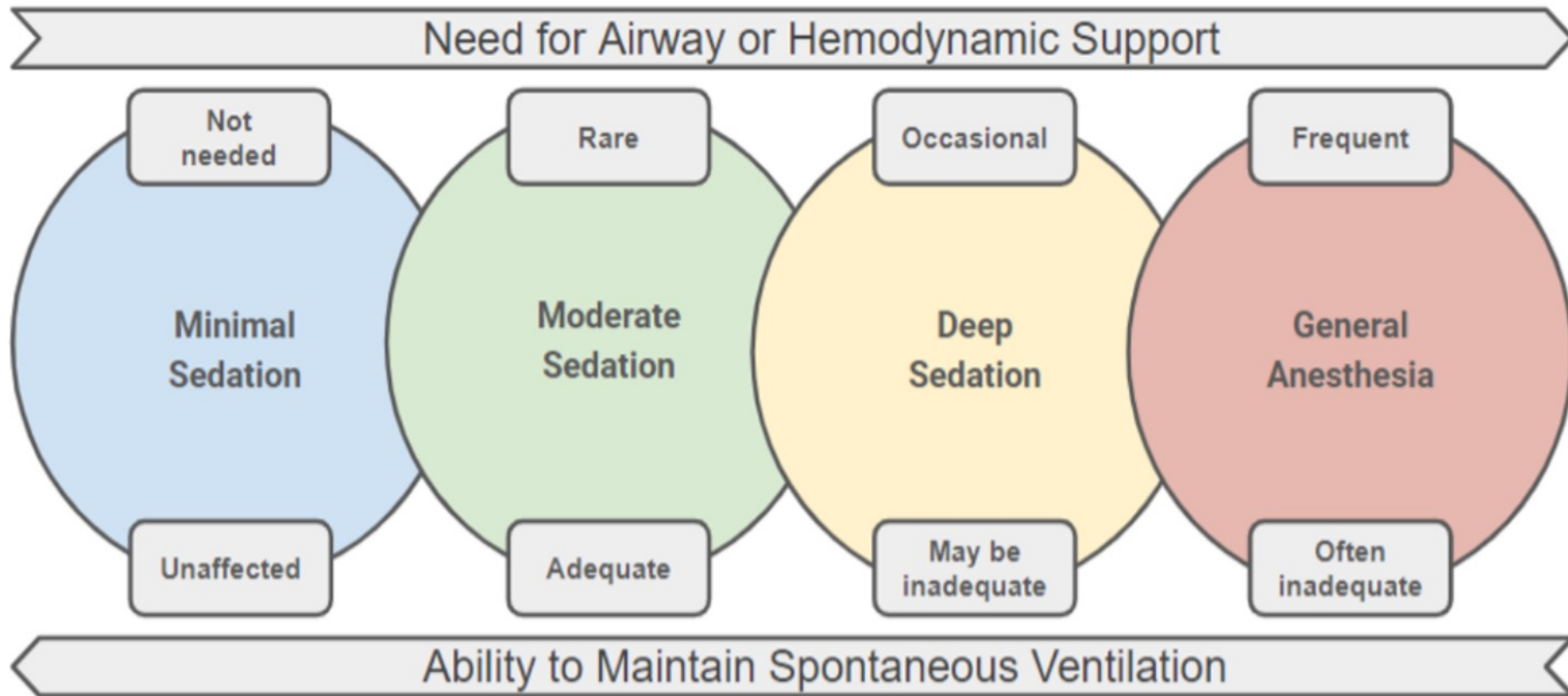


Figure 1. Continuum of the depth of sedation

The New York Times

*Researchers Warn on Anesthesia,
Unsure of Risk to Children*

**Dental Sedation Kills 4-Year-Old
Who Might Have Been Saved By A
Toothbrush**

**General anesthetic may disrupt
brain development in children**

**Sedatives Cited in Toddler's Dentist Office
Death**

[KidsHealth](#) > [Parents](#) > [Can Anesthesia Hurt Brain Development?](#)

Can Anesthesia Hurt Brain Development?

Drug	Nonpainful procedures	Minor painful procedures	Major painful procedures
Midazolam (mg/kg)	p/o 0,5 i/n 0,3 – 0,5 (max 10 mg) i/v 0,05 – 0,1(max 6 mg)	±	±
Pentobarbital (mg/kg)	p/o 3-5	±	±
Phentanyl (µg/kg)		i/n 1,5	±
Ketamin (mg/kg)		i/n 1 i/v 0,3	±
Dexmedetomidine (µg/kg)		i/n 0,5 - 2	±
Propofol (mg/kg)			i/v 1-2 (followed by 0,5 mg/kg as needed)
Ketamine (mg/kg)			i/v 1-1,5

Pediatric Procedural Sedation

Jacob Stern; Alexander Pozun.

▸ [Author Information and Affiliations](#)

Last Update: May 22, 2023.

Table 2. COMPARISON OF MODERATE AND DEEP SEDATION EQUIPMENT AND PERSONNEL REQUIREMENTS

	Moderate sedation	Deep sedation
Personnel	An observer who will monitor the patient but who may also assist with interruptible tasks; should be trained in PALS	An independent observer whose only responsibility is to continuously monitor the patient; trained in PALS
Responsible practitioner	Skilled to rescue a child with apnea, laryngospasm, and/or airway obstruction including the ability to open the airway, suction secretions, provide CPAP, and perform successful bag-valve-mask ventilation; recommended that at least 1 practitioner should be skilled in obtaining vascular access in children; trained in PALS	Skilled to rescue a child with apnea, laryngospasm, and/or airway obstruction, including the ability to open the airway, suction secretions, provide CPAP, perform successful bag-valve-mask ventilation, <u>tracheal intubation, and cardiopulmonary resuscitation</u> ; training in PALS is required; at least 1 practitioner skilled in obtaining vascular access in children immediately available

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

A comprehensive study by the Pediatric Sedation Research Consortium of more than 30000 cases of procedural sedation performed outside the operating room reported a **5,3%** incidence of complications.

However, the incidence of events requiring hospital admission was only 1: 1500, only one case of cardiopulmonary resuscitation, and no deaths were reported (1).

Infants and children aged 5 years old or younger had a higher adverse event rate than older children (15.8% vs 4%) (2).

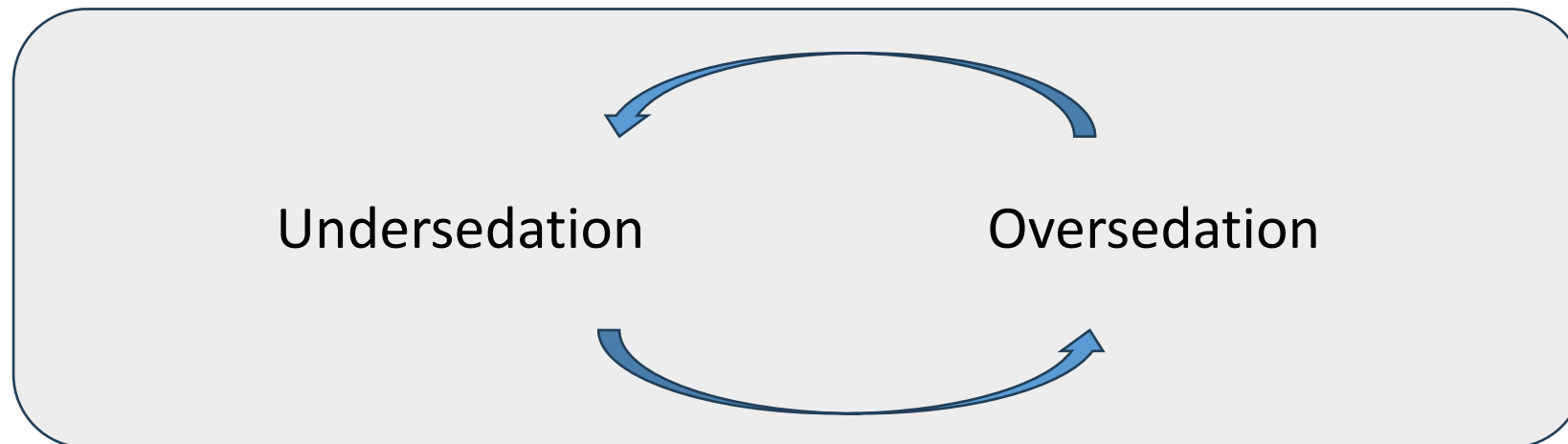
The current incidence of complications associated with sedation in the nonoperating room environment remains irresolute and high-quality studies are lacking. There are no data comparing practice outcomes between different practitioners and specialties (3).

1. Cravero, et al; Pediatrics 2006
2. Biber, et al; Pediatr Crit Care Med 2015
3. Metzner, et al; Review Curr Opin Anaesthesiol 2010

Test for need of sedation



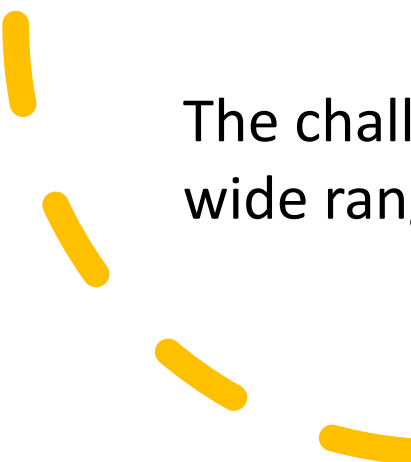
- The aim of analgesia and sedation in the PICU is twofold:
(I) to treat pain and (II) to ensure patient safety and comfort during invasive treatments.
- Other possible goals include optimizing patient-ventilator synchrony, reducing oxygen demand, line and tube maintenance, and reducing anxiety.





A key component of sedation management in the PICU is that pain should be treated before targeting sedation depth, i.e., analgesia-based sedation.

Commonly used pain assessments in the PICU include:
COMFORT Score, FLACC score and Multidimensional Assessment of Pain Scale.



The challenge of such a tool in pediatrics is that it must be validated for a wide range of ages and developmental stages.

- 2499 pt. 2 mo – 17 y

No difference in length of MV, mortality, LOS, significant IWS (1).

- 1360 pt. follow-up

No difference in functional status, quality of life or indication of posttraumatic stress disorder between the groups (2)

- 129 pt

No differences in length of MV, cumulative dose of benzodiazepines or PICU LOS and daily sedation interruption was associated with increased mortality and need for reintubation (3)

1. Curley, et al. RESTORE trial, JAMA 2015
2. Watson, et al. Am J Respir Crit Care Med 2018
3. Vet, et al. Intensive Care Med 2016

In conclusion...

...deep procedural sedation for children less than 5 years old should be provided by anesthesiologist.

...we need better sedation protocols for PICU that take into account the range of ages and developmental stages.



THANK YOU!

Photo: Eliisa Appelberg