

Analgo – sedation in Pediatric Emergency Medicine

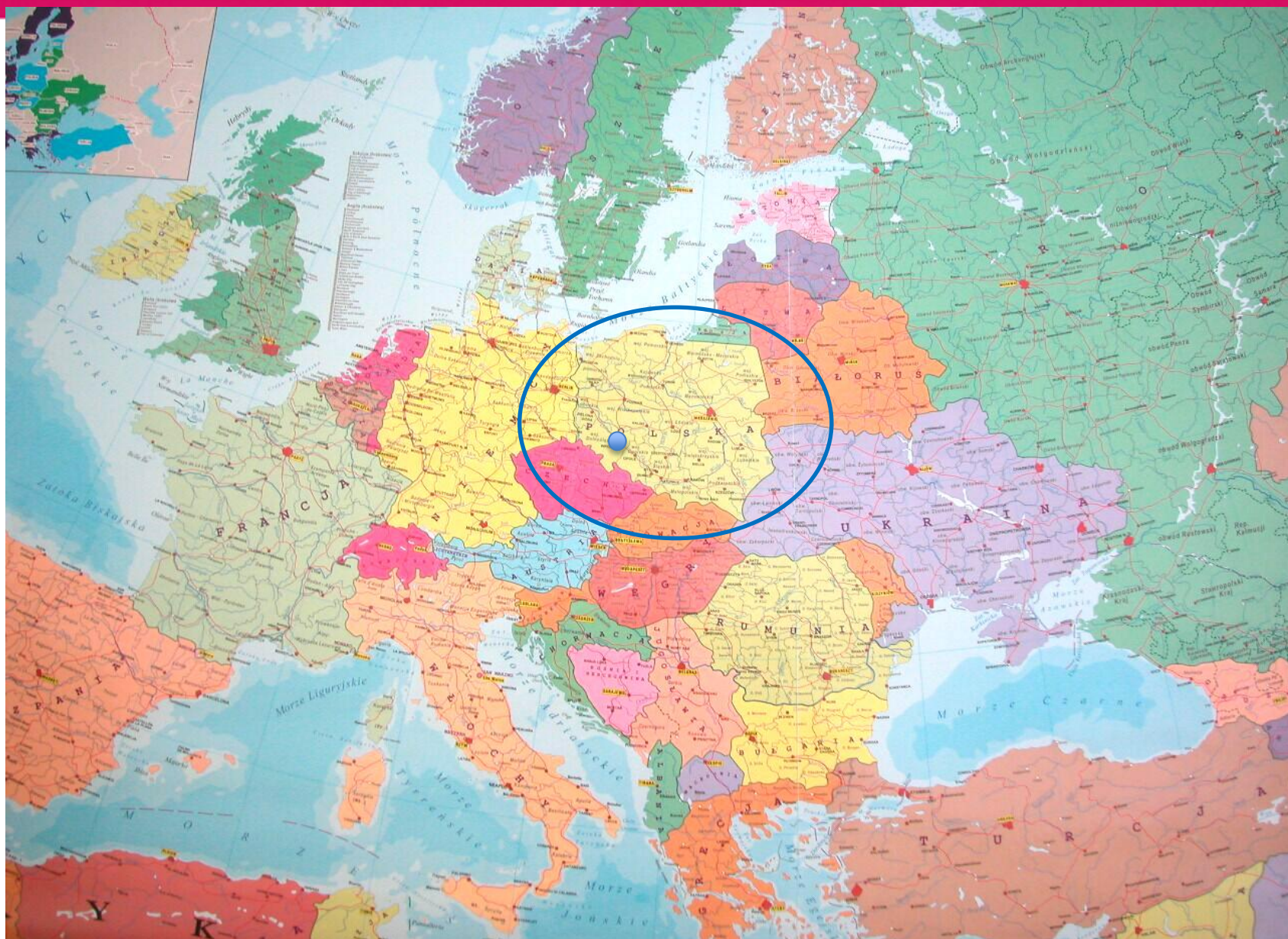
Juliusz Jakubaszko



COI Disclosure

I have no relevant relationship or financial/ material support to disclose.

PRESENTER: JULIUSZ JAKUBASZKO





Wroclaw University

from its history:

- **prof. Jan Mikulicz-Radecki (1850-1905)** *great surgeon
pionier of modern surgery and antiseptics*
- **prof. Albert Neisser (1855-1916)** *dermatologist/bacteriologist
discovered gonococcus (Neisseria Gonorrhoeae)*
- **prof. Alois Alzheimer (1864-1915)** *psychiatrist/neurologist
described neurodegenerative dementia*
- **prof. Ludwik Hirszfeld (1884-1954)** *bakteriologist/immunologist
discovered human blood groups*
- **prof. Max Born (1882-1970)** *physicist/mathematician
Nobel Prizer in Physics for research on Quantum Mechanics*



EMERGENCY MEDICINE

Patient related limb- and life- saving care

- Reduction of preventable deaths
- Reduction of patients disability
- Diminishing of human suffer and pain relief in emergencies
- Rationalization of time and costs of treatment

CORE CURRICULUM

in EMERGENCY MEDICINE

The orientation of training in Emergency Medicine shall encompass the following:

- Core Competencies of the European Emergency Physician
- Common Presenting Symptoms and Problems Core Knowledge
- System-Based Core Knowledge
- Specific Topics Core Knowledge
- **Core Clinical Procedures and Skills.**

3.5 Core Clinical Procedures and Skills

3.5.1 CPR Skills

3.5.2 Airway Management Skills

3.5.3 Analgesia and Sedation Skills

3.5.4 Breathing and Ventilation Management Skills

3.5.5 Circulatory Support and Cardiac Skills and Procedures

3.5.6 Diagnostic Procedures and Skills

3.5.7 ENT Skills and Procedures

3.5.8 Gastrointestinal Procedures

3.5.9 Genitourinary Procedures

3.5.10 Hygiene Skills and Procedures

3.5.11 Musculoskeletal Techniques

3.5.12 Neurological Skills and Procedures

3.5.13 Obstetric and Gynaecological Skills and Procedures

3.5.14 Ophthalmic Skills and Procedures

3.5.15 Temperature Control Procedures

3.5.16 Transportation of the Critically Ill Patient

3.5.17 Wound Management

Analgesia and Sedation in Emergency Medicine Clinics

- fundamental skill of emergency physicians
- important part of emergency department practice
- improves quality of care
- improves patient satisfaction

Emergency Department realities

- 50 % of Emergency Department visits are pain - related as chief complains, often associated with anxiety
- wide variety of diagnostic and therapeutic procedures in ED are painful

Both aspects especially important when related to children

Analgesia and Sedation Terminology

- from conscious sedation to
procedural sedation and analgesia (PSA)
- from minimal sedation to
general anesthesia

(ACEP-1998, ASA-1999, JCAHO-2003)

Analgesia and Sedation level definitions

(Joint Commission on Accreditation of Health Care Organizations 2003)

Minimal sedation (*previous „anxiolysis”*):

A drug-induced state during which individuals respond normally to verbal commands. Although cognitive function and coordination may be impaired, ventilatory and cardiovascular functions are unaffected.

Analgesia and Sedation level definitions

(Joint Commission on Accreditation of Health Care Organizations 2003)

Moderate sedation and analgesia (*previous „conscious sedation“*):

A drug-induced depression of consciousness during which individuals respond purposefully to verbal commands alone or accompanied by light tactile stimulation. No interventions are required to maintain a patent airway, and spontaneous ventilation. Cardiovascular function is usually maintained.

Analgesia and Sedation level definitions

(Joint Commission on Accreditation of Health Care Organizations 2003)

Deep sedation and analgesia:

A drug-induced depression of consciousness during which individuals cannot be easily aroused but respond purposefully after repeated or painful stimulation. The ability to independently maintain ventilatory function may be impaired. Individuals may require assistance in maintaining a patent airway and spontaneous ventilation may be inadequate. Cardiovascular function is usually maintained.

Ramsay Sedation Scale

Score

Responsiveness

1. Patient is anxious and agitated or restless, or both
2. Patient is cooperative, oriented, and tranquil
3. Patient responds to commands only
4. Patient exhibits brisk response to light glabellar tap, or loud auditory stimulus
5. Patient exhibits sluggish response to light glabellar tap, or loud auditory stimulus
6. Patient exhibits no response

Analgesia and Sedation level definitions

(Joint Commission on Accreditation of Health Care Organizations 2003)

Anesthesia:

A drug-included loss of consciousness during which individuals cannot be aroused, even by painful stimulation. Often required ventilatory assistance. Cardiovascular function may be impaired. Consists of general anesthesia and spinal or major regional anesthesia. It does not include local anesthesia.

ANESTHESIA
domain of anesthesiologists

**PROCEDURAL SEDATION AND ANALGESIA
(PSA)**

or

Analgo – sedation

daily routine of emergency physicians

Analgo-sedation in ED

most common indications

- relief of pain and anxiety
- facilitation of diagnostic procedures
- facilitation of therapeutic procedures

Analgo-sedation in ED

most common indications

<i>Clinical Situation</i>	<i>Indication</i>	<i>Procedural Requirements</i>	<i>Suggested Sedation Strategies</i>
Noninvasive procedures	CT Echocardiography Electroencephalography MRI Ultrasonography	Motion control Anxiolysis	Comforting alone Chloral hydrate PO (in patients < 3 yr of age) Methohexital PR Pentobarbital PO, IM, or IV Midazolam IV Propofol or etomidate IV
Procedure associated with low pain and high anxiety	Dental procedures Flexible fiberoptic laryngoscopy Foreign body removal, simple IV cannulation Laceration repair, simple Lumbar puncture Ocular irrigation Phlebotomy Slit-lamp examination	Sedation Anxiolysis Motion control	Comforting and topical/local anesthesia Midazolam PO/IN/PR/IV Nitrous oxide

Analgo-sedation in ED

most common indications

<i>Clinical Situation</i>	<i>Indication</i>	<i>Procedural Requirements</i>	<i>Suggested Sedation Strategies</i>
Procedures associated with high level of pain, high anxiety, or both	Abscess incision and drainage Arthrocentesis Bone marrow aspiration/biopsy Burn débridement Cardiac catheterization Cardioversion Central line placement Endoscopy Foreign body removal, complicated Fracture/dislocation reduction Interventional radiology procedures Laceration repair, complex Paracentesis Parahimosi reduction Sexual assault examination Thoracentesis Thoracostomy tube placement	Sedation Anxiolysis Analgesia Amnesia Motion control	Propofol or etomidate IV ± fentanyl Ketamine IM/IV Midazolam or fentanyl IV

Analgo-sedation in ED

commonly used agents

Drug	Class	Effect	Side Effects	Dose	Peak	Duration
Morphine	Opioid	Analgesia Sedation	↓Respirations ↓BP, HR ↑Histamine	Children: IV: 0,05-0,1 mg/kg Adults: IV: 3-5 mg	IV: 20 m Oral: 60 m IM:30-60 min	1-3 h
Fentanyl	Opioid	Analgesia Sedation	↓Respirations Chest wall rigidity	Children: IV: 1-2µg/kg Adults: IV: 1µg/kg	IV: 0,5-2 m	30-60 m
Alfentanil	Opioid	Analgesia	↓Respirations ↓BP	Adults: IV: 1mg/bolus	IV: 0,5-1 m	10-15 m
Midazolam	Benzodiazepine	Sedation Amnesia	↓Respirations ↓BP ↓Pulse	Children: IV:0,05 mg/kg PO:0,5 mg/kg Adults: IV:0,5-5 mg	IV: 1-5 m PO: 30 m	30-60 m
Diazepam	Benzodiazepine	Sedation Amnesia	↓Respirations ↓BP ↓Pulse	Children: IV:0,05 mg/kg PO:0,2 mg/kg Adults: IV:2,5-5 mg PO: 10 mg	IV: 5-15 m PO:45-60 min	2-6 h

Analgo-sedation in ED

commonly used agents

Drug	Class	Effect	Side Effects	Dose	Peak	Duration
Methohexital	Barbiturate	Sedation Amnesia	↓Respirations ↓BP ↑Histamine	Adults: IV:1-3 mg/kg Children: PR:25 mg/kg (max 500 mg)	IV: 1 m PR: 8 m	IV: 3-5 m PR: 80 m
Pentobarbital	Barbiturate	Sedation Amnesia	↓Respirations N&V ↓BP ↑Histamine	Children: IV: 2 mg/kg IM:2-6 mg/kg Adults: IV: 100 mg	IV: 1 m	6-10 m
Propofol	Imidazole derivative	Sedation Amnesia Antiemetic	↓Respirations ↓BP	1-2 mg/kg bolus 50-100 µg/kg/m IV continuous infusion	0,5 m	4-8 m
Etomidate	Isopropyl phenol	Sedation Amnesia	↓Respirations	0,1 mg/kg	1 m	5-8 m

Analgo-sedation in ED

commonly used agents

Drug	Class	Effect	Side Effects	Dose	Peak	Duration
Ketamine	Phencyclidine derivative	Dissociation Analgesia Sedation Amnesia	↑BP, HR Laryngospasm Increased secretions	Adults: IV: 1-2 mg/kg Children: IV: 1 mg IM: 2-5 mg/kg	IV: 1 m IM: 5 min	IV:15-20 m IM: 30 m
Dexmedetomidine	α ₂ -adrenergic agonist	Analgesia Sedation Anxiolysis	Bradycardia, Heart block, Hypotension	Children: IV: 1 mcg/kg bolus then 0.5-0.7 mcg/kg/h	10 min	depending from infusion
Nitrous oxide	Anesthetic gas	Analgesia Sedation		Self administered 50:50 mix NO ₂ -O ₂	1-2 m	5 m
Naloxon	Antagonist	Opioid reversal		Children: IV: 0,1 mg/kg – 2 mg/dose Adults: IV: 0,4-2 mg	2 m	20-40 m
Flumazenil	Antagonist	Benzodiazepine reversal		Children: IV: 0,02 mg/kg Adults: IV: 0,2 mg/kg	1-2 m	30-60 m

Common Pediatric Sedation and Analgesic Agents

Agent	Dosage	Onset	Duration
Fentanyl	IV: 0.52 mcg/kg	1-2 min	30-45 min
	Nasal: 1.5-2 mcg/kg	2-5 min	30-60 min
Ketamine	IV: 1-2 mg/kg	1-2 min	20-60 min
	IM: 3-5 mg/kg	5-10 min	60-120 min
Dexmedetomidine	IV: 1 mcg/kg bolus then 0.5-0.7 mcg/kg/h	15-30 min	240 min
Midazolam	IV: 0.05-0.1 mg/kg (6 mo-5 y) q2-3min prn (max 0.6 mg/kg)	1-5 min	20-60 min
	0.025-0.05 mg/kg (6-12 y) q2-3min prn (max 0.4 mg/kg)	10-15 min	60-120 min
	IM: 1-0.15 mg/kg	5-10 min	30-60 min
	Nasal: 0.2-0.6 mg/kg		
Propofol	IV: 1 mg/kg then 0.5 mg/kg prn	30-60 sec	2-5 min
	IV drip: 5-50 mcg/kg/min		
Etomidate	IV: 0.1-0.2 mg/kg	30-60 sec	3-5 min
Naloxone	IV: 0.01 mg/kg q 2-3 min prn	1-5 min	30-60 min
Flumazenil	IV: 0.01 mg/kg/min to max 0.05 mg/kg	1-5 min	20-75 min

Analgo-sedation in ED

most common complications

Complication	Etiology
Delayed awakening	Prolonged drug action Hypoxemia, hypercarbia, hypovolemia
Agitation	Pain, hypoxemia, hypercarbia, full bladder Paradoxical reactions Emergence reactions
Nausea and vomiting	Sedative agents Premature oral fluids
Cardiorespiratory events	
Tachycardia	Pain, hypovolemia, impaired ventilation
Bradycardia	Vagal stimulation, opioids, hypoxia
Hypoxia	Laryngospasm, airway obstruction, oversedation

Analgo-sedation in ED

safety precautions

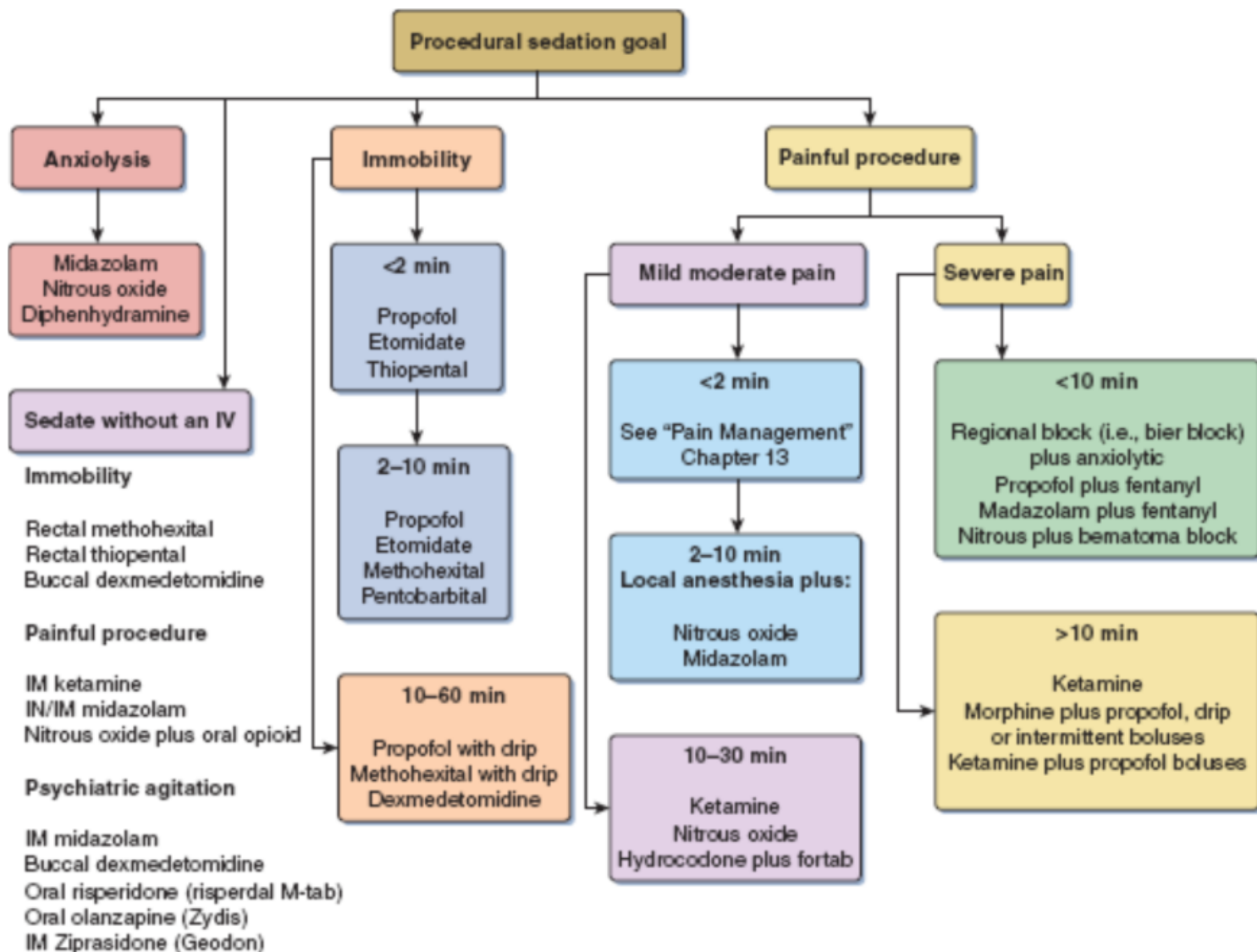
- careful patients assessment and evaluation (*history and physical examination,...*)
- risk stratification (*ASA classification,...*)
- precise, individual medicaments selection
- personal procedural expertise
- continuous patient observation and monitoring
- proper recovery facilities
- detailed discharge procedures and disposition instructions

Pediatric history for Analgo-Sedation (SAMPLE)

- *Signs/symptoms*: Respiratory infections or obstruction? Snoring? Sleep apnea? Stridor? Heart disease? Gastroesophageal reflux? Swallowing problems?
- *Allergies*: Include egg, soy, and latex
- *Medications*: Particularly concurrent opioids, other analgesics
- *Past medical and sedation history*: Seizures? Family history of or prior sedation problems?
- *Last meal, liquid*
- *Events leading to need for sedation*: Head injury? Previous failed sedation? Bad experiences with needles or health care?

Equipment for Analgo-Sedation (SOAP ME)

- *Suction*: Appropriate-size suction catheters connected and tested
- *Oxygen*: Appropriate-size mask, bag, and sufficient oxygen flow to inflate anesthesia bag
- *Airway*: Nasopharyngeal, oropharyngeal airways, LMAs, laryngoscope, blades, endotracheal tubes
- *Pharmacy*: Advanced life-support medications and reversal agents
- *Monitors*: Cardiac, respiratory, oxygen saturation, and ETCO₂ when appropriate
- *Equipment*: Case appropriate special equipment (C-arm, defibrillator)



Source: Robert Schafermeyer, Milton Tenenbein, Charles G. Macias, Ghazala Q. Sharieff, Loren G. Yamamoto: *Strange and Schafermeyer's Pediatric Emergency Medicine*, 4th Edition: www.accessemergencymedicine.com
Copyright © McGraw-Hill Education. All rights reserved.

Analgo-sedation in ED

discharge criteria

- Vital signs stable for at least 30 min
- No evidence of respiratory distress
- Minimal or no nausea, vomiting, or dizziness
- Alert, oriented, and able to retain information
- Able to take fluids and medications by mouth
- Ambulation consistent with pre-procedure status
- Responsible person present to accompany patient



**Polskie Towarzystwo
Medycyny Ratunkowej**

**Polish Society for
Emergency Medicine**

<http://www.medycynaratunkowa.wroc.pl>