

PEDIATRIC ANALGESIA AND SEDATION DRUG MANUAL



HARBOR-UCLA MEDICAL CENTER

PEDIATRIC ANALGESIA AND SEDATION DRUG MANUAL

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Preface

The attached sedation manual is based on using length as a marker of estimated weight. All equipment sizes are based upon measured length. Drug doses are based upon either actual measured metric weight or derived lean weight; these weights can be determined either by actually weighing the child on a kilogram scale or by deriving the 50th percentile lean weight from the child's measured length. For ease of application at the bedside, this reference employs a length-based, color-coded tape for establishing a color zone, rather than using exact length.

The length-based resuscitation tape lumps together several centimeter lengths into one color zone. Each color zone corresponds to a narrow length range that includes children who can share the same equipment sizes and drugs doses. Length has many advantages in drug dosing and equipment sizing. First, length is the best index for the sizing of equipment in emergencies. Second, length is a time-honored predictor of lean body weight, and provides a single, clean and reproducible lean weight measurement in critical situations.

The best determination of weight is to weigh the child on a scale in kilograms. If this cannot be accomplished or the child is too sick to place on a scale, then utilization of the Broselow-Luten tape for children 3-36 kg to estimate weight should be employed. Children greater than 36 kg should be given adult dosing regimens.

Pediatric equipment, supplies, and medications appropriate for children of all ages and sizes should be easily accessible, clearly labeled, and logically organized. The emergency department staff should be educated on the location of all pediatric equipment and medications, and a daily method in place to verify the proper location and function of pediatric equipment and supplies should be established. Finally, a medication chart, length-based tape, medical software, or other system readily available to ensure proper sizing of resuscitation equipment and proper dosing of medications should be available.

Disclaimer

The analgesia and sedation drugs and doses presented in this Analgesia & Sedation Manual have been reviewed and updated by the staff at Harbor-UCLA Medical Center.

Unexpected adverse events may occur with all of these drugs, especially in physiologically distressed patients, even at recommended doses. Careful monitoring of patients receiving these drugs should be employed by ED staff.

It is imperative that the clinician be appropriately informed about ongoing changes in drug doses and drug indications, interactions, and complications. No resource document can possibly substitute for conscientious clinical judgment by appropriately-qualified medical providers.

Finally, formularies may be different from one medical center to the next thus the dosages presented in this manual are based on the formulary at Harbor-UCLA Medical Center and may not reflect those at your institution.

Acknowledgements

Special thanks to Ron Dieckmann, MD, MPH and John Fazio, RN for allowing us to adapt their original manual.

Nonpharmacologic Methods for Management of Pain and Anxiety

- Rock in a wide, rhythmic arc (rather than bouncing).
- Provide simple rhythmic cutaneous stimulation (massage with hand lotion). Infants in particular enjoy scalp and hand stroking.
- Whenever possible, consider using topical agents to modify the pain of needle injection. Topical agents such as EMLA (intact skin) and LET (open wound) are excellent choices, if properly applied and allowed the time to achieve local anesthesia.
- When injecting local lidocaine or bupivocaine, remember to use small needles, consider buffering with bicarbonate, and perform injection during withdrawal of the needle.
- Distraction with movies, music or other diversions may reduce pain.

NEONATAL PAIN

- Newborns have been shown to have the neuroendocrine mechanisms that transmit pain.
- Investigations comparing neonates between 28 and 32 weeks gestation exposed to multiple painful stimuli to neonates without exposure have demonstrated an increase in distress in those with multiple prior exposure during future painful procedures.

Techniques

- Suckling and breast feeding are quite effective non-pharmacologic pain relief mechanisms.
- Kangaroo care (maternal skin to neonatal skin contact) has been shown to lower the premature infant pain during heel lancing.
- Whenever possible, use 12 to 50% oral sucrose solution = up to 2 ml of solution administered via dropper, syringe or pacifier 2 minutes prior to painful procedure. These simple solutions have been shown to reduce pain and anxiety.
- Combination of sucrose, oral tactile stimulation and parental holding has been associated with reduced crying and distress during painful procedures.

Nonpharmacologic Methods for Management of Pain and Anxiety

- Rock in a wide, rhythmic arc (rather than bouncing).
- Provide simple rhythmic cutaneous stimulation (massage with hand lotion). Infants in particular enjoy scalp and hand stroking.
- Whenever possible, consider using topical agents to modify the pain of needle injection. Topical agents such as EMLA (intact skin) and LET (open wound) are excellent choices, if properly applied and allowed the time to achieve local anesthesia.
- When injecting local lidocaine or bupivocaine, remember to use small needles, consider buffering with bicarbonate, and perform injection during withdrawal of the needle.
- Distraction with movies, music or other diversions may reduce pain.

NEONATAL PAIN

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- Whenever possible, use 12 to 50% oral sucrose solution = up to 2 ml of solution administered via dropper, syringe or pacifier 2 minutes prior to painful procedure. These simple solutions have been shown to reduce pain and anxiety.
- Combination of sucrose, oral tactile stimulation and parental holding has been associated with reduced crying and distress during painful procedures.

Gray Weight 1 kg Gray

Heart rate 100 to 170

SBP 55 to 75

Resp 40 to 60

Acetaminophen (Tylenol):

Oral drops: 80 mg/0.8 ml = 100 mg/ml

Suppository: 120 mg, 325 mg, or 650 mg

Route	Dose per kg	Onset	Duration	Dose	ml to give
PO, PR	15 mg/kg	30 m	4 hr	15 mg	0.15 ml of 100 mg/ml

Alerts: Check concentration, as there are many different formulations.

Comments: Equivalent to NSAID's for pain and fever, but has no anti-inflammatory effect. Oral liquid can be 100 mg/ml infant drops OR children's suspension 160 mg/5ml.

Suppositories also available as above. Do not exceed 5 doses per day and use with extreme caution in children with hepatic dysfunction.

Diazepam: Intravenous formulation (same for IV or PR): 5 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV	0.2 mg/kg	1-3 m	0.5 hr	0.2 mg	0.04 ml
PR	0.5 mg/kg	2-15 m	0.5 hr	0.5 mg	0.1 ml

Alerts: Resp depression with fast IV push. Rectal gel available at 2.5 mg/ml.

Comments: Not a first line drug. Works for status epilepticus, but midazolam or lorazepam preferred. Works for sedation but midazolam or lorazepam preferred. Push slowly IV. May repeat IV dose q 10 minutes prn, with max total dose of 5 mg. Decrease dose by ½ if given with morphine. IV solution can be administered with lubricated TB syringe (no needle) into rectum. Rectal gel easier to insert into rectum, but expensive.

Etomidate: Intravenous formulation: 2 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV	0.2 mg/kg	30-60 sec	2-15 min	0.2 mg	Sedation dose 0.1 ml
IV	0.3 mg/kg	30-60 sec	5-15 min	0.3 mg	RSI dose 0.15 ml

Alerts: Give lower dose for sedation for imaging. Watch for myoclonus, vomiting.

Comments: Use starting dose of 0.2 mg/kg for sedation for imaging.

Use with narcotic (e.g., fentanyl) for procedural sedation.

Use higher dose of 0.3 mg/kg for induction for rapid sequence intubation.

Increase by 0.05 mg/kg every 60-90 seconds to maximum of 0.4 mg/kg (**4 mg**).

Gray Weight 1 kg Gray

Heart rate 100 to 170

SBP 55 to 75

Resp 40 to 60

Fentanyl: IV/IM formulation: 100 mcg/2ml = 50 mcg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV, IM	1 mcg/kg	<1 m IV 7-15 m IM	30-60 m	1 mcg	0.02 ml

Alerts: Resp depression, reversible with naloxone. Avoid rapid infusion, as it may lead to rigid chest syndrome and need for respiratory support.

Comments: Start with 1 mcg/kg. May repeat dose q5-10 minutes prn. The respiratory depressant effects may last longer than analgesic effects. Best drug for major trauma cases and possible hypoperfusion.

Fentanyl (Intranasal): Use IV formulation for intranasal administration:
100 mcg/2ml = 50 mcg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IN	2 mcg/kg	1-2 m	½-2 hr	2 mcg	0.04 ml

Alerts: Atomizer needed to nebulize drug intranasally to maximize absorption.

Comments: Put half of each dose in each nostril. May repeat 0.5 mcg/kg dose q 5-10 minutes prn. The respiratory depressant effects may last longer than analgesic effects. Use when vascular access unavailable or unnecessary. Has not been trialed on <3 yo.

Hydromorphone (Dilaudid): IV/IM formulation: 2 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV, IM	0.02 mg/kg	2-5 m	4-5 hr	0.02 mg	0.01 ml

Alerts: Resp depression possible. Contraindicated in status asthmaticus.

Comments: Not recommended for children intolerant or unresponsive to morphine. Excellent alternative to morphine for sickle cell pain. 1 mg hydromorphone = 7 mg morphine.

Gray Weight 1 kg Gray

Heart rate 100 to 170

SBP 55 to 75

Resp 40 to 60

Ketamine: IV/IM formulation: 50 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV	1-2 mg/kg	30 sec	15-30 m	1-2 mg	0.02 –0.04 ml
IM	5 mg/kg	3-5 m	30-90 m	5 mg	0.1 ml
Alerts: Laryngospasm, hypersalivation, vomiting. Contraindicated if increased intracranial or intraocular pressure. Watch for emergence reaction, nausea/vomiting. Comments: No atropine needed. Do not exceed injection rate of 0.5 mg/kg/min or give the dose in less than 1 minute.					

Lorazepam (Ativan): IV/IM formulation: 2 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV, IM	0.05- 0.1 mg/kg	2-3 m	6-8 hrs	0.05-0.1 mg	0.025-0.05 ml
Alerts: Check concentration (4 mg/ml also available). Resp depression, especially with fast IV push. Comments: Best first seizure drug. Decrease dose by ½ if given with morphine.					

Midazolam (Versed): IV/IM formulation: 1 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV, IM	0.1 mg/kg	1-5 m	½-1 hr	0.1 mg	0.1 ml
Alerts: Faster metabolism in infants and high doses, up to 0.6 mg/kg, may be needed. Check concentration (also available in 5 mg/ml). Watch for resp depression, especially with rapid IV push. Comments: Decrease dose by ½ if given with morphine. May increase dose by 0.1 mg/kg every 5 minutes. Max total IV dose 6 mg.					

Gray Weight 1 kg Gray

Heart rate 100 to 170

SBP 55 to 75

Resp 40 to 60

Morphine: IV/IM formulations (multiple): 5 or 10 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV, IM	0.05 mg/kg	1-3 m	1-2 hrs	0.05 mg	0.01 ml of 5 mg/ml
Alerts: Check concentration (multiple formulations). Adjust dose for renal impairment. May cause hypotension or resp depression, nausea, emesis, or pruritis. Comments: May repeat dose q 5-15 minutes to desired effect. Decrease dose by ½ if given with barbiturates, hydroxyzine/diphenhydramine, or with other benzodiazepines.					

Pentobarbital (Nembutal): IV/IM formulation: 50 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV	1-2 mg/kg	3-5 m	15-45 m	1-2 mg	0.02-0.04 ml
IM	5 mg/kg	10 m	1-4 hrs	5 mg	0.1
Alerts: May cause hypotension. Paradoxical excitement may occur when administered (small doses of morphine can ameliorate this effect). Comments: Not first line drug for imaging sedation—use etomidate. Decrease dose by ½ if given with morphine. Do not inject >50 mg/min. Lasts longer than methohexital.					

Gray Weight 1 kg Gray

Heart rate 100 to 170

SBP 55 to 75

Resp 40 to 60

Reversal Agents

Flumazenil (Romazicon): IV formulation: 0.1 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV	0.01 mg/kg	1-2 m	20-60 m	0.01 mg	0.1 ml
Alerts: Contraindicated if benzodiazepine addiction or concomitant tricyclic antidepressant overdose.					
Comments: May repeat 0.02 mg/kg q1 min up to a total of 1 mg.					

Naloxone (Narcan): IV/IO/IM/IN/ET formulation: 0.4 mg/ml, or 1 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV, IO, IM, SC, IN, ET	0.1 mg/kg	<2 m (IV, IO), 2-5 m (IM, SC, IN, ET)	30-60 m	0.1 mg	0.25 ml of 0.4 mg/ml
Alerts: Use with extreme caution in neonates to avoid seizures. Contraindicated if hypersensitivity to naloxone.					
Comments: May repeat 0.05 mg/kg q2-3 min up to total 2 mg. Max single dose 2 mg. Titrate dose for either partial or complete opiate reversal.					

Gray Weight 1 kg Gray

Heart rate 100 to 170

SBP 55 to 75

Resp 40 to 60

Topical Pain Management

EMLA (Eutectic Mixture of Local Anesthetics): Formulation: lidocaine 2.5% & prilocaine 2.5% cream (5 g tube)

Route	Max dose	Max area of coverage	Onset	Duration
Topical	1 g	10 cm ² area of skin	60 m	2-3 hrs
<p>Alerts: Avoid use in infants <3 months (except circumcision) and those up to 12 months who are also receiving methemoglobin-inducing agents.</p> <p>Do not apply to mucous membranes or open wounds. Apply for no longer than 1 hours. Contraindicated if hypersensitivity to lidocaine or prilocaine.</p> <p>Comments: May cause methemoglobinemia. Anesthesia lasts 1-2 hrs after removal of cream.</p>				

Lidocaine 1% (Xylocaine): Formulation: Lidocaine 1% (10 mg/ml)

Route	Max Dose	Onset	Duration
Infiltration	0.45 ml	Rapid	½-1 hr
<p>Alerts: Do not exceed 4-5 mg/kg due to risk of seizures, or 8 mg/kg if combined with epinephrine. Do not use lidocaine/epinephrine combo on fingertips, toes, nose, or penis.</p> <p>Comments: Buffer lidocaine injection (lidocaine 1%) as a 1:10 mixture of 1 part sodium bicarbonate solution in 9 parts of lidocaine 1% to reduce pain of injection.</p>			

Gray Weight 2 kg Gray

Heart rate 100 to 170

SBP 55 to 75

Resp 40 to 60

Acetaminophen (Tylenol):

Oral drops: 80 mg/0.8 ml = 100 mg/ml

Suppository: 120 mg, 325 mg, or 650 mg

Route	Dose per kg	Onset	Duration	Dose	ml to give
PO, PR	15 mg/kg	30 m	4 hr	30 mg	0.3 ml of 100 mg/ml

Alerts: Check concentration, as there are many different formulations.

Comments: Equivalent to NSAID's for pain and fever, but has no anti-inflammatory effect. Oral liquid can be 100 mg/ml infant drops OR children's suspension 160 mg/5ml.

Suppositories also available as above. Do not exceed 5 doses per day and use with extreme caution in children with hepatic dysfunction.

Diazepam: Intravenous formulation (same for IV or PR): 5 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV	0.2 mg/kg	1-3 m	0.5 hr	0.4 mg	0.08 ml
PR	0.5 mg/kg	2-15 m	0.5 hr	1 mg	0.2 ml

Alerts: Resp depression with fast IV push. Rectal gel available at 2.5 mg/ml.

Comments: Not a first line drug. Works for status epilepticus, but midazolam or lorazepam preferred. Works for sedation but midazolam or lorazepam preferred. Push slowly IV. May repeat IV dose q 10 minutes prn, with max total dose of 5 mg. Decrease dose by ½ if given with morphine. IV solution can be administered with lubricated TB syringe (no needle) into rectum. Rectal gel easier to insert into rectum, but expensive.

Etomidate: Intravenous formulation: 2 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV	0.2 mg/kg	30-60 sec	2-15 min	0.4 mg	Sedation dose 0.2 ml
IV	0.3 mg/kg	30-60 sec	5-15 min	0.6 mg	RSI dose 0.3 ml

Alerts: Give lower dose for sedation for imaging. Watch for myoclonus, vomiting.

Comments: Use starting dose of 0.2 mg/kg for sedation for imaging.

Use with narcotic (e.g., fentanyl) for procedural sedation.

Use higher dose of 0.3 mg/kg for induction for rapid sequence intubation.

Increase by 0.05 mg/kg every 60-90 seconds to maximum of 0.4 mg/kg (**4 mg**).

Gray Weight 2 kg Gray

Heart rate 100 to 170

SBP 55 to 75

Resp 40 to 60

Fentanyl: IV/IM formulation: 100 mcg/2ml = 50 mcg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV, IM	1 mcg/kg	<1 m IV 7-15 m IM	30-60 m	2 mcg	0.04 ml

Alerts: Resp depression, reversible with naloxone. Avoid rapid infusion, as it may lead to rigid chest syndrome and need for respiratory support.

Comments: Start with 1 mcg/kg. May repeat dose q5-10 minutes prn. The respiratory depressant effects may last longer than analgesic effects. Best drug for major trauma cases and possible hypoperfusion.

Fentanyl (Intranasal): Use IV formulation for intranasal administration:
100 mcg/2ml = 50 mcg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IN	2 mcg/kg	1-2 m	½-2 hr	4 mcg	0.08 ml

Alerts: Atomizer needed to nebulize drug intranasally to maximize absorption.

Comments: Put half of each dose in each nostril. May repeat 0.5 mcg/kg dose q 5-10 minutes prn. The respiratory depressant effects may last longer than analgesic effects. Use when vascular access unavailable or unnecessary. Has not been trialed on <3 yo.

Hydromorphone (Dilaudid): IV/IM formulation: 2 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV, IM	0.02 mg/kg	2-5 m	4-5 hr	0.04 mg	0.02 ml

Alerts: Resp depression possible. Contraindicated in status asthmaticus.

Comments: Not recommended for children intolerant or unresponsive to morphine. Excellent alternative to morphine for sickle cell pain. 1 mg hydromorphone = 7 mg morphine.

Gray Weight 2 kg Gray

Heart rate 100 to 170

SBP 55 to 75

Resp 40 to 60

Ketamine: IV/IM formulation: 50 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV	1-2 mg/kg	30 sec	15-30 m	2-4 mg	0.04–0.08 ml
IM	5 mg/kg	3-5 m	30-90 m	10 mg	0.2 ml

Alerts: Laryngospasm, hypersalivation, vomiting. Contraindicated if increased intracranial or intraocular pressure. Watch for emergence reaction, nausea/vomiting.

Comments: No atropine needed. Do not exceed injection rate of 0.5 mg/kg/min or give the dose in less than 1 minute.

Lorazepam (Ativan): IV/IM formulation: 2 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV, IM	0.05- 0.1 mg/kg	2-3 m	6-8 hrs	0.1-0.2 mg	0.05-0.1 ml

Alerts: Check concentration (4 mg/ml also available). Resp depression, especially with fast IV push.

Comments: Best first seizure drug. Decrease dose by ½ if given with morphine.

Midazolam (Versed): IV/IM formulation: 1 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV, IM	0.1 mg/kg	1-5 m	½-1 hr	0.2 mg	0.2 ml

Alerts: Faster metabolism in infants and high doses, up to 0.6 mg/kg, may be needed. Check concentration (also available in 5 mg/ml). Watch for resp depression, especially with rapid IV push.

Comments: Decrease dose by ½ if given with morphine. May increase dose by 0.1 mg/kg every 5 minutes. Max total IV dose 6 mg.

Gray Weight 2 kg Gray

Heart rate 100 to 170

SBP 55 to 75

Resp 40 to 60

Morphine: IV/IM formulations (multiple): 5 or 10 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV, IM	0.05 mg/kg	1-3 m	1-2 hrs	0.1 mg	0.02 ml of 5 mg/ml
Alerts: Check concentration (multiple formulations). Adjust dose for renal impairment. May cause hypotension or resp depression, nausea, emesis, or pruritis. Comments: May repeat dose q 5-15 minutes to desired effect. Decrease dose by ½ if given with barbiturates, hydroxyzine/diphenhydramine, or with other benzodiazepines.					

Pentobarbital (Nembutal): IV/IM formulation: 50 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV	1-2 mg/kg	3-5 m	15-45 m	2-4 mg	0.04-0.08 ml
IM	5 mg/kg	10 m	1-4 hrs	10 mg	0.2ml
Alerts: May cause hypotension. Paradoxical excitement may occur when administered (small doses of morphine can ameliorate this effect). Comments: Not first line drug for imaging sedation—use etomidate. Decrease dose by ½ if given with morphine. Do not inject >50 mg/min. Lasts longer than methohexital.					

Gray Weight 2 kg Gray

Heart rate 100 to 170

SBP 55 to 75

Resp 40 to 60

Reversal Agents

Flumazenil (Romazicon): IV formulation: 0.1 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV	0.01 mg/kg	1-2 m	20-60 m	0.02 mg	0.2 ml
Alerts: Contraindicated if benzodiazepine addiction or concomitant tricyclic antidepressant overdose.					
Comments: May repeat 0.02 mg/kg q1 min up to a total of 1 mg.					

Naloxone (Narcan): IV/IO/IM/IN/ET formulation: 0.4 mg/ml, or 1 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV, IO, IM, SC, IN, ET	0.1 mg/kg	<2 m (IV, IO), 2-5 m (IM, SC, IN, ET)	30-60 m	0.2 mg	0.5 ml of 0.4 mg/ml
Alerts: Use with extreme caution in neonates to avoid seizures. Contraindicated if hypersensitivity to naloxone.					
Comments: May repeat 0.05 mg/kg q2-3 min up to total 2 mg. Max single dose 2 mg. Titrate dose for either partial or complete opiate reversal.					

Gray Weight 2 kg Gray

Heart rate 100 to 170 SBP 55 to 75 Resp 40 to 60

Topical Pain Management

EMLA (Eutectic Mixture of Local Anesthetics): Formulation: lidocaine 2.5% & prilocaine 2.5% cream (5 g tube)

Route	Max dose	Max area of coverage	Onset	Duration
Topical	1 g	10 cm ² area of skin	60 m	2-3 hrs
<p>Alerts: Avoid use in infants <3 months (except circumcision) and those up to 12 months who are also receiving methemoglobin-inducing agents.</p> <p>Do not apply to mucous membranes or open wounds. Apply for no longer than 1 hours. Contraindicated if hypersensitivity to lidocaine or prilocaine.</p> <p>Comments: May cause methemoglobinemia. Anesthesia lasts 1-2 hrs after removal of cream.</p>				

Lidocaine 1% (Xylocaine): Formulation: Lidocaine 1% (10 mg/ml)

Route	Max Dose	Onset	Duration
Infiltration	0.9 ml	Rapid	½-1 hr
<p>Alerts: Do not exceed 4-5 mg/kg due to risk of seizures, or 8 mg/kg if combined with epinephrine. Do not use lidocaine/epinephrine combo on fingertips, toes, nose, or penis.</p> <p>Comments: Buffer lidocaine injection (lidocaine 1%) as a 1:10 mixture of 1 part sodium bicarbonate solution in 9 parts of lidocaine 1% to reduce pain of injection.</p>			

Gray Weight 3 kg Gray

Heart rate 100 to 170

SBP 55 to 75

Resp 40 to 60

Acetaminophen (Tylenol):

Oral drops: 80 mg/0.8 ml = 100 mg/ml

Suppository: 120 mg, 325 mg, or 650 mg

Route	Dose per kg	Onset	Duration	Dose	ml to give
PO, PR	15 mg/kg	30 m	4 hr	45 mg	0.5 ml of 100 mg/ml

Alerts: Check concentration, as there are many different formulations.

Comments: Equivalent to NSAID's for pain and fever, but has no anti-inflammatory effect. Oral liquid can be 100 mg/ml infant drops OR children's suspension 160 mg/5ml.

Suppositories also available as above. Do not exceed 5 doses per day and use with extreme caution in children with hepatic dysfunction.

Diazepam: Intravenous formulation (same for IV or PR): 5 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV	0.2 mg/kg	1-3 m	0.5 hr	0.6 mg	0.12 ml
PR	0.5 mg/kg	2-15 m	0.5 hr	1.5 mg	0.3 ml

Alerts: Resp depression with fast IV push. Rectal gel available at 2.5 mg/ml.

Comments: Not a first line drug. Works for status epilepticus, but midazolam or lorazepam preferred. Works for sedation but midazolam or lorazepam preferred. Push slowly IV. May repeat IV dose q 10 minutes prn, with max total dose of 5 mg. Decrease dose by ½ if given with morphine. IV solution can be administered with lubricated TB syringe (no needle) into rectum. Rectal gel easier to insert into rectum, but expensive.

Etomidate: Intravenous formulation: 2 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV	0.2 mg/kg	30-60 sec	2-15 min	0.6 mg	Sedation dose 0.3 ml
IV	0.3 mg/kg	30-60 sec	5-15 min	0.9 mg	RSI dose 0.45 ml

Alerts: Give lower dose for sedation for imaging. Watch for myoclonus, vomiting.

Comments: Use starting dose of 0.2 mg/kg for sedation for imaging.

Use with narcotic (e.g., fentanyl) for procedural sedation.

Use higher dose of 0.3 mg/kg for induction for rapid sequence intubation.

Increase by 0.05 mg/kg every 60-90 seconds to maximum of 0.4 mg/kg (**4 mg**).

Gray Weight 3 kg Gray

Heart rate 100 to 170

SBP 55 to 75

Resp 40 to 60

Fentanyl: IV/IM formulation: 100 mcg/2ml = 50 mcg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV, IM	1 mcg/kg	<1 m IV 7-15 m IM	30-60 m	3 mcg	0.06 ml

Alerts: Resp depression, reversible with naloxone. Avoid rapid infusion, as it may lead to rigid chest syndrome and need for respiratory support.

Comments: Start with 1 mcg/kg. May repeat dose q5-10 minutes prn. The respiratory depressant effects may last longer than analgesic effects. Best drug for major trauma cases and possible hypoperfusion.

Fentanyl (Intranasal): Use IV formulation for intranasal administration:
100 mcg/2ml = 50 mcg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IN	2 mcg/kg	1-2 m	½-2 hr	6 mcg	0.12 ml

Alerts: Atomizer needed to nebulize drug intranasally to maximize absorption.

Comments: Put half of each dose in each nostril. May repeat 0.5 mcg/kg dose q 5-10 minutes prn. The respiratory depressant effects may last longer than analgesic effects. Use when vascular access unavailable or unnecessary. Has not been trialed on <3 yo.

Hydromorphone (Dilaudid): IV/IM formulation: 2 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV, IM	0.02 mg/kg	2-5 m	4-5 hr	0.06 mg	0.03 ml

Alerts: Resp depression possible. Contraindicated in status asthmaticus.

Comments: Not recommended for children intolerant or unresponsive to morphine. Excellent alternative to morphine for sickle cell pain. 1 mg hydromorphone = 7 mg morphine.

Gray Weight 3 kg Gray

Heart rate 100 to 170

SBP 55 to 75

Resp 40 to 60

Ketamine: IV/IM formulation: 50 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV	1-2 mg/kg	30 sec	15-30 m	3-6 mg	0.06 –0.12 ml
IM	5 mg/kg	3-5 m	30-90 m	15 mg	0.3 ml

Alerts: Laryngospasm, hypersalivation, vomiting. Contraindicated if increased intracranial or intraocular pressure. Watch for emergence reaction, nausea/vomiting.

Comments: No atropine needed. Do not exceed injection rate of 0.5 mg/kg/min or give the dose in less than 1 minute.

Lorazepam (Ativan): IV/IM formulation: 2 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV, IM	0.05- 0.1 mg/kg	2-3 m	6-8 hrs	0.15-0.3 mg	0.08-0.15 ml

Alerts: Check concentration (4 mg/ml also available). Resp depression, especially with fast IV push.

Comments: Best first seizure drug. Decrease dose by ½ if given with morphine.

Midazolam (Versed): IV/IM formulation: 1 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV, IM	0.1 mg/kg	1-5 m	½-1 hr	0.3 mg	0.3 ml

Alerts: Faster metabolism in infants and high doses, up to 0.6 mg/kg, may be needed. Check concentration (also available in 5 mg/ml). Watch for resp depression, especially with rapid IV push.

Comments: Decrease dose by ½ if given with morphine. May increase dose by 0.1 mg/kg every 5 minutes. Max 2 mg single dose IV, max total IV dose 6 mg.

Gray Weight 3 kg Gray

Heart rate 100 to 170

SBP 55 to 75

Resp 40 to 60

Morphine: IV/IM formulations (multiple): 5 or 10 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV, IM	0.05 mg/kg	1-3 m	1-2 hrs	0.15 mg	0.03 ml of 5 mg/ml
Alerts: Check concentration (multiple formulations). Adjust dose for renal impairment. May cause hypotension or resp depression, nausea, emesis, or pruritis. Comments: May repeat dose q 5-15 minutes to desired effect. Decrease dose by ½ if given with barbiturates, hydroxyzine/diphenhydramine, or with other benzodiazepines.					

Pentobarbital (Nembutal): IV/IM formulation: 50 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV	1-2 mg/kg	3-5 m	15-45 m	3-6 mg	0.06-0.12 ml
IM	5 mg/kg	10 m	1-4 hrs	15 mg	0.3 ml
Alerts: May cause hypotension. Paradoxical excitement may occur when administered (small doses of morphine can ameliorate this effect). Comments: Not first line drug for imaging sedation—use etomidate. Decrease dose by ½ if given with morphine. Do not inject >50 mg/min. Lasts longer than methohexital.					

Gray Weight 3 kg Gray

Heart rate 100 to 170

SBP 55 to 75

Resp 40 to 60

Reversal Agents

Flumazenil (Romazicon): IV formulation: 0.1 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV	0.01 mg/kg	1-2 m	20-60 m	0.03 mg	0.3 ml
Alerts: Contraindicated if benzodiazepine addiction or concomitant tricyclic antidepressant overdose.					
Comments: May repeat 0.02 mg/kg q1 min up to a total of 1 mg.					

Naloxone (Narcan): IV/IO/IM/IN/ET formulation: 0.4 mg/ml, or 1 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV, IO, IM, SC, IN, ET	0.1 mg/kg	<2 m (IV, IO), 2-5 m (IM, SC, IN, ET)	30-60 m	0.3 mg	0.75 ml of 0.4 mg/ml
Alerts: Use with extreme caution in neonates to avoid seizures. Contraindicated if hypersensitivity to naloxone.					
Comments: May repeat 0.05 mg/kg q2-3 min up to total 2 mg. Max single dose 2 mg. Titrate dose for either partial or complete opiate reversal.					

Gray Weight 3 kg Gray

Heart rate 100 to 170

SBP 55 to 75

Resp 40 to 60

Topical Pain Management

EMLA (Eutectic Mixture of Local Anesthetics): Formulation: lidocaine 2.5% & prilocaine 2.5% cream (5 g tube)

Route	Max dose	Max area of coverage	Onset	Duration
Topical	1 g	10 cm ² area of skin	60 m	2-3 hrs
<p>Alerts: Avoid use in infants <3 months (except circumcision) and those up to 12 months who are also receiving methemoglobin-inducing agents.</p> <p>Do not apply to mucous membranes or open wounds. Apply for no longer than 1 hours. Contraindicated if hypersensitivity to lidocaine or prilocaine.</p> <p>Comments: May cause methemoglobinemia. Anesthesia lasts 1-2 hrs after removal of cream.</p>				

Lidocaine 1% (Xylocaine): Formulation: Lidocaine 1% (10 mg/ml)

Route	Max Dose	Onset	Duration
Infiltration	1.35 ml	Rapid	½-1 hr
<p>Alerts: Do not exceed 4-5 mg/kg due to risk of seizures, or 8 mg/kg if combined with epinephrine. Do not use lidocaine/epinephrine combo on fingertips, toes, nose, or penis.</p> <p>Comments: Buffer lidocaine injection (lidocaine 1%) as a 1:10 mixture of 1 part sodium bicarbonate solution in 9 parts of lidocaine 1% to reduce pain of injection.</p>			

Gray Weight 4 kg Gray

Heart rate 100 to 170

SBP 55 to 75

Resp 40 to 60

Acetaminophen (Tylenol):

Oral drops: 80 mg/0.8 ml = 100 mg/ml

Suppository: 120 mg, 325 mg, 650 mg

Route	Dose per kg	Onset	Duration	Dose	ml to give
PO, PR	15 mg/kg	30 m	4 hr	60 mg	0.6 ml of 100 mg/ml

Alerts: Check concentration, as there are many different formulations.

Comments: Equivalent to NSAID's for pain and fever, but has no anti-inflammatory effect. Oral liquid can be 100 mg/ml infant drops OR children's suspension 160 mg/5ml. Suppository also available as above. Do not exceed 5 doses per day and use with extreme caution in children with hepatic dysfunction.

Diazepam: Intravenous formulation (same for IV or PR): 5 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV	0.2 mg/kg	1-3 m	0.5 hr	0.8 mg	0.16 ml
PR	0.5 mg/kg	2-15 m	0.5 hr	2 mg	0.4 ml

Alerts: Resp depression with fast IV push. Rectal gel available at 2.5 mg/ml.

Comments: Not a first line drug. Works for status epilepticus, but midazolam or lorazepam preferred. Works for sedation but midazolam or lorazepam preferred. Push slowly IV. May repeat IV dose q 10 minutes prn, with max total dose of 5 mg. Decrease dose by ½ if given with morphine. IV solution can be administered with lubricated TB syringe (no needle) into rectum. Rectal gel easier to insert into rectum, but expensive.

Etomidate: Intravenous formulation: 2 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV	0.2 mg/kg	30-60 sec	2-15 min	0.8 mg	Sedation dose 0.4 ml
IV	0.3 mg/kg	30-60 sec	5-15 min	1.2 mg	RSI dose 0.6 ml

Alerts: Give lower dose for sedation for imaging. Watch for myoclonus, vomiting.

Comments: Use starting dose of 0.2 mg/kg for sedation for imaging.

Use with narcotic (e.g., fentanyl) for procedural sedation.

Use higher dose of 0.3 mg/kg for induction for rapid sequence intubation.

Increase by 0.05 mg/kg every 60-90 seconds to maximum of 0.4 mg/kg (**4 mg**).

Gray Weight 4 kg Gray

Heart rate 100 to 170

SBP 55 to 75

Resp 40 to 60

Fentanyl: IV/IM formulation: 100 mcg/2ml = 50 mcg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV, IM	1 mcg/kg	<1 m IV 7-15 m IM	30-60 m	4 mcg	0.08 ml
<p>Alerts: Resp depression, reversible with naloxone. Avoid rapid infusion, as it may lead to rigid chest syndrome and need for respiratory support.</p> <p>Comments: Start with 1 mcg/kg. May repeat dose q5-10 minutes prn. The respiratory depressant effects may last longer than analgesic effects. Best drug for major trauma cases and possible hypoperfusion.</p>					

Fentanyl (Intranasal): Use IV formulation for intranasal administration:
100 mcg/2ml = 50 mcg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IN	2 mcg/kg	1-2 m	½-2 hr	8 mcg	0.16 ml
<p>Alerts: Atomizer needed to nebulize drug intranasally to maximize absorption.</p> <p>Comments: Put half of each dose in each nostril. May repeat 0.5 mcg/kg dose q 5-10 minutes prn. The respiratory depressant effects may last longer than analgesic effects. Use when vascular access unavailable or unnecessary. Has not been trialed on <3 yo.</p>					

Hydromorphone (Dilaudid): IV/IM formulation: 2 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV, IM	0.02 mg/kg	2-5 m	4-5 hr	0.08 mg	0.04 ml
<p>Alerts: Resp depression possible. Contraindicated in status asthmaticus.</p> <p>Comments: Not recommended for children intolerant or unresponsive to morphine. Excellent alternative to morphine for sickle cell pain. 1 mg hydromorphone = 7 mg morphine.</p>					

Gray Weight 4 kg Gray

Heart rate 100 to 170

SBP 55 to 75

Resp 40 to 60

Ketamine: IV/IM formulation: 50 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV	1-2 mg/kg	30 sec	15-30 m	4-8 mg	0.08 -0.16 ml
IM	5 mg/kg	3-5 m	30-90 m	20 mg	0.4 ml
Alerts: Laryngospasm, hypersalivation, vomiting. Contraindicated if increased intracranial or intraocular pressure. Watch for emergence reaction, nausea/vomiting. Comments: No atropine needed. Do not exceed injection rate of 0.5 mg/kg/min or give the dose in less than 1 minute.					

Lorazepam (Ativan): IV/IM formulation: 2 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV, IM	0.05- 0.1 mg/kg	2-3 m	6-8 hrs	0.2-0.4 mg	0.1-0.2 ml
Alerts: Check concentration (4 mg/ml also available). Resp depression, especially with fast IV push. Comments: Best first seizure drug. Decrease dose by ½ if given with morphine.					

Midazolam (Versed): IV/IM formulation: 1 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV, IM	0.1 mg/kg	1-5 m	½-1 hr	0.4 mg	0.4 ml
Alerts: Faster metabolism in infants and high doses, up to 0.6 mg/kg, may be needed. Check concentration (also available in 5 mg/ml). Watch for resp depression, especially with rapid IV push. Comments: Decrease dose by ½ if given with morphine. May increase dose by 0.1 mg/kg every 5 minutes. Max 2 mg single dose IV, max total IV dose 6 mg.					

Morphine: IV/IM formulations (multiple): 5 or 10 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV, IM	0.05 mg/kg	1-3 m	1-2 hrs	0.2 mg	0.04 ml of 5 mg/ml
Alerts: Check concentration (multiple formulations). Adjust dose for renal impairment. May cause hypotension or resp depression, nausea, emesis, or pruritis. Comments: May repeat dose q 5-15 minutes to desired effect. Decrease dose by ½ if given with barbiturates, hydroxyzine/diphenhydramine, or with other benzodiazepines.					

4 kg

Gray Weight 4 kg Gray

Heart rate 100 to 170

SBP 55 to 75

Resp 40 to 60

Pentobarbital (Nembutal): IV/IM formulation: 50 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV	1-2 mg/kg	3-5 m	15-45 m	4-8 mg	0.08-0.16 ml
IM	5 mg/kg	10 m	1-4 hrs	20 mg	0.4 ml

Alerts: May cause hypotension. Paradoxical excitement may occur when administered (small doses of morphine can ameliorate this effect).

Comments: Not first line drug for imaging sedation—use etomidate. Decrease dose by ½ if given with morphine. Do not inject >50 mg/min. Lasts longer than methohexital.

Gray Weight 4 kg Gray

Heart rate 100 to 170

SBP 55 to 75

Resp 40 to 60

Reversal Agents

Flumazenil (Romazicon): IV formulation: 0.1 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV	0.01 mg/kg	1-2 m	20-60 m	0.04 mg	0.4 ml
Alerts: Contraindicated if benzodiazepine addiction or concomitant tricyclic antidepressant overdose.					
Comments: May repeat 0.02 mg/kg q1 min up to a total of 1 mg.					

Naloxone (Narcan): IV/IO/IM/IN/ET formulation: 0.4 mg/ml, or 1 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV, IO, IM, SC, IN, ET	0.1 mg/kg	<2 m (IV, IO), 2-5 m (IM, SC, IN, ET)	30-60 m	0.4 mg	1 ml of 0.4 mg/ml
Alerts: Use with extreme caution in neonates to avoid seizures. Contraindicated if hypersensitivity to naloxone.					
Comments: May repeat 0.05 mg/kg q2-3 min up to total 2 mg. Max single dose 2 mg. Titrate dose for either partial or complete opiate reversal.					

Gray Weight 4 kg Gray

Heart rate 100 to 170

SBP 55 to 75

Resp 40 to 60

Topical Pain Management

EMLA (Eutectic Mixture of Local Anesthetics): Formulation: lidocaine 2.5% & prilocaine 2.5% cream (5 g tube)

Route	Max dose	Max area of coverage	Onset	Duration
Topical	1 g	10 cm ² area of skin	60 m	2-3 hrs
Alerts: Do not apply to mucous membranes or open wounds. Apply for no longer than 1 hours. Contraindicated if hypersensitivity to lidocaine or prilocaine. Avoid use in infants <3 months (except circumcision) and those up to 12 months who are also receiving methemoglobin-inducing agents. Comments: May cause methemoglobinemia. Anesthesia lasts 1-2 hrs after removal of cream.				

Lidocaine 1% (Xylocaine): Formulation: Lidocaine 1% (10 mg/ml)

Route	Max Dose	Onset	Duration
Infiltration	1.8 ml	Rapid	½-1 hr
Alerts: Do not exceed 4-5 mg/kg due to risk of seizures, or 8 mg/kg if combined with epinephrine. Do not use lidocaine/epinephrine combo on fingertips, toes, nose, or penis. Comments: Buffer lidocaine injection (lidocaine 1%) as a 1:10 mixture of 1 part sodium bicarbonate solution in 9 parts of lidocaine 1% to reduce pain of injection.			

Gray Weight 5 kg Gray

Heart rate 100 to 160

SBP 70 to 85

Resp 35 to 55

Acetaminophen (Tylenol):

Oral drops: 80 mg/0.8 ml = 100 mg/ml

Suppository: 120 mg, 325 mg, 650 mg

Route	Dose per kg	Onset	Duration	Dose	ml to give
PO, PR	15 mg/kg	30 m	4 hr	75 mg	0.8 ml of 100 mg/ml

Alerts: Check concentration, as there are many different formulations.

Comments: Equivalent to NSAID's for pain and fever, but has no anti-inflammatory effect. Oral liquid can be 100 mg/ml infant drops OR children's suspension 160 mg/5ml. Suppository also available as above. Do not exceed 5 doses per day and use with extreme caution in children with hepatic dysfunction.

Diazepam: Intravenous formulation (same for IV or PR): 5 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV	0.2 mg/kg	1-3 m	0.5 hr	1 mg	0.2 ml
PR	0.5 mg/kg	2-15 m	0.5 hr	2.5 mg	0.5 ml

Alerts: Resp depression with fast IV push. Rectal gel available at 2.5 mg/ml.

Comments: Not a first line drug. Works for status epilepticus, but midazolam or lorazepam preferred. Works for sedation but midazolam or lorazepam preferred. Push slowly IV. May repeat IV dose q 10 minutes prn, with max total dose of 5 mg. Decrease dose by ½ if given with morphine. IV solution can be administered with lubricated TB syringe (no needle) into rectum. Rectal gel easier to insert into rectum, but expensive.

Etomidate: Intravenous formulation: 2 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV	0.2 mg/kg	30-60 sec	2-15 min	1 mg	Sedation dose 0.5 ml
IV	0.3 mg/kg	30-60 sec	5-15 min	1.5 mg	RSI dose 0.75 ml

Alerts: Give lower dose for sedation for imaging. Watch for myoclonus, vomiting.

Comments: Use starting dose of 0.2 mg/kg for sedation for imaging.

Use with narcotic (e.g., fentanyl) for procedural sedation.

Use higher dose of 0.3 mg/kg for induction for rapid sequence intubation.

Increase by 0.05 mg/kg every 60-90 seconds to maximum of 0.4 mg/kg (**4 mg**).

Gray Weight 5 kg Gray

Heart rate 100 to 160

SBP 70 to 85

Resp 35 to 55

Fentanyl: IV/IM formulation: 100 mcg/2ml = 50 mcg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV, IM	1 mcg/kg	<1 m IV 7-15 m IM	30-60 m	5 mcg	0.1 ml

Alerts: Resp depression, reversible with naloxone. Avoid rapid infusion, as it may lead to rigid chest syndrome and need for respiratory support.

Comments: Start with 1 mcg/kg. Max 100 mcg single dose. May repeat dose q5-10 minutes prn. The respiratory depressant effects may last longer than analgesic effects. Best drug for major trauma cases and possible hypoperfusion.

Fentanyl (Intranasal): Use IV formulation for intranasal administration:
100 mcg/2ml = 50 mcg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IN	2 mcg/kg	1-2 m	½-2 hr	10 mcg	0.2 ml

Alerts: Atomizer needed to nebulize drug intranasally to maximize absorption.

Comments: Put half of each dose in each nostril. May repeat 0.5 mcg/kg dose q 5-10 minutes prn. The respiratory depressant effects may last longer than analgesic effects. Use when vascular access unavailable or unnecessary. Has not been trialed on <3 yo.

Hydromorphone (Dilaudid): IV/IM formulation: 2 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV, IM	0.02 mg/kg	2-5 m	4-5 hr	0.1 mg	0.05 ml

Alerts: Resp depression possible. Contraindicated in status asthmaticus.

Comments: Not recommended for children intolerant or unresponsive to morphine. Excellent alternative to morphine for sickle cell pain. 1 mg hydromorphone = 7 mg morphine.

Gray Weight 5 kg Gray

Heart rate 100 to 160

SBP 70 to 85

Resp 35 to 55

Ketamine: IV/IM formulation: 50 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV	1-2 mg/kg	30 sec	15-30 m	5-10 mg	0.1-0.2 ml
IM	5 mg/kg	3-5 m	30-90 m	25 mg	0.5 ml
Alerts: Laryngospasm, hypersalivation, vomiting. Contraindicated if increased intracranial or intraocular pressure. Watch for emergence reaction, nausea/vomiting.					
Comments: No atropine needed. Do not exceed injection rate of 0.5 mg/kg/min or give the dose in less than 1 minute.					

Lorazepam (Ativan): IV/IM formulation: 2 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV, IM	0.05- 0.1 mg/kg	2-3 m	6-8 hrs	0.25-0.5 mg	0.13-0.25 ml
Alerts: Check concentration (4 mg/ml also available). Resp depression, especially with fast IV push.					
Comments: Best first seizure drug. Decrease dose by ½ if given with morphine.					

Midazolam (Versed): IV/IM formulation: 1 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV, IM	0.1 mg/kg	1-5 m	½-1 hr	0.5 mg	0.5 ml
Alerts: Faster metabolism in infants and high doses, up to 0.6 mg/kg, may be needed. Check concentration (also available in 5 mg/ml). Watch for resp depression, especially with rapid IV push.					
Comments: Decrease dose by ½ if given with morphine. May increase dose by 0.1 mg/kg every 5 minutes. Max 2 mg single dose IV, max total IV dose 6 mg.					

Gray Weight 5 kg Gray

Heart rate 100 to 160

SBP 70 to 85

Resp 35 to 55

Morphine: IV/IM formulations (multiple): 5 or 10 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV, IM	0.05-0.1 mg/kg	1-3 m	1-2 hrs	0.25-0.5 mg	0.05 – 0.1 ml of 5 mg/ml

Alerts: Check concentration (multiple formulations). Adjust dose for renal impairment. May cause hypotension or resp depression, nausea, emesis, or pruritis.

Comments: May repeat dose q 5-15 minutes to desired effect. Decrease dose by ½ if given with barbiturates, hydroxyzine/diphenhydramine, or with other benzodiazepines.

Pentobarbital (Nembutal): IV/IM formulation: 50 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV	1-2 mg/kg	3-5 m	15-45 m	5-10 mg	0.1-0.2ml
IM	5 mg/kg	10 m	1-4 hrs	25 mg	0.5 ml

Alerts: May cause hypotension. Paradoxical excitement may occur when administered (small doses of morphine can ameliorate this effect).

Comments: Not first line drug for imaging sedation—use etomidate. Decrease dose by ½ if given with morphine. Do not inject >50 mg/min. Lasts longer than methohexital.

Gray Weight 5 kg Gray

Heart rate 100 to 160

SBP 70 to 85

Resp 35 to 55

Reversal Agents

Flumazenil (Romazicon): IV formulation: 0.1 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV	0.01 mg/kg	1-2 m	20-60 m	0.05 mg	0.5 ml
Alerts: Contraindicated if benzodiazepine addiction or concomitant tricyclic antidepressant overdose.					
Comments: May repeat 0.02 mg/kg q1 min up to a total of 1 mg.					

Naloxone (Narcan): IV/IO/IM/IN/ET formulation: 0.4 mg/ml, or 1 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV, IO, IM, SC, IN, ET	0.1 mg/kg	<2 m (IV, IO), 2-5 m (IM, SC, IN, ET)	30-60 m	0.5 mg	1.3 ml of 0.4 mg/ml
Alerts: Use with extreme caution in neonates to avoid seizures. Contraindicated if hypersensitivity to naloxone.					
Comments: May repeat 0.05 mg/kg q2-3 min up to total 2 mg. Max single dose 2 mg. Titrate dose for either partial or complete opiate reversal.					

Gray Weight 5 kg Gray

Heart rate 100 to 160

SBP 70 to 85

Resp 35 to 55

Topical Pain Management

EMLA (Eutectic Mixture of Local Anesthetics): Formulation: lidocaine 2.5% & prilocaine 2.5% cream (5 g tube)

Route	Max dose	Max area of coverage	Onset	Duration
Topical	2 g	20 cm ² area of skin	60 m	2-3 hrs
<p>Alerts: Do not apply to mucous membranes or open wounds. Apply for no longer than 4 hours. Contraindicated if hypersensitivity to lidocaine or prilocaine. Avoid use in infants <3 months (except circumcision) and those up to 12 months who are also receiving methemoglobin-inducing agents.</p> <p>Comments: May cause methemoglobinemia. Anesthesia lasts 1-2 hrs after removal of cream.</p>				

LET (lidocaine, epinephrine, tetracaine): Formulation: Lidocaine 4%, Epinephrine 1:1000, & Tetracaine 0.5% (3 ml bottle)

Route	Dose	Onset	Duration
Topical	1 ml	10 m	1-2 hrs
<p>Alerts: Do not use on fingertips, toes, nose, or penis. Max dose is 8 mg/kg of lidocaine. Contraindicated if hypersensitivity to lidocaine, epinephrine, or tetracaine. Avoid contact with mucous membranes.</p> <p>Comments: For facial lacerations, apply solution with dropper or gauze (gel is better).</p>			

Lidocaine 1% (Xylocaine): Formulation: Lidocaine 1% (10 mg/ml)

Route	Max Dose	Onset	Duration
Infiltration	2.25 ml	Rapid	½-1 hr
<p>Alerts: Do not exceed 4-5 mg/kg due to risk of seizures, or 8 mg/kg if combined with epinephrine. Do not use lidocaine/epinephrine combo on fingertips, toes, nose, or penis.</p> <p>Comments: Buffer lidocaine injection (lidocaine 1%) as a 1:10 mixture of 1 part sodium bicarbonate solution in 9 parts of lidocaine 1% to reduce pain of injection.</p>			

Pink Weight 6 kg Pink

Heart rate 100 to 160

SBP 70 to 85

Resp 24 to 38

Acetaminophen (Tylenol):

Oral drops: 80 mg/0.8 ml = 100 mg/ml

Suppository: 120 mg, 325 mg, 650 mg

Route	Dose per kg	Onset	Duration	Dose	ml to give
PO, PR	15 mg/kg	30 m	4 hr	90 mg	0.9 ml of 100 mg/ml

Alerts: Check concentration, as there are many different formulations.

Comments: Equivalent to NSAID's for pain and fever, but has no anti-inflammatory effect. Oral liquid can be 100 mg/ml infant drops OR children's suspension 160 mg/5ml. Suppository also available as above. Do not exceed 5 doses per day and use with extreme caution in children with hepatic dysfunction.

Diazepam: Intravenous formulation (same for IV or PR): 5 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV	0.2 mg/kg	1-3 m	0.5 hr	1.2 mg	0.24 ml
PR	0.5 mg/kg	2-15 m	0.5 hr	3 mg	0.6 ml

Alerts: Resp depression with fast IV push. Rectal gel available at 2.5 mg/ml.

Comments: Not a first line drug. Works for status epilepticus, but midazolam or lorazepam preferred. Works for sedation but midazolam or lorazepam preferred. Push slowly IV. May repeat IV dose q 10 minutes prn, with max total dose of 5 mg. Decrease dose by ½ if given with morphine. IV solution can be administered with lubricated TB syringe (no needle) into rectum. Rectal gel easier to insert into rectum, but expensive.

Etomidate: Intravenous formulation: 2 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV	0.2 mg/kg	30-60 sec	2-15 min	1.2 mg	Sedation dose 0.6 ml
IV	0.3 mg/kg	30-60 sec	5-15 min	1.8 mg	RSI dose 0.9 ml

Alerts: Give lower dose for sedation for imaging. Watch for myoclonus, vomiting.

Comments: Use starting dose of 0.2 mg/kg for sedation for imaging.

Use with narcotic (e.g., fentanyl) for procedural sedation.

Use higher dose of 0.3 mg/kg for induction for rapid sequence intubation.

Increase by 0.05 mg/kg every 60-90 seconds to maximum of 0.4 mg/kg (**4 mg**).

Pink Weight 6 kg Pink

Heart rate 100 to 160

SBP 70 to 85

Resp 24 to 38

Fentanyl: IV/IM formulation: 100 mcg/2ml = 50 mcg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV, IM	1 mcg/kg	<1 m IV 7-15 m IM	30-60 m	6 mcg	0.12 ml
Alerts: Resp depression, reversible with naloxone. Avoid rapid infusion, as it may lead to rigid chest syndrome and need for respiratory support. Comments: Start with 1 mcg/kg. Max 100 mcg single dose. May repeat dose q5-10 minutes prn. The respiratory depressant effects may last longer than analgesic effects. Best drug for major trauma cases and possible hypoperfusion.					

Fentanyl (Intranasal): Use IV formulation for intranasal administration:
100 mcg/2ml = 50 mcg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IN	2 mcg/kg	1-2 m	½-2 hr	12 mcg	0.24 ml
Alerts: Atomizer needed to nebulize drug intranasally to maximize absorption. Comments: Put half of each dose in each nostril. May repeat 0.5 mcg/kg dose q 5-10 minutes prn. The respiratory depressant effects may last longer than analgesic effects. Use when vascular access unavailable or unnecessary. Has not been trialed on <3 yo.					

Hydromorphone (Dilaudid): IV/IM formulation: 2 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV, IM	0.02 mg/kg	2-5 m	4-5 hr	0.12 mg	0.06 ml
Alerts: Resp depression possible. Contraindicated in status asthmaticus. Comments: Not recommended for children intolerant or unresponsive to morphine. Excellent alternative to morphine for sickle cell pain. 1 mg hydromorphone = 7 mg morphine.					

Pink Weight 6 kg Pink

Heart rate 100 to 160 SBP 70 to 85 Resp 24 to 38

Ketamine: IV/IM formulation: 50 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV	1-2 mg/kg	30 sec	15-30 m	6-12 mg	0.12-0.24 ml
IM	5 mg/kg	3-5 m	30-90 m	30 mg	0.6 ml
<p>Alerts: Laryngospasm, hypersalivation, vomiting. Contraindicated if increased intracranial or intraocular pressure. Watch for emergence reaction, nausea/vomiting.</p> <p>Comments: No atropine needed. Do not exceed injection rate of 0.5 mg/kg/min or give the dose in less than 1 minute.</p>					

Lorazepam (Ativan): IV/IM formulation: 2 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV, IM	0.05- 0.1 mg/kg	2-3 m	6-8 hrs	0.3-0.6 mg	0.15-0.3 ml
<p>Alerts: Check concentration (4 mg/ml also available). Resp depression, especially with fast IV push.</p> <p>Comments: Best first seizure drug. Decrease dose by ½ if given with morphine.</p>					

Midazolam (Versed): IV/IM formulation: 1 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV, IM	0.1 mg/kg	1-5 m	½-1 hr	0.6 mg	0.6 ml
<p>Alerts: Faster metabolism in infants and high doses, up to 0.6 mg/kg, may be needed. Check concentration (also available in 5 mg/ml). Watch for resp depression, especially with rapid IV push.</p> <p>Comments: Decrease dose by ½ if given with morphine. May increase dose by 0.1 mg/kg every 5 minutes. Max 2 mg single dose IV, max total IV dose 6 mg.</p>					

Pink Weight 6 kg Pink

Heart rate 100 to 160 SBP 70 to 85 Resp 24 to 38

Morphine: IV/IM formulations (multiple): 5 or 10 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV, IM	0.05 – 0.1 mg/kg	1-3 m	1-2 hrs	0.3 -0.6 mg	0.06 -0.12 ml of 5 mg/ml
Alerts: Check concentration (multiple formulations). Adjust dose for renal impairment. May cause hypotension or resp depression, nausea, emesis, or pruritis. Comments: May repeat dose q 5-15 minutes to desired effect. Decrease dose by ½ if given with barbiturates, hydroxyzine/diphenhydramine, or with other benzodiazepines.					

Pentobarbital (Nembutal): IV/IM formulation: 50 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV	1-2 mg/kg	3-5 m	15-45 m	6-12 mg	0.12-0.24 ml
IM	5 mg/kg	10 m	1-4 hrs	30 mg	0.6 ml
Alerts: May cause hypotension. Paradoxical excitement may occur when administered (small doses of morphine can ameliorate this effect). Comments: Not first line drug for imaging sedation—use etomidate. Decrease dose by ½ if given with morphine. Do not inject >50 mg/min. Lasts longer than methohexital.					

Pink Weight 6 kg Pink

Heart rate 100 to 160

SBP 70 to 85

Resp 24 to 38

Reversal Agents

Flumazenil (Romazicon): IV formulation: 0.1 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV	0.01 mg/kg	1-2 m	20-60 m	0.06 mg	0.6 ml
Alerts: Contraindicated if benzodiazepine addiction or concomitant tricyclic antidepressant overdose.					
Comments: May repeat 0.02 mg/kg q1 min up to a total of 1 mg.					

Naloxone (Narcan): IV/IO/IM/IN/ET formulation: 0.4 mg/ml, or 1 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV, IO, IM, SC, IN, ET	0.1 mg/kg	<2 m (IV, IO), 2-5 m (IM, SC, IN, ET)	30-60 m	0.6 mg	1.5 ml of 0.4 mg/ml
Alerts: Use with extreme caution in neonates to avoid seizures. Contraindicated if hypersensitivity to naloxone.					
Comments: May repeat 0.05 mg/kg q2-3 min up to total 2 mg. Max single dose 2 mg. Titrate dose for either partial or complete opiate reversal.					

Pink Weight 6 kg Pink

Heart rate 100 to 160

SBP 70 to 85

Resp 24 to 38

Topical Pain Management

EMLA (Eutectic Mixture of Local Anesthetics): Formulation: lidocaine 2.5% & prilocaine 2.5% cream (5 g tube)

Route	Max dose	Max area of coverage	Onset	Duration
Topical	2 g	20 cm ² area of skin	60 m	2-3 hrs
Alerts: Do not apply to mucous membranes or open wounds. Apply for no longer than 4 hours. Contraindicated if hypersensitivity to lidocaine or prilocaine. Avoid use in infants <3 months (except circumcision) and those up to 12 months who are also receiving methemoglobin-inducing agents. Comments: May cause methemoglobinemia. Anesthesia lasts 1-2 hrs after removal of cream.				

LET (lidocaine, epinephrine, tetracaine): Formulation: Lidocaine 4%, Epinephrine 1:1000, & Tetracaine 0.5% (3 ml bottle)

Route	Dose	Onset	Duration
Topical	1 ml	10 m	1-2 hrs
Alerts: Do not use on fingertips, toes, nose, or penis. Max dose is 8 mg/kg of lidocaine. Contraindicated if hypersensitivity to lidocaine, epinephrine, or tetracaine. Avoid contact with mucous membranes. Comments: For facial lacerations, apply solution with dropper or gauze (gel is better).			

Lidocaine 1% (Xylocaine): Formulation: Lidocaine 1% (10 mg/ml)

Route	Max Dose	Onset	Duration
Infiltration	2.7 ml	Rapid	½-1 hr
Alerts: Do not exceed 4-5 mg/kg due to risk of seizures, or 8 mg/kg if combined with epinephrine. Do not use lidocaine/epinephrine combo on fingertips, toes, nose, or penis. Comments: Buffer lidocaine injection (lidocaine 1%) as a 1:10 mixture of 1 part sodium bicarbonate solution in 9 parts of lidocaine 1% to reduce pain of injection.			

Pink Weight 7 kg Pink

Heart rate 100 to 160

SBP 88 to 92

Resp 24 to 38

Acetaminophen (Tylenol):

Oral drops: 80 mg/0.8 ml = 100 mg/ml

Suppository: 120 mg, 325 mg, 650 mg

Route	Dose per kg	Onset	Duration	Dose	ml to give
PO, PR	15 mg/kg	30 m	4 hr	105 mg	1.1 ml of 100 mg/ml

Alerts: Check concentration, as there are many different formulations.

Comments: Equivalent to NSAID's for pain and fever, but has no anti-inflammatory effect. Oral liquid can be 100 mg/ml infant drops OR children's suspension 160 mg/5ml. Suppository also available as above. Do not exceed 5 doses per day and use with extreme caution in children with hepatic dysfunction.

Diazepam: Intravenous formulation (same for IV or PR): 5 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV	0.2 mg/kg	1-3 m	0.5 hr	1.4 mg	0.28 ml
PR	0.5 mg/kg	2-15 m	0.5 hr	3.5 mg	0.7 ml

Alerts: Resp depression with fast IV push. Rectal gel available at 2.5 mg/ml.

Comments: Not a first line drug. Works for status epilepticus, but midazolam or lorazepam preferred. Works for sedation but midazolam or lorazepam preferred. Push slowly IV. May repeat IV dose q 10 minutes prn, with max total dose of 5 mg. Decrease dose by ½ if given with morphine. IV solution can be administered with lubricated TB syringe (no needle) into rectum. Rectal gel easier to insert into rectum, but expensive.

Etomidate: Intravenous formulation: 2 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV	0.2 mg/kg	30-60 sec	2-15 min	1.4 mg	Sedation dose 0.7 ml
IV	0.3 mg/kg	30-60 sec	5-15 min	2.1 mg	RSI dose 1.1 ml

Alerts: Give lower dose for sedation for imaging. Watch for myoclonus, vomiting.

Comments: Use starting dose of 0.2 mg/kg for sedation for imaging.

Use with narcotic (e.g., fentanyl) for procedural sedation.

Use higher dose of 0.3 mg/kg for induction for rapid sequence intubation.

Increase by 0.05 mg/kg every 60-90 seconds to maximum of 0.4 mg/kg (**4 mg**).

Pink Weight 7 kg Pink

Heart rate 100 to 160

SBP 88 to 92

Resp 24 to 38

Fentanyl: IV/IM formulation: 100 mcg/2ml = 50 mcg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV, IM	1 mcg/kg	<1 m IV 7-15 m IM	30-60 m	7 mcg	0.14 ml
Alerts: Resp depression, reversible with naloxone. Avoid rapid infusion, as it may lead to rigid chest syndrome and need for respiratory support. Comments: Start with 1 mcg/kg. Max 100 mcg single dose. May repeat dose q5-10 minutes prn. The respiratory depressant effects may last longer than analgesic effects. Best drug for major trauma cases and possible hypoperfusion.					

Fentanyl (Intranasal): Use IV formulation for intranasal administration:
100 mcg/2ml = 50 mcg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IN	2 mcg/kg	1-2 m	½-2 hr	14 mcg	0.28 ml
Alerts: Atomizer needed to nebulize drug intranasally to maximize absorption. Comments: Put half of each dose in each nostril. May repeat 0.5 mcg/kg dose q 5-10 minutes prn. The respiratory depressant effects may last longer than analgesic effects. Use when vascular access unavailable or unnecessary. Has not been trialed on <3 yo.					

Hydromorphone (Dilaudid): IV/IM formulation: 2 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV, IM	0.02 mg/kg	2-5 m	4-5 hr	0.14 mg	0.07 ml
Alerts: Resp depression possible. Contraindicated in status asthmaticus. Comments: Not recommended for children intolerant or unresponsive to morphine. Excellent alternative to morphine for sickle cell pain. 1 mg hydromorphone = 7 mg morphine.					

Pink Weight 7 kg Pink

Heart rate 100 to 160 SBP 88 to 92 Resp 24 to 38

Ketamine: IV/IM formulation: 50 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV	1-2 mg/kg	30 sec	15-30 m	7-14 mg	0.14-0.28 ml
IM	5 mg/kg	3-5 m	30-90 m	35 mg	0.7 ml

Alerts: Laryngospasm, hypersalivation, vomiting. Contraindicated if increased intracranial or intraocular pressure. Watch for emergence reaction, nausea/vomiting.

Comments: No atropine needed. Do not exceed injection rate of 0.5 mg/kg/min or give the dose in less than 1 minute.

Lorazepam (Ativan): IV/IM formulation: 2 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV, IM	0.05- 0.1 mg/kg	2-3 m	6-8 hrs	0.35-0.7 mg	0.18-0.35 ml

Alerts: Check concentration (4 mg/ml also available). Resp depression, especially with fast IV push.

Comments: Best first seizure drug. Decrease dose by ½ if given with morphine.

Midazolam (Versed): IV/IM formulation: 1 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV, IM	0.1 mg/kg	1-5 m	½-1 hr	0.7 mg	0.7 ml

Alerts: Faster metabolism in infants and high doses, up to 0.6 mg/kg, may be needed. Check concentration (also available in 5 mg/ml). Watch for resp depression, especially with rapid IV push.

Comments: Decrease dose by ½ if given with morphine. May increase dose by 0.1 mg/kg every 5 minutes. Max 2 mg single dose IV, max total IV dose 6 mg.

Pink Weight 7 kg Pink

Heart rate 100 to 160

SBP 88 to 92

Resp 24 to 38

Morphine: IV/IM formulations (multiple): 5 or 10 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV, IM	0.05-0.1 mg/kg	1-3 m	1-2 hrs	0.35-0.7 mg	0.07-0.14 ml of 5 mg/ml

Alerts: Check concentration (multiple formulations). Adjust dose for renal impairment. May cause hypotension or resp depression, nausea, emesis, or pruritis.

Comments: May repeat dose q 5-15 minutes to desired effect. Decrease dose by ½ if given with barbiturates, hydroxyzine/diphenhydramine, or with other benzodiazepines.

Pentobarbital (Nembutal): IV/IM formulation: 50 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV	1-2 mg/kg	3-5 m	15-45 m	7-14 mg	0.14-0.28 ml
IM	5 mg/kg	10 m	1-4 hrs	35 mg	0.7 ml

Alerts: May cause hypotension. Paradoxical excitement may occur when administered (small doses of morphine can ameliorate this effect).

Comments: Not first line drug for imaging sedation—use etomidate. Decrease dose by ½ if given with morphine. Do not inject >50 mg/min. Lasts longer than methohexital.

Pink Weight 7 kg Pink

Heart rate 100 to 160

SBP 88 to 92

Resp 24 to 38

Reversal Agents

Flumazenil (Romazicon): IV formulation: 0.1 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV	0.01 mg/kg	1-2 m	20-60 m	0.07 mg	0.7 ml
Alerts: Contraindicated if benzodiazepine addiction or concomitant tricyclic antidepressant overdose.					
Comments: May repeat 0.02 mg/kg q1 min up to a total of 1 mg.					

Naloxone (Narcan): IV/IO/IM/IN/ET formulation: 0.4 mg/ml, or 1 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV, IO, IM, SC, IN, ET	0.1 mg/kg	<2 m (IV, IO), 2-5 m (IM, SC, IN, ET)	30-60 m	0.7 mg	1.75 ml of 0.4 mg/ml
Alerts: Use with extreme caution in neonates to avoid seizures. Contraindicated if hypersensitivity to naloxone.					
Comments: May repeat 0.05 mg/kg q2-3 min up to total 2 mg. Max single dose 2 mg. Titrate dose for either partial or complete opiate reversal.					

Pink Weight 7 kg Pink

Heart rate 100 to 160 SBP 88 to 92 Resp 24 to 38

Topical Pain Management

EMLA (Eutectic Mixture of Local Anesthetics): Formulation: lidocaine 2.5% & prilocaine 2.5% cream (5 g tube)

Route	Max dose	Max area of coverage	Onset	Duration
Topical	2 g	20 cm ² area of skin	60 m	2-3 hrs
Alerts: Do not apply to mucous membranes or open wounds. Apply for no longer than 4 hours. Contraindicated if hypersensitivity to lidocaine or prilocaine. Avoid use in infants who are also receiving methemoglobin-inducing agents. Comments: May cause methemoglobinemia. Anesthesia lasts 1-2 hrs after removal of cream.				

LET (lidocaine, epinephrine, tetracaine): Formulation: Lidocaine 4%, Epinephrine 1:1000, & Tetracaine 0.5% (3 ml bottle)

Route	Dose	Onset	Duration
Topical	1 ml	10 m	1-2 hrs
Alerts: Do not use on fingertips, toes, nose, or penis. Max dose is 8 mg/kg of lidocaine. Contraindicated if hypersensitivity to lidocaine, epinephrine, or tetracaine. Avoid contact with mucous membranes. Comments: For facial lacerations, apply solution with dropper or gauze (gel is better).			

Lidocaine 1% (Xylocaine): Formulation: Lidocaine 1% (10 mg/ml)

Route	Max Dose	Onset	Duration
Infiltration	3.1 ml	Rapid	½-1 hr
Alerts: Do not exceed 4-5 mg/kg due to risk of seizures, or 8 mg/kg if combined with epinephrine. Do not use lidocaine/epinephrine combo on fingertips, toes, nose, or penis. Comments: Buffer lidocaine injection (lidocaine 1%) as a 1:10 mixture of 1 part sodium bicarbonate solution in 9 parts of lidocaine 1% to reduce pain of injection.			

Red Weight 8 kg Red

Heart rate 100 to 160

SBP 88 to 92

Resp 24 to 38

Acetaminophen (Tylenol):

Oral drops: 80 mg/0.8 ml = 100 mg/ml

Suppository: 120 mg, 325 mg, 650 mg

Route	Dose per kg	Onset	Duration	Dose	ml to give
PO, PR	15 mg/kg	30 m	4 hr	120 mg	1.2 ml of 100 mg/ml

Alerts: Check concentration, as there are many different formulations.

Comments: Equivalent to NSAID's for pain and fever, but has no anti-inflammatory effect. Oral liquid can be 100 mg/ml infant drops OR children's suspension 160 mg/5ml. Suppository also available as above. Do not exceed 5 doses per day and use with extreme caution in children with hepatic dysfunction.

Diazepam: Intravenous formulation (same for IV or PR): 5 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV	0.2 mg/kg	1-3 m	0.5 hr	1.6 mg	0.32 ml
PR	0.5 mg/kg	2-15 m	0.5 hr	4 mg	0.8 ml

Alerts: Resp depression with fast IV push. Rectal gel available at 2.5 mg/ml.

Comments: Not a first line drug. Works for status epilepticus, but midazolam or lorazepam preferred. Works for sedation but midazolam or lorazepam preferred. Push slowly IV. May repeat IV dose q 10 minutes prn, with max total dose of 5 mg. Decrease dose by ½ if given with morphine. IV solution can be administered with lubricated TB syringe (no needle) into rectum. Rectal gel easier to insert into rectum, but expensive.

Etomidate: Intravenous formulation: 2 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV	0.2 mg/kg	30-60 sec	2-15 min	1.6 mg	Sedation dose 0.8 ml
IV	0.3 mg/kg	30-60 sec	5-15 min	2.4 mg	RSI dose 1.2 ml

Alerts: Give lower dose for sedation for imaging. Watch for myoclonus, vomiting.

Comments: Use starting dose of 0.2 mg/kg for sedation for imaging.

Use with narcotic (e.g., fentanyl) for procedural sedation.

Use higher dose of 0.3 mg/kg for induction for rapid sequence intubation.

Increase by 0.05 mg/kg every 60-90 seconds to maximum of 0.4 mg/kg (**4 mg**).

Red Weight 8 kg Red

Heart rate 100 to 160 SBP 88 to 92 Resp 24 to 38

Fentanyl: IV/IM formulation: 100 mcg/2ml = 50 mcg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV, IM	1 mcg/kg	<1 m IV 7-15 m IM	30-60 m	8 mcg	0.16 ml
Alerts: Resp depression, reversible with naloxone. Avoid rapid infusion, as it may lead to rigid chest syndrome and need for respiratory support. Comments: Start with 1 mcg/kg. Max 100 mcg single dose. May repeat dose q5-10 minutes prn. The respiratory depressant effects may last longer than analgesic effects. Best drug for major trauma cases and possible hypoperfusion.					

Fentanyl (Intranasal): Use IV formulation for intranasal administration:
100 mcg/2ml = 50 mcg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IN	2 mcg/kg	1-2 m	½-2 hr	16 mcg	0.32 ml
Alerts: Atomizer needed to nebulize drug intranasally to maximize absorption. Comments: Put half of each dose in each nostril. May repeat 0.5 mcg/kg dose q 5-10 minutes prn. The respiratory depressant effects may last longer than analgesic effects. Use when vascular access unavailable or unnecessary. Has not been trialed on <3 yo.					

Hydromorphone (Dilaudid): IV/IM formulation: 2 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV, IM	0.02 mg/kg	2-5 m	4-5 hr	0.16 mg	0.08 ml
Alerts: Resp depression possible. Contraindicated in status asthmaticus. Comments: Not recommended for children intolerant or unresponsive to morphine. Excellent alternative to morphine for sickle cell pain. 1 mg hydromorphone = 7 mg morphine.					

Red Weight 8 kg Red

Heart rate 100 to 160 SBP 88 to 92 Resp 24 to 38

Ibuprofen (Motrin): Formulation: Oral liquid 100 mg/5 ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
PO	10 mg/kg	30 m	6 hr	80 mg	4 ml of 100 mg/5 ml

Alerts: Contraindicated if hypersensitive to NSAID's. Use with extreme caution in patients with decreased renal function.

Comments: Excellent first line analgesic and antipyretic. Use when an anti-inflammatory effect is desired in patients with pain or fever.

Ketamine: IV/IM formulation: 50 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV	1-2 mg/kg	30 sec	15-30 m	8-16 mg	0.16-0.32 ml
IM	5 mg/kg	3-5 m	30-90 m	40 mg	0.8 ml

Alerts: Laryngospasm, hypersalivation, vomiting. Contraindicated if increased intracranial or intraocular pressure. Watch for emergence reaction, nausea/vomiting.

Comments: No atropine needed. Do not exceed injection rate of 0.5 mg/kg/min or give the dose in less than 1 minute.

Lorazepam (Ativan): IV/IM formulation: 2 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV, IM	0.05- 0.1 mg/kg	2-3 m	6-8 hrs	0.4-0.8 mg	0.2-0.4 ml

Alerts: Check concentration (4 mg/ml also available). Resp depression, especially with fast IV push.

Comments: Best first seizure drug. Decrease dose by ½ if given with morphine.

Midazolam (Versed): IV/IM formulation: 1 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV, IM	0.1 mg/kg	1-5 m	½-1 hr	0.8 mg	0.8 ml

Alerts: Faster metabolism in infants and high doses, up to 0.6 mg/kg, may be needed. Check concentration (also available in 5 mg/ml). Watch for resp depression, especially with rapid IV push.

Comments: Decrease dose by ½ if given with morphine. May increase dose by 0.1 mg/kg every 5 minutes. Max 2 mg single dose IV, max total IV dose 6 mg.

Red Weight 8 kg Red

Heart rate 100 to 160 SBP 88 to 92 Resp 24 to 38

Morphine: IV/IM formulations (multiple): 5 or 10 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV, IM	0.05-0.1 mg/kg	1-3 m	1-2 hrs	0.4-0.8 mg	0.08-0.16 ml of 5 mg/ml

Alerts: Check concentration (multiple formulations). Adjust dose for renal impairment. May cause hypotension or resp depression, nausea, emesis, or pruritis.

Comments: May repeat dose q 5-15 minutes to desired effect. Decrease dose by ½ if given with barbiturates, hydroxyzine/diphenhydramine, or with other benzodiazepines.

Pentobarbital (Nembutal): IV/IM formulation: 50 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV	1-2 mg/kg	3-5 m	15-45 m	8-16 mg	0.16-0.32 ml
IM	5 mg/kg	10 m	1-4 hrs	40 mg	0.8 ml

Alerts: May cause hypotension. Paradoxical excitement may occur when administered (small doses of morphine can ameliorate this effect).

Comments: Not first line drug for imaging sedation—use etomidate. Decrease dose by ½ if given with morphine. Do not inject >50 mg/min. Lasts longer than methohexital.

Red Weight 8 kg Red

Heart rate 100 to 160

SBP 88 to 92

Resp 24 to 38

Reversal Agents

Flumazenil (Romazicon): IV formulation: 0.1 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV	0.01 mg/kg	1-2 m	20-60 m	0.08 mg	0.8 ml
Alerts: Contraindicated if benzodiazepine addiction or concomitant tricyclic antidepressant overdose.					
Comments: May repeat 0.02 mg/kg q1 min up to a total of 1 mg.					

Naloxone (Narcan): IV/IO/IM/IN/ET formulation: 0.4 mg/ml, or 1 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV, IO, IM, SC, IN, ET	0.1 mg/kg	<2 m (IV, IO), 2-5 m (IM, SC, IN, ET)	30-60 m	0.8 mg	2 ml of 0.4 mg/ml
Alerts: Careful with concentration. Use with extreme caution in neonates to avoid seizures. Contraindicated if hypersensitivity to naloxone.					
Comments: May repeat 0.05 mg/kg q2-3 min up to total 2 mg. Max single dose 2 mg. Titrate dose for either partial or complete opiate reversal.					

Red Weight 8 kg Red

Heart rate 100 to 160 SBP 88 to 92 Resp 24 to 38

Topical Pain Management

EMLA (Eutectic Mixture of Local Anesthetics): Formulation: lidocaine 2.5% & prilocaine 2.5% cream (5 g tube)

Route	Max dose	Max area of coverage	Onset	Duration
Topical	2 g	20 cm ² area of skin	60 m	2-3 hrs
Alerts: Do not apply to mucous membranes or open wounds. Apply for no longer than 4 hours. Contraindicated if hypersensitivity to lidocaine or prilocaine. Avoid use in infants who are also receiving methemoglobin-inducing agents. Comments: May cause methemoglobinemia. Anesthesia lasts 1-2 hrs after removal of cream.				

LET (lidocaine, epinephrine, tetracaine): Formulation: Lidocaine 4%, Epinephrine 1:1000, & Tetracaine 0.5% (3 ml bottle)

Route	Dose	Onset	Duration
Topical	1 ml	10 m	1-2 hrs
Alerts: Do not use on fingertips, toes, nose, or penis. Max dose is 8 mg/kg of lidocaine. Contraindicated if hypersensitivity to lidocaine, epinephrine, or tetracaine. Avoid contact with mucous membranes. Comments: For facial lacerations, apply solution with dropper or gauze (gel is better).			

Lidocaine 1% (Xylocaine): Formulation: Lidocaine 1% (10 mg/ml)

Route	Max Dose	Onset	Duration
Infiltration	3.6 ml	Rapid	½-1 hr
Alerts: Do not exceed 4-5 mg/kg due to risk of seizures, or 8 mg/kg if combined with epinephrine. Do not use lidocaine/epinephrine combo on fingertips, toes, nose, or penis. Comments: Buffer lidocaine injection (lidocaine 1%) as a 1:10 mixture of 1 part sodium bicarbonate solution in 9 parts of lidocaine 1% to reduce pain of injection.			

Red Weight 9 kg Red

Heart rate 90 to 150

SBP 94 to 102

Resp 22 to 30

Acetaminophen (Tylenol):

Oral drops: 80 mg/0.8 ml = 100 mg/ml

Suppository: 120 mg, 325 mg, 650 mg

Route	Dose per kg	Onset	Duration	Dose	ml to give
PO, PR	15 mg/kg	30 m	4 hr	135 mg	1.4 ml of 100 mg/ml

Alerts: Check concentration

Comments: Equivalent to NSAID's for pain and fever, but has no anti-inflammatory effect. Oral liquid can be 100 mg/ml infant drops OR children's suspension 160 mg/5ml. Suppository also available as above. Do not exceed 5 doses per day and use with extreme caution in children with hepatic dysfunction.

Diazepam: Intravenous formulation (same for IV or PR): 5 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV	0.2 mg/kg	1-3 m	0.5 hr	1.8 mg	0.36 ml
PR	0.5 mg/kg	2-15 m	0.5 hr	4.5 mg	0.9 ml

Alerts: Resp depression with fast IV push. Rectal gel available at 2.5 mg/ml.

Comments: Not a first line drug. Works for status epilepticus, but midazolam or lorazepam preferred. Works for sedation but midazolam or lorazepam preferred. Push slowly IV. May repeat IV dose q 10 minutes prn, with max total dose of 5 mg. Decrease dose by ½ if given with morphine. IV solution can be administered with lubricated TB syringe (no needle) into rectum. Rectal gel easier to insert into rectum, but expensive.

Etomidate: Intravenous formulation: 2 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV	0.2 mg/kg	30-60 sec	2-15 min	1.8 mg	Sedation dose 0.9 ml
IV	0.3 mg/kg	30-60 sec	5-15 min	2.7 mg	RSI dose 1.4 ml

Alerts: Give lower dose for sedation for imaging. Watch for myoclonus, vomiting.

Comments: Use starting dose of 0.2 mg/kg for sedation for imaging.

Use with narcotic (e.g., fentanyl) for procedural sedation.

Use higher dose of 0.3 mg/kg for induction for rapid sequence intubation.

Increase by 0.05 mg/kg every 60-90 seconds to maximum of 0.4 mg/kg (4 mg).

Red Weight 9 kg Red

Heart rate 90 to 150

SBP 94 to 102

Resp 22 to 30

Fentanyl: IV/IM formulation: 100 mcg/2ml = 50 mcg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV, IM	1 mcg/kg	<1 m IV 7-15 m IM	30-60 m	9 mcg	0.18 ml
Alerts: Resp depression, reversible with naloxone. Avoid rapid infusion, as it may lead to rigid chest syndrome and need for respiratory support. Comments: Start with 1 mcg/kg. Max 100 mcg single dose. May repeat dose q5-10 minutes prn. The respiratory depressant effects may last longer than analgesic effects. Best drug for major trauma cases and possible hypoperfusion.					

Fentanyl (Intranasal): Use IV formulation for intranasal administration:
100 mcg/2ml = 50 mcg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IN	2 mcg/kg	1-2 m	½-2 hr	18 mcg	0.36 ml
Alerts: Atomizer needed to nebulize drug intranasally to maximize absorption. Comments: Put half of each dose in each nostril. May repeat 0.5 mcg/kg dose q 5-10 minutes prn. The respiratory depressant effects may last longer than analgesic effects. Use when vascular access unavailable or unnecessary. Has not been trialed on <3 yo.					

Hydromorphone (Dilaudid): IV/IM formulation: 2 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV, IM	0.02 mg/kg	2-5 m	4-5 hr	0.18 mg	0.09 ml
Alerts: Resp depression possible. Contraindicated in status asthmaticus. Comments: Not recommended for children intolerant or unresponsive to morphine. Excellent alternative to morphine for sickle cell pain. 1 mg hydromorphone = 7 mg morphine.					

Red Weight 9 kg Red

Heart rate 90 to 150

SBP 94 to 102

Resp 22 to 30

Ibuprofen (Motrin): Formulation: Oral liquid 100 mg/5ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
PO	10 mg/kg	30 m	6 hr	90 mg	4.5 ml of 100 mg/5 ml

Alerts: Contraindicated if hypersensitive to NSAID's. Use with extreme caution in patients with decreased renal function.

Comments: Excellent first line analgesic and antipyretic. Use when an anti-inflammatory effect is desired in patients with pain or fever.

Ketamine: IV/IM formulation: 50 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV	1-2 mg/kg	30 sec	15-30 m	9-18 mg	0.18-0.36 ml
IM	5 mg/kg	3-5 m	30-90 m	45 mg	0.9 ml

Alerts: Laryngospasm, hypersalivation, vomiting. Contraindicated if increased intracranial or intraocular pressure. Watch for emergence reaction, nausea/vomiting.

Comments: No atropine needed. Do not exceed injection rate of 0.5 mg/kg/min or give the dose in less than 1 minute.

Lorazepam (Ativan): IV/IM formulation: 2 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV, IM	0.05- 0.1 mg/kg	2-3 m	6-8 hrs	0.45-0.9 mg	0.23-0.45 ml

Alerts: Check concentration (4 mg/ml also available). Resp depression, especially with fast IV push.

Comments: Best first seizure drug. Decrease dose by ½ if given with morphine.

Midazolam (Versed): IV/IM formulation: 1 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV, IM	0.1 mg/kg	1-5 m	½-1 hr	0.9 mg	0.9 ml

Alerts: Faster metabolism in infants and high doses, up to 0.6 mg/kg, may be needed. Check concentration (also available in 5 mg/ml). Watch for resp depression, especially with rapid IV push.

Comments: Decrease dose by ½ if given with morphine. May increase dose by 0.1 mg/kg every 5 minutes. Max 2 mg single dose IV, max total IV dose 6 mg.

9 kg

Red Weight 9 kg Red

Heart rate 90 to 150 SBP 94 to 102 Resp 22 to 30

Morphine: IV/IM formulations (multiple): 5 or 10 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV, IM	0.05-0.1 mg/kg	1-3 m	1-2 hrs	0.45-0.9 mg	0.09-0.18 ml of 5 mg/ml
Alerts: Check concentration (multiple formulations). Adjust dose for renal impairment. May cause hypotension or resp depression, nausea, emesis, or pruritis. Comments: May repeat dose q 5-15 minutes to desired effect. Decrease dose by ½ if given with barbiturates, hydroxyzine/diphenhydramine, or with other benzodiazepines.					

Pentobarbital (Nembutal): IV/IM formulation: 50 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV	1-2 mg/kg	3-5 m	15-45 m	9-18 mg	0.18-0.36 ml
IM	5 mg/kg	10 m	1-4 hrs	45 mg	0.9 ml
Alerts: May cause hypotension. Paradoxical excitement may occur when administered (small doses of morphine can ameliorate this effect). Comments: Not first line drug for imaging sedation—use etomidate. Decrease dose by ½ if given with morphine. Do not inject >50 mg/min. Lasts longer than methohexital.					

Red Weight 9 kg Red

Heart rate 90 to 150

SBP 94 to 102

Resp 22 to 30

Reversal Agents

Flumazenil (Romazicon): IV formulation: 0.1 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV	0.01 mg/kg	1-2 m	20-60 m	0.09 mg	0.9 ml
Alerts: Contraindicated if benzodiazepine addiction or concomitant tricyclic antidepressant overdose.					
Comments: May repeat 0.02 mg/kg q1 min up to a total of 1 mg.					

Naloxone (Narcan): IV/IO/IM/IN/ET formulation: 0.4 mg/ml, or 1 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV, IO, IM, SC, IN, ET	0.1 mg/kg	<2 m (IV, IO), 2-5 m (IM, SC, IN, ET)	30-60 m	0.9 mg	2.3 ml of 0.4 mg/ml
Alerts: Careful with concentration. Use with extreme caution in neonates to avoid seizures. Contraindicated if hypersensitivity to naloxone.					
Comments: May repeat 0.05 mg/kg q2-3 min up to total 2 mg. Max single dose 2 mg. Titrate dose for either partial or complete opiate reversal.					

Red Weight 9 kg Red

Heart rate 90 to 150 SBP 94 to 102 Resp 22 to 30

Topical Pain Management

EMLA (Eutectic Mixture of Local Anesthetics): Formulation: lidocaine 2.5% & prilocaine 2.5% cream (5 g tube)

Route	Max dose	Max area of coverage	Onset	Duration
Topical	2 g	20 cm ² area of skin	60 m	2-3 hrs
Alerts: Do not apply to mucous membranes or open wounds. Apply for no longer than 4 hours. Contraindicated if hypersensitivity to lidocaine or prilocaine. Avoid use in infants who are also receiving methemoglobin-inducing agents. Comments: May cause methemoglobinemia. Anesthesia lasts 1-2 hrs after removal of cream.				

LET (lidocaine, epinephrine, tetracaine): Formulation: Lidocaine 4%, Epinephrine 1:1000, & Tetracaine 0.5% (3 ml bottle)

Route	Dose	Onset	Duration
Topical	1 ml	10 m	1-2 hrs
Alerts: Do not use on fingertips, toes, nose, or penis. Max dose is 8 mg/kg of lidocaine. Contraindicated if hypersensitivity to lidocaine, epinephrine, or tetracaine. Avoid contact with mucous membranes. Comments: For facial lacerations, apply solution with dropper or gauze (gel is better).			

Lidocaine 1% (Xylocaine): Formulation: Lidocaine 1% (10 mg/ml)

Route	Max Dose	Onset	Duration
Infiltration	4 ml	Rapid	½-1 hr
Alerts: Do not exceed 4-5 mg/kg due to risk of seizures, or 8 mg/kg if combined with epinephrine. Do not use lidocaine/epinephrine combo on fingertips, toes, nose, or penis. Comments: Buffer lidocaine injection (lidocaine 1%) as a 1:10 mixture of 1 part sodium bicarbonate solution in 9 parts of lidocaine 1% to reduce pain of injection.			

9 kg

Purple Weight 10 kg Purple

Heart rate 90 to 150

SBP 94 to 102

Resp 22 to 30

Acetaminophen (Tylenol):

Oral drops: 80 mg/0.8 ml = 100 mg/ml

Oral elixir: 160 mg/5 ml

Suppositories: 120 mg, 325 mg, 650 mg

Route	Dose per kg	Onset	Duration	Dose	ml to give
PO, PR	15 mg/kg	30 m	4 hr	150 mg	5 ml of 160 mg/5 ml
Alerts: Check concentration, as there are many different formulations. Comments: Equivalent to NSAID's for pain and fever, but has no anti-inflammatory effect. Suppository also available as above. Do not exceed 5 doses per day and use with extreme caution in children with hepatic dysfunction.					

Diazepam: Intravenous formulation (same for IV or PR): 5 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV	0.2 mg/kg	1-3 m	0.5 hr	2 mg	0.4 ml
PR	0.5 mg/kg	2-15 m	0.5 hr	5 mg (max)	1 ml
Alerts: Resp depression with fast IV push. Rectal gel available at 2.5 mg/ml. Comments: Not a first line drug. Works for status epilepticus, but midazolam or lorazepam preferred. Works for sedation but midazolam or lorazepam preferred. Push slowly IV. May repeat IV dose q 10 minutes prn, with max total dose of 5 mg. Decrease dose by ½ if given with morphine. IV solution can be administered with lubricated TB syringe (no needle) into rectum. Rectal gel easier to insert into rectum, but expensive.					

Etomidate: Intravenous formulation: 2 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV	0.2 mg/kg	30-60 sec	2-15 min	2 mg	Sedation dose 1 ml
IV	0.3 mg/kg	30-60 sec	5-15 min	3 mg	RSI dose 1.5 ml
Alerts: Give lower dose for sedation for imaging. Watch for myoclonus, vomiting. Comments: Use starting dose of 0.2 mg/kg for sedation for imaging. Use with narcotic (e.g., fentanyl) for procedural sedation. Use higher dose of 0.3 mg/kg for induction for rapid sequence intubation. Increase by 0.05 mg/kg every 60-90 seconds to maximum of 0.4 mg/kg (4 mg).					

Purple Weight 10 kg Purple

Heart rate 90 to 150

SBP 94 to 102

Resp 22 to 30

Fentanyl: IV/IM formulation: 100 mcg/2ml = 50 mcg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV, IM	1 mcg/kg	<1 m IV 7-15 m IM	30-60 m	10 mcg	0.2 ml
<p>Alerts: Resp depression, reversible with naloxone. Avoid rapid infusion, as it may lead to rigid chest syndrome and need for respiratory support.</p> <p>Comments: Start with 1 mcg/kg. Max 100 mcg single dose. May repeat dose q5-10 minutes prn. The respiratory depressant effects may last longer than analgesic effects. Best drug for major trauma cases and possible hypoperfusion.</p>					

Fentanyl (Intranasal): Use IV formulation for intranasal administration:
100 mcg/2ml = 50 mcg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IN	2 mcg/kg	1-2 m	½-2 hr	20 mcg	0.4 ml
<p>Alerts: Atomizer needed to nebulize drug intranasally to maximize absorption.</p> <p>Comments: Put half of each dose in each nostril. May repeat 0.5 mcg/kg dose q 5-10 minutes prn. The respiratory depressant effects may last longer than analgesic effects. Use when vascular access unavailable or unnecessary. Has not been trialed on <3 yo.</p>					

Hydromorphone (Dilaudid): IV/IM formulation: 2 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV, IM	0.02 mg/kg	2-5 m	4-5 hr	0.2 mg	0.1 ml
<p>Alerts: Resp depression possible. Contraindicated in status asthmaticus.</p> <p>Comments: Not recommended for children intolerant or unresponsive to morphine. Excellent alternative to morphine for sickle cell pain. 1 mg hydromorphone = 7 mg morphine.</p>					

Purple Weight 10 kg Purple

Heart rate 90 to 150

SBP 94 to 102

Resp 22 to 30

Ibuprofen (Motrin): Formulation: Oral liquid 100 mg/5ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
PO	10 mg/kg	30 m	6 hr	100 mg	5 ml of 100 mg/5 ml

Alerts: Contraindicated if hypersensitive to NSAID's. Use with extreme caution in patients with decreased renal function.

Comments: Excellent first line analgesic and antipyretic. Use when an anti-inflammatory effect is desired in patients with pain or fever.

Ketamine: IV/IM formulation: 50 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV	1-2 mg/kg	30 sec	15-30 m	10-20 mg	0.2-0.4 ml
IM	5 mg/kg	3-5 m	30-90 m	50 mg	1 ml

Alerts: Laryngospasm, hypersalivation, vomiting. Contraindicated if increased intracranial or intraocular pressure. Watch for emergence reaction, nausea/vomiting.

Comments: No atropine needed. Do not exceed injection rate of 0.5 mg/kg/min or give the dose in less than 1 minute.

Lorazepam (Ativan): IV/IM formulation: 2 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV, IM	0.05- 0.1 mg/kg	2-3 m	6-8 hrs	0.5-1 mg	0.25-0.5 ml

Alerts: Check concentration (4 mg/ml also available). Resp depression, especially with fast IV push.

Comments: Best first seizure drug. Decrease dose by ½ if given with morphine.

Purple Weight 10 kg Purple

Heart rate 90 to 150

SBP 94 to 102

Resp 22 to 30

Methohexital (Brevital): IV/ PR (1% solution): 500 mg/50 ml = 10 mg/ml

IM (5% solution): 500 mg/10 ml = 50 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV	1 mg/kg	1 m	10 m	10 mg	1 ml of 10 mg/ml
IM	6 mg/kg	2-10 m	1-1½ hr	60 mg	1.2 ml of 50 mg/ml
Rectal	25 mg/kg	5-15 m	1-1½ hr	250 mg	25 ml of 10 mg/ml
Alerts: Resp depression. Note there is a different dilution for IV/PR versus IM administration. Not for use in infants < 12 mos. Do not use with hypoperfusion. Comments: Deep sedation drug. Continuous monitoring essential.					

Midazolam (Versed): IV/IM formulation: 1 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV, IM	0.05-0.1 mg/kg	1-5 m	½-1 hr	0.5-1 mg	0.5-1 ml
Alerts: Check concentration (also available in 5 mg/ml). Watch for resp depression, especially with rapid IV push. Comments: Decrease dose by ½ if given with morphine. May increase dose by 0.1 mg/kg every 5 minutes, to a maximum of 0.4 mg/kg to attain seizure control or sedation. Infants may need higher doses, up to 0.6 mg/kg. Max 2 mg single dose IV, max total IV dose 6 mg.					

Morphine: IV/IM formulations (multiple): 5 or 10 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV, IM	0.05-0.1 mg/kg	1-3 m	1-2 hrs	0.5-1 mg	0.1-0.2 ml of 5 mg/ml
Alerts: Check concentration (multiple formulations). Adjust dose for renal impairment. May cause hypotension or resp depression, nausea, emesis, or pruritis. Comments: May repeat dose q 5-15 minutes to desired effect. Decrease dose by ½ if given with barbiturates, hydroxyzine/diphenhydramine, or with other benzodiazepines.					

Purple Weight 10 kg Purple

Heart rate 90 to 150

SBP 94 to 102

Resp 22 to 30

Pentobarbital (Nembutal): IV/IM formulation: 50 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV	1-2 mg/kg	3-5 m	15-45 m	10-20 mg	0.2-0.4 ml
IM	5 mg/kg	10 m	1-4 hrs	50 mg	1 ml

Alerts: May cause hypotension. Paradoxical excitement may occur when administered (small doses of morphine can ameliorate this effect).

Comments: Not first line drug for imaging sedation—use etomidate. Decrease dose by ½ if given with morphine. Do not inject >50 mg/min. Lasts longer than methohexital.

Purple Weight 10 kg Purple

Heart rate 90 to 150

SBP 94 to 102

Resp 22 to 30

Reversal Agents

Flumazenil (Romazicon): IV formulation: 0.1 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV	0.01 mg/kg	1-2 m	20-60 m	0.1 mg	1 ml
Alerts: Contraindicated if benzodiazepine addiction or concomitant tricyclic antidepressant overdose.					
Comments: May repeat 0.02 mg/kg q1 min up to a total of 1 mg.					

Naloxone (Narcan): IV/IO/IM/IN/ET formulation: 0.4 mg/ml, or 1 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV, IO, IM, SC, IN, ET	0.1 mg/kg	<2 m (IV, IO), 2-5 m (IM, SC, IN, ET)	30-60 m	1 mg	1 ml of 1 mg/ml
Alerts: Careful with concentration. Use with extreme caution in neonates to avoid seizures. Contraindicated if hypersensitivity to naloxone.					
Comments: May repeat 0.05 mg/kg q2-3 min up to total 2 mg. Max single dose 2 mg. Titrate dose for either partial or complete opiate reversal.					

Purple Weight 10 kg Purple

Heart rate 90 to 150

SBP 94 to 102

Resp 22 to 30

Topical Pain Management

EMLA (Eutectic Mixture of Local Anesthetics): Formulation: lidocaine 2.5% & prilocaine 2.5% cream (5 g tube)

Route	Max dose	Max area of coverage	Onset	Duration
Topical	10 g	100 cm ² area of skin	60 m	2-3 hrs
Alerts: Do not apply to mucous membranes or open wounds. If infant age <12 months, apply for no longer than 4 hours. Contraindicated if hypersensitivity to lidocaine or prilocaine. Avoid use in children also receiving methemoglobin-inducing agents. Comments: May cause methemoglobinemia. Anesthesia lasts 1-2 hrs after removal of cream.				

LET (lidocaine, epinephrine, tetracaine): Formulation: Lidocaine 4%, Epinephrine 1:1000, & Tetracaine 0.5% (3 ml bottle)

Route	Dose	Onset	Duration
Topical	1 ml	10 m	1-2 hrs
Alerts: Do not use on fingertips, toes, nose, or penis. Max dose is 8 mg/kg of lidocaine. Contraindicated if hypersensitivity to lidocaine, epinephrine, or tetracaine. Avoid contact with mucous membranes. Comments: For facial lacerations, apply solution with dropper or gauze (gel is better).			

Lidocaine 1% (Xylocaine): Formulation: Lidocaine 1% (10 mg/ml)

Route	Max Dose	Onset	Duration
Infiltration	4.5 ml	Rapid	½-1 hr
Alerts: Do not exceed 4-5 mg/kg due to risk of seizures, or 8 mg/kg if combined with epinephrine. Do not use lidocaine/epinephrine combo on fingertips, toes, nose, or penis. Comments: Buffer lidocaine injection (lidocaine 1%) as a 1:10 mixture of 1 part sodium bicarbonate solution in 9 parts of lidocaine 1% to reduce pain of injection.			

Purple Weight 11 kg Purple

Heart rate 90 to 150

SBP 94 to 102

Resp 22 to 30

Acetaminophen (Tylenol):

Oral drops: 80 mg/0.8 ml = 100 mg/ml

Oral elixir: 160 mg/5 ml

Suppositories: 120 mg, 325 mg, 650 mg

Route	Dose per kg	Onset	Duration	Dose	ml to give
PO, PR	15 mg/kg	30 m	4 hr	165 mg	5.1 ml of 160 mg/5 ml

Alerts: Check concentration, as there are many different formulations.

Comments: Equivalent to NSAID's for pain and fever, but has no anti-inflammatory effect. Oral liquid can be 100 mg/ml infant drops OR children's suspension 160 mg/5ml. Suppository also available as above. Do not exceed 5 doses per day and use with extreme caution in children with hepatic dysfunction.

Diazepam: Intravenous formulation (same for IV or PR): 5 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV	0.2 mg/kg	1-3 m	0.5 hr	2.2 mg	0.44 ml
PR	0.5 mg/kg	2-15 m	0.5 hr	5 mg (max)	1 ml

Alerts: Resp depression with fast IV push. Rectal gel available at 2.5 mg/ml.

Comments: Not a first line drug. Works for status epilepticus, but midazolam or lorazepam preferred. Works for sedation but midazolam or lorazepam preferred. Push slowly IV. May repeat IV dose q 10 minutes prn, with max total dose of 5 mg. Decrease dose by ½ if given with morphine. IV solution can be administered with lubricated TB syringe (no needle) into rectum. Rectal gel easier to insert into rectum, but expensive.

Etomidate: Intravenous formulation: 2 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV	0.2 mg/kg	30-60 sec	2-15 min	2.2 mg	Sedation dose 1.1 ml
IV	0.3 mg/kg	30-60 sec	5-15 min	3.3 mg	RSI dose 1.7 ml

Alerts: Give lower dose for sedation for imaging. Watch for myoclonus, vomiting.

Comments: Use starting dose of 0.2 mg/kg for sedation for imaging.

Use with narcotic (e.g., fentanyl) for procedural sedation.

Use higher dose of 0.3 mg/kg for induction for rapid sequence intubation.

Increase by 0.05 mg/kg every 60-90 seconds to maximum of 0.4 mg/kg (**4 mg**).

11 kg

Purple Weight 11 kg Purple

Heart rate 90 to 150

SBP 94 to 102

Resp 22 to 30

Fentanyl: IV/IM formulation: 100 mcg/2ml = 50 mcg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV, IM	1 mcg/kg	<1 m IV 7-15 m IM	30-60 m	11 mcg	0.22 ml

Alerts: Resp depression, reversible with naloxone. Avoid rapid infusion, as it may lead to rigid chest syndrome and need for respiratory support.

Comments: Start with 1 mcg/kg. Max 100 mcg single dose. May repeat dose q5-10 minutes prn. The respiratory depressant effects may last longer than analgesic effects. Best drug for major trauma cases and possible hypoperfusion.

Fentanyl (Intranasal): Use IV formulation for intranasal administration:
100 mcg/2ml = 50 mcg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IN	2 mcg/kg	1-2 m	½-2 hr	22 mcg	0.44 ml

Alerts: Atomizer needed to nebulize drug intranasally to maximize absorption.

Comments: Put half of each dose in each nostril. May repeat 0.5 mcg/kg dose q 5-10 minutes prn. The respiratory depressant effects may last longer than analgesic effects. Use when vascular access unavailable or unnecessary. Has not been trialed on <3 yo.

Hydromorphone (Dilaudid): IV/IM formulation: 2 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV, IM	0.02 mg/kg	2-5 m	4-5 hr	0.22 mg	0.11 ml

Alerts: Resp depression possible. Contraindicated in status asthmaticus.

Comments: Not recommended for children intolerant or unresponsive to morphine. Excellent alternative to morphine for sickle cell pain. 1 mg hydromorphone = 7 mg morphine.

Purple Weight 11 kg Purple

Heart rate 90 to 150

SBP 94 to 102

Resp 22 to 30

Ibuprofen (Motrin): Formulation: Oral liquid comes 100 mg/5ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
PO	10 mg/kg	30 m	6 hr	110 mg	5.5 ml of 100 mg/5 ml

Alerts: Contraindicated if hypersensitive to NSAID's. Use with extreme caution in patients with decreased renal function.

Comments: Excellent first line analgesic and antipyretic. Use when an anti-inflammatory effect is desired in patients with pain or fever.

Ketamine: IV/IM formulation: 50 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV	1-2 mg/kg	30 sec	15-30 m	11-22 mg	0.22-0.44 ml
IM	5 mg/kg	3-5 m	30-90 m	55 mg	1.1 ml

Alerts: Laryngospasm, hypersalivation, vomiting. Contraindicated if increased intracranial or intraocular pressure. Watch for emergence reaction, nausea/vomiting.

Comments: No atropine needed. Do not exceed injection rate of 0.5 mg/kg/min or give the dose in less than 1 minute.

Lorazepam (Ativan): IV/IM formulation: 2 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV, IM	0.05- 0.1 mg/kg	2-3 m	6-8 hrs	0.55-1.1 mg	0.28-0.55 ml

Alerts: Check concentration (4 mg/ml also available). Resp depression, especially with fast IV push.

Comments: Best first seizure drug. Decrease dose by ½ if given with morphine.

Purple Weight 11 kg Purple

Heart rate 90 to 150

SBP 94 to 102

Resp 22 to 30

Methohexital (Brevital): IV/ PR (1% solution): 500 mg/ 50 ml = 10 mg/ml

IM (5% solution): 500 mg/10ml = 50 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV	1 mg/kg	1 m	10 m	11 mg	1.1 ml of 10 mg/ml
IM	6 mg/kg	2-10 m	1-1½ hr	66 mg	1.32 ml of 50 mg/ml
Rectal	25 mg/kg	5-15 m	1-1½ hr	275 mg	27.5 ml of 10 mg/ml

Alerts: Resp depression. Note there is a different dilution for IV/PR versus IM administration. Do not use with hypoperfusion.

Comments: Deep sedation drug. Continuous monitoring essential.

Midazolam (Versed): IV/IM formulation: 1 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV, IM	0.05-0.1 mg/kg	1-5 m	½-1 hr	0.55-1.1 mg	0.55-1.1 ml

Alerts: Check concentration (also available in 5 mg/ml). Watch for resp depression, especially with rapid IV push.

Comments: Decrease dose by ½ if given with morphine. May increase dose by 0.1 mg/kg every 5 minutes, to a **maximum** of 0.4 mg/kg to attain seizure control or sedation. Max 2 mg single dose IV, max total IV dose 6 mg.

Morphine: IV/IM formulations (multiple): 5 or 10 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV, IM	0.05-0.1 mg/kg	1-3 m	1-2 hrs	0.55-1.1 mg	0.11-0.22 ml of 5 mg/ml

Alerts: Check concentration (multiple formulations). Adjust dose for renal impairment. May cause hypotension or resp depression, nausea, emesis, or pruritis.

Comments: May repeat dose q 5-15 minutes to desired effect. Decrease dose by ½ if given with barbiturates, hydroxyzine/diphenhydramine, or with other benzodiazepines.

Purple Weight 11 kg Purple

Heart rate 90 to 150

SBP 94 to 102

Resp 22 to 30

Pentobarbital (Nembutal): IV/IM formulation: 50 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV	1-2 mg/kg	3-5 m	15-45 m	11-22 mg	0.22-0.44 ml
IM	5 mg/kg	10 m	1-4 hrs	55 mg	1.1 ml

Alerts: May cause hypotension. Paradoxical excitement may occur when administered (small doses of morphine can ameliorate this effect).

Comments: Not first line drug for imaging sedation—use etomidate. Decrease dose by ½ if given with morphine. Do not inject >50 mg/min. Lasts longer than methohexital.

Purple Weight 11 kg Purple

Heart rate 90 to 150

SBP 94 to 102

Resp 22 to 30

Reversal Agents

Flumazenil (Romazicon): IV formulation: 0.1 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV	0.01 mg/kg	1-2 m	20-60 m	0.11 mg	1.1 ml
Alerts: Contraindicated if benzodiazepine addiction or concomitant tricyclic antidepressant overdose.					
Comments: May repeat 0.02 mg/kg q1 min up to a total of 1 mg.					

Naloxone (Narcan): IV/IO/IM/IN/ET formulation: 0.4 mg/ml, or 1 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV, IO, IM, SC, IN, ET	0.1 mg/kg	<2 m (IV, IO), 2-5 m (IM, SC, IN, ET)	30-60 m	1.1 mg	1.1 ml of 1 mg/ml
Alerts: Careful with concentration. Use with extreme caution in neonates to avoid seizures. Contraindicated if hypersensitivity to naloxone.					
Comments: May repeat 0.05 mg/kg q2-3 min up to total 2 mg. Max single dose 2 mg. Titrate dose for either partial or complete opiate reversal.					

Purple Weight 11 kg Purple

Heart rate 90 to 150

SBP 94 to 102

Resp 22 to 30

Topical Pain Management

EMLA (Eutectic Mixture of Local Anesthetics): Formulation: lidocaine 2.5% & prilocaine 2.5% cream (5 g tube)

Route	Max dose	Max area of coverage	Onset	Duration
Topical	10 g	100 cm ² area of skin	60 m	2-3 hrs
Alerts: Do not apply to mucous membranes or open wounds. Apply for no longer than 4 hours. Contraindicated if hypersensitivity to lidocaine or prilocaine. Comments: May cause methemoglobinemia. Anesthesia lasts 1-2 hrs after removal of cream.				

LET (lidocaine, epinephrine, tetracaine): Formulation: Lidocaine 4%, Epinephrine 1:1000, & Tetracaine 0.5% (3 ml bottle)

Route	Dose	Onset	Duration
Topical	1-2 ml	10 m	1-2 hrs
Alerts: Do not use on fingertips, toes, nose, or penis. Max dose is 8 mg/kg of lidocaine. Contraindicated if hypersensitivity to lidocaine, epinephrine, or tetracaine. Avoid contact with mucous membranes. Comments: For facial lacerations, apply solution with dropper or gauze (gel is better).			

Lidocaine 1% (Xylocaine): Formulation: Lidocaine 1% (10 mg/ml)

Route	Max Dose	Onset	Duration
Infiltration	4.9 ml	Rapid	½-1 hr
Alerts: Do not exceed 4-5 mg/kg due to risk of seizures, or 8 mg/kg if combined with epinephrine. Do not use lidocaine/epinephrine combo on fingertips, toes, nose, or penis. Comments: Buffer lidocaine injection (lidocaine 1%) as a 1:10 mixture of 1 part sodium bicarbonate solution in 9 parts of lidocaine 1% to reduce pain of injection.			

Yellow Weight 12 kg Yellow

Heart rate 90 to 150

SBP 94 to 102

Resp 22 to 30

Acetaminophen (Tylenol):

Oral drops: 80 mg/0.8 ml = 100 mg/ml

Oral elixir: 160 mg/5 ml

Suppositories: 120 mg, 325 mg, 650 mg

Route	Dose per kg	Onset	Duration	Dose	ml to give
PO, PR	15 mg/kg	30 m	4 hr	180 mg	5.6 ml of 160 mg/5 ml

Alerts: Check concentration, as there are many different formulations.

Comments: Equivalent to NSAID's for pain and fever, but has no anti-inflammatory effect. Oral liquid can be 100 mg/ml infant drops OR children's suspension 160 mg/5ml. Suppository also available as above. Do not exceed 5 doses per day and use with extreme caution in children with hepatic dysfunction.

Diazepam: Intravenous formulation (same for IV or PR): 5 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV	0.2 mg/kg	1-3 m	0.5 hr	2.4 mg	0.48 ml
PR	0.5 mg/kg	2-15 m	0.5 hr	5 mg (max)	1 ml

Alerts: Resp depression with fast IV push. Rectal gel available at 2.5 mg/ml.

Comments: Not a first line drug. Works for status epilepticus, but midazolam or lorazepam preferred. Works for sedation but midazolam or lorazepam preferred. Push slowly IV. May repeat IV dose q 10 minutes prn, with max total dose of 5 mg. Decrease dose by ½ if given with morphine. IV solution can be administered with lubricated TB syringe (no needle) into rectum. Rectal gel easier to insert into rectum, but expensive.

Etomidate: Intravenous formulation: 2 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV	0.2 mg/kg	30-60 sec	2-15 min	2.4 mg	Sedation dose 1.2 ml
IV	0.3 mg/kg	30-60 sec	5-15 min	3.6 mg	RSI dose 1.8 ml

Alerts: Give lower dose for sedation for imaging. Watch for myoclonus, vomiting.

Comments: Use starting dose of 0.2 mg/kg for sedation for imaging.

Use with narcotic (e.g., fentanyl) for procedural sedation.

Use higher dose of 0.3 mg/kg for induction for rapid sequence intubation.

Increase by 0.05 mg/kg every 60-90 seconds to maximum of 0.4 mg/kg (**4 mg**).

12 kg

Yellow Weight 12 kg Yellow

Heart rate 90 to 150

SBP 94 to 102

Resp 22 to 30

Fentanyl: IV/IM formulation: 100 mcg/2ml = 50 mcg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV, IM	1 mcg/kg	<1 m IV 7-15 m IM	30-60 m	12 mcg	0.24 ml

Alerts: Resp depression, reversible with naloxone. Avoid rapid infusion, as it may lead to rigid chest syndrome and need for respiratory support.

Comments: Start with 1 mcg/kg. Max 100 mcg single dose. May repeat dose q5-10 minutes prn. The respiratory depressant effects may last longer than analgesic effects. Best drug for major trauma cases and possible hypoperfusion.

Fentanyl (Intranasal): Use IV formulation for intranasal administration:
100 mcg/2ml = 50 mcg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IN	2 mcg/kg	1-2 m	½-2 hr	24 mcg	0.48 ml

Alerts: Atomizer needed to nebulize drug intranasally to maximize absorption.

Comments: Put half of each dose in each nostril. May repeat 0.5 mcg/kg dose q 5-10 minutes prn. The respiratory depressant effects may last longer than analgesic effects. Use when vascular access unavailable or unnecessary. Has not been trialed on <3 yo.

Hydromorphone (Dilaudid): IV/IM formulation: 2 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV, IM	0.02 mg/kg	2-5 m	4-5 hr	0.24 mg	0.12 ml

Alerts: Resp depression possible. Contraindicated in status asthmaticus.

Comments: Not recommended for children intolerant or unresponsive to morphine. Excellent alternative to morphine for sickle cell pain. 1 mg hydromorphone = 7 mg morphine.

Yellow Weight 12 kg Yellow

Heart rate 90 to 150

SBP 94 to 102

Resp 22 to 30

Ibuprofen (Motrin): Formulation: Oral liquid 100 mg/5ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
PO	10 mg/kg	30 m	6 hr	120 mg	6 ml of 100 mg/5 ml

Alerts: Contraindicated if hypersensitive to NSAID's. Use with extreme caution in patients with decreased renal function.

Comments: Excellent first line analgesic and antipyretic. Use when an anti-inflammatory effect is desired in patients with pain or fever.

Ketamine: IV/IM formulation: 50 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV	1-2 mg/kg	30 sec	15-30 m	12-24 mg	0.24-0.48 ml
IM	5 mg/kg	3-5 m	30-90 m	60 mg	1.2 ml

Alerts: Laryngospasm, hypersalivation, vomiting. Contraindicated if increased intracranial or intraocular pressure. Watch for emergence reaction, nausea/vomiting.

Comments: No atropine needed. Do not exceed injection rate of 0.5 mg/kg/min or give the dose in less than 1 minute.

Lorazepam (Ativan): IV/IM formulation: 2 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV, IM	0.05- 0.1 mg/kg	2-3 m	6-8 hrs	0.6-1.2 mg	0.3-0.6 ml

Alerts: Check concentration (4 mg/ml also available). Resp depression, especially with fast IV push.

Comments: Best first seizure drug. Decrease dose by ½ if given with morphine.

Yellow Weight 12 kg Yellow

Heart rate 90 to 150

SBP 94 to 102

Resp 22 to 30

Methohexital (Brevital): IV/ PR (1% solution): 500 mg/ 50 ml = 10 mg/ml

IM (5% solution): 500 mg/10ml = 50 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV	1 mg/kg	1 m	10 m	12 mg	1.2 ml of 10 mg/ml
IM	6 mg/kg	2-10 m	1-1½ hr	72 mg	1.44 ml of 50 mg/ml
Rectal	25 mg/kg	5-15 m	1-1½ hr	300 mg	30 ml of 10 mg/ml
Alerts: Resp depression. Note there is a different dilution for IV/PR versus IM administration. Do not use with hypoperfusion. Comments: Deep sedation drug. Continuous monitoring essential.					

Midazolam (Versed): IV/IM formulation: 1 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV, IM	0.05-0.1 mg/kg	1-5 m	½-1 hr	0.6-1.2 mg	0.6-1.2 ml
Alerts: Check concentration (also available in 5 mg/ml). Watch for resp depression, especially with rapid IV push. Comments: Decrease dose by ½ if given with morphine. May increase dose by 0.1 mg/kg every 5 minutes, to a maximum of 0.4 mg/kg to attain seizure control or sedation. Max 2 mg single dose IV, max total IV dose 6 mg.					

Morphine: IV/IM formulations (multiple): 5 or 10 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV, IM	0.05-0.1 mg/kg	1-3 m	1-2 hrs	0.6-1.2 mg	0.12-0.24 ml of 5 mg/ml
Alerts: Check concentration (multiple formulations). Adjust dose for renal impairment. May cause hypotension or resp depression, nausea, emesis, or pruritis. Comments: May repeat dose q 5-15 minutes to desired effect. Decrease dose by ½ if given with barbiturates, hydroxyzine/diphenhydramine, or with other benzodiazepines.					

Yellow Weight 12 kg Yellow

Heart rate 90 to 150

SBP 94 to 102

Resp 22 to 30

Pentobarbital (Nembutal): IV/IM formulation: 50 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV	1-2 mg/kg	3-5 m	15-45 m	12-24 mg	0.24-0.48 ml
IM	5 mg/kg	10 m	1-4 hrs	60 mg	1.2 ml

Alerts: May cause hypotension. Paradoxical excitement may occur when administered (small doses of morphine can ameliorate this effect).

Comments: Not first line drug for imaging sedation—use etomidate. Decrease dose by ½ if given with morphine. Do not inject >50 mg/min. Lasts longer than methohexital.

Yellow Weight 12 kg Yellow

Heart rate 90 to 150

SBP 94 to 102

Resp 22 to 30

Reversal Agents

Flumazenil (Romazicon): IV formulation: 0.1 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV	0.01 mg/kg	1-2 m	20-60 m	0.12 mg	1.2 ml
Alerts: Contraindicated if benzodiazepine addiction or concomitant tricyclic antidepressant overdose.					
Comments: May repeat 0.02 mg/kg q1 min up to a total of 1 mg.					

Naloxone (Narcan): IV/IO/IM/IN/ET formulation: 0.4 mg/ml, or 1 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV, IO, IM, SC, IN, ET	0.1 mg/kg	<2 m (IV, IO), 2-5 m (IM, SC, IN, ET)	30-60 m	1.2 mg	1.2 ml of 1 mg/ml
Alerts: Careful with concentration. Use with extreme caution in neonates to avoid seizures. Contraindicated if hypersensitivity to naloxone.					
Comments: May repeat 0.05 mg/kg q2-3 min up to total 2 mg. Max single dose 2 mg. Titrate dose for either partial or complete opiate reversal.					

Yellow Weight 12 kg Yellow

Heart rate 90 to 150

SBP 94 to 102

Resp 22 to 30

Topical Pain Management

EMLA (Eutectic Mixture of Local Anesthetics): Formulation: lidocaine 2.5% & prilocaine 2.5% cream (5 g tube)

Route	Max dose	Max area of coverage	Onset	Duration
Topical	10 g	100 cm ² area of skin	60 m	2-3 hrs
Alerts: Do not apply to mucous membranes or open wounds. If infant age <12 months, apply for no longer than 4 hours. Contraindicated if hypersensitivity to lidocaine or prilocaine. Avoid use in infants <3 months (except circumcision) and those up to 12 months who are also receiving methemoglobin-inducing agents. Comments: May cause methemoglobinemia. Anesthesia lasts 1-2 hrs after removal of cream.				

LET (lidocaine, epinephrine, tetracaine): Formulation: Lidocaine 4%, Epinephrine 1:1000, & Tetracaine 0.5% (3 ml bottle)

Route	Dose	Onset	Duration
Topical	1-2 ml	10 m	1-2 hrs
Alerts: Do not use on fingertips, toes, nose, or penis. Max dose is 8 mg/kg of lidocaine. Contraindicated if hypersensitivity to lidocaine, epinephrine, or tetracaine. Avoid contact with mucous membranes. Comments: For facial lacerations, apply solution with dropper or gauze (gel is better).			

Lidocaine 1% (Xylocaine): Formulation: Lidocaine 1% (10 mg/ml)

Route	Max Dose	Onset	Duration
Infiltration	5.4 ml	Rapid	½-1 hr
Alerts: Do not exceed 4-5 mg/kg due to risk of seizures, or 8 mg/kg if combined with epinephrine. Do not use lidocaine/epinephrine combo on fingertips, toes, nose, or penis. Comments: Buffer lidocaine injection (lidocaine 1%) as a 1:10 mixture of 1 part sodium bicarbonate solution in 9 parts of lidocaine 1% to reduce pain of injection.			

Yellow Weight 13 kg Yellow

Heart rate 90 to 150

SBP 98 to 106

Resp 22 to 30

Acetaminophen (Tylenol):

Oral drops: 80 mg/0.8 ml = 100 mg/ml

Oral elixir: 160 mg/5 ml

Suppositories: 120 mg, 325 mg, 650 mg

Route	Dose per kg	Onset	Duration	Dose	ml to give
PO, PR	15 mg/kg	30 m	4 hr	195 mg	6.1 ml of 160 mg/5 ml
<p>Alerts: Check concentration, as there are many different formulations.</p> <p>Comments: Equivalent to NSAID's for pain and fever, but has no anti-inflammatory effect. Oral liquid can be 100 mg/ml infant drops OR children's suspension 160 mg/5ml. Suppository also available as above. Do not exceed 5 doses per day and use with extreme caution in children with hepatic dysfunction.</p>					

Diazepam: Intravenous formulation (same for IV or PR): 5 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV	0.2 mg/kg	1-3 m	0.5 hr	2.6 mg	0.52 ml
PR	0.5 mg/kg	2-15 m	0.5 hr	5 mg (max)	1 ml
<p>Alerts: Resp depression with fast IV push. Rectal gel available at 2.5 mg/ml.</p> <p>Comments: Not a first line drug. Works for status epilepticus, but midazolam or lorazepam preferred. Works for sedation but midazolam or lorazepam preferred. Push slowly IV. May repeat IV dose q 10 minutes prn, with max total dose of 5 mg. Decrease dose by ½ if given with morphine. IV solution can be administered with lubricated TB syringe (no needle) into rectum. Rectal gel easier to insert into rectum, but expensive.</p>					

Etomidate: Intravenous formulation: 2 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV	0.2 mg/kg	30-60 sec	2-15 min	2.6 mg	Sedation dose 1.3 ml
IV	0.3 mg/kg	30-60 sec	5-15 min	3.9 mg	RSI dose 1.95 ml
<p>Alerts: Give lower dose for sedation for imaging. Watch for myoclonus, vomiting.</p> <p>Comments: Use starting dose of 0.2 mg/kg for sedation for imaging.</p> <p>Use with narcotic (e.g., fentanyl) for procedural sedation.</p> <p>Use higher dose of 0.3 mg/kg for induction for rapid sequence intubation.</p> <p>Increase by 0.05 mg/kg every 60-90 seconds to maximum of 0.4 mg/kg (4 mg).</p>					

13 kg

Yellow Weight 13 kg Yellow

Heart rate 90 to 150

SBP 98 to 106

Resp 22 to 30

Fentanyl: IV/IM formulation: 100 mcg/2ml = 50 mcg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV, IM	1 mcg/kg	<1 m IV 7-15 m IM	30-60 m	13 mcg	0.26 ml

Alerts: Resp depression, reversible with naloxone. Avoid rapid infusion, as it may lead to rigid chest syndrome and need for respiratory support.

Comments: Start with 1 mcg/kg. Max 100 mcg single dose. May repeat dose q5-10 minutes prn. The respiratory depressant effects may last longer than analgesic effects. Best drug for major trauma cases and possible hypoperfusion.

Fentanyl (Intranasal): Use IV formulation for intranasal administration:
100 mcg/2ml = 50 mcg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IN	2 mcg/kg	1-2 m	½-2 hr	26 mcg	0.52 ml

Alerts: Atomizer needed to nebulize drug intranasally to maximize absorption.

Comments: Put half of each dose in each nostril. May repeat 0.5 mcg/kg dose q 5-10 minutes prn. The respiratory depressant effects may last longer than analgesic effects. Use when vascular access unavailable or unnecessary. Has not been trialed on <3 yo.

Hydromorphone (Dilaudid): IV/IM formulation: 2 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV, IM	0.02 mg/kg	2-5 m	4-5 hr	0.26 mg	0.13 ml

Alerts: Resp depression possible. Contraindicated in status asthmaticus.

Comments: Not recommended for children intolerant or unresponsive to morphine. Excellent alternative to morphine for sickle cell pain. 1 mg hydromorphone = 7 mg morphine.

13 kg

Yellow Weight 13 kg Yellow

Heart rate 90 to 150

SBP 98 to 106

Resp 22 to 30

Ibuprofen (Motrin): Formulation: Oral liquid comes in 40 mg/ml infant drops
OR 100 mg/5ml children's suspension

Route	Dose per kg	Onset	Duration	Dose	ml to give
PO	10 mg/kg	30 m	6 hr	130 mg	6.5 ml of 100 mg/5 ml

Alerts: Contraindicated if hypersensitive to NSAID's. Use with extreme caution in patients with decreased renal function.

Comments: Excellent first line analgesic and antipyretic. Use when an anti-inflammatory effect is desired in patients with pain or fever.

Ketamine: IV/IM formulation: 50 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV	1-2 mg/kg	30 sec	15-30 m	13-26 mg	0.26-0.52 ml
IM	5 mg/kg	3-5 m	30-90 m	65 mg	1.3 ml

Alerts: Laryngospasm, hypersalivation, vomiting. Contraindicated if increased intracranial or intraocular pressure. Watch for emergence reaction, nausea/vomiting.

Comments: No atropine needed. Do not exceed injection rate of 0.5 mg/kg/min or give the dose in less than 1 minute.

Lorazepam (Ativan): IV/IM formulation: 2 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV, IM	0.05- 0.1 mg/kg	2-3 m	6-8 hrs	0.65-1.3 mg	0.33-0.66 ml

Alerts: Check concentration (4 mg/ml also available). Resp depression, especially with fast IV push.

Comments: Best first seizure drug. Decrease dose by ½ if given with morphine.

Yellow Weight 13 kg Yellow

Heart rate 90 to 150

SBP 98 to 106

Resp 22 to 30

Methohexital (Brevital): IV/ PR (1% solution): 500 mg/ 50 ml = 10 mg/ml

IM (5% solution): 500 mg/10ml = 50 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV	1 mg/kg	1 m	10 m	13 mg	1.3 ml of 10 mg/ml
IM	6 mg/kg	2-10 m	1-1½ hr	78 mg	1.56 ml of 50 mg/ml
Rectal	25 mg/kg	5-15 m	1-1½ hr	325 mg	32.5 ml of 10 mg/ml

Alerts: Resp depression. Note there is a different dilution for IV/PR versus IM administration. Do not use with hypoperfusion.

Comments: Deep sedation drug. Continuous monitoring essential.

Midazolam (Versed): IV/IM formulation: 1 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV, IM	0.05-0.1 mg/kg	1-5 m	½-1 hr	0.65-1.3 mg	0.65-1.3 ml

Alerts: Check concentration (also available in 5 mg/ml). Watch for resp depression, especially with rapid IV push.

Comments: Decrease dose by ½ if given with morphine. May increase dose by 0.1 mg/kg every 5 minutes, to a **maximum** of 0.4 mg/kg to attain seizure control or sedation. Max 2 mg single dose IV, max total IV dose 6 mg.

Morphine: IV/IM formulations (multiple): 5 or 10 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV, IM	0.05-0.1 mg/kg	1-3 m	1-2 hrs	0.65-1.3 mg	0.13-0.26 ml of 5 mg/ml

Alerts: Check concentration (multiple formulations). Adjust dose for renal impairment. May cause hypotension or resp depression, nausea, emesis, or pruritis.

Comments: May repeat dose q 5-15 minutes to desired effect. Decrease dose by ½ if given with barbiturates, hydroxyzine/diphenhydramine, or with other benzodiazepines.

13 kg

Yellow Weight 13 kg Yellow

Heart rate 90 to 150

SBP 98 to 106

Resp 22 to 30

Pentobarbital (Nembutal): IV/IM formulation: 50 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV	1-2 mg/kg	3-5 m	15-45 m	13-26 mg	0.26-0.52 ml
IM	5 mg/kg	10 m	1-4 hrs	65 mg	1.3 ml

Alerts: May cause hypotension. Paradoxical excitement may occur when administered (small doses of morphine can ameliorate this effect).

Comments: Not first line drug for imaging sedation—use etomidate. Decrease dose by ½ if given with morphine. Do not inject >50 mg/min. Lasts longer than methohexital.

Yellow Weight 13 kg Yellow

Heart rate 90 to 150

SBP 98 to 106

Resp 22 to 30

Reversal Agents

Flumazenil (Romazicon): IV formulation: 0.1 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV	0.01 mg/kg	1-2 m	20-60 m	0.13 mg	1.3 ml
Alerts: Contraindicated if benzodiazepine addiction or concomitant tricyclic antidepressant overdose.					
Comments: May repeat 0.02 mg/kg q1 min up to a total of 1 mg.					

Naloxone (Narcan): IV/IO/IM/IN/ET formulation: 0.4 mg/ml, or 1 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV, IO, IM, SC, IN, ET	0.1 mg/kg	<2 m (IV, IO), 2-5 m (IM, SC, IN, ET)	30-60 m	1.3 mg	1.3 ml of 1 mg/ml
Alerts: Careful with concentration. Use with extreme caution in neonates to avoid seizures. Contraindicated if hypersensitivity to naloxone.					
Comments: May repeat 0.05 mg/kg q2-3 min up to total 2 mg. Max single dose 2 mg. Titrate dose for either partial or complete opiate reversal.					

Yellow Weight 13 kg Yellow

Heart rate 90 to 150

SBP 98 to 106

Resp 22 to 30

Topical Pain Management

EMLA (Eutectic Mixture of Local Anesthetics): Formulation: lidocaine 2.5% & prilocaine 2.5% cream (5 g tube)

Route	Max dose	Max area of coverage	Onset	Duration
Topical	10 g	100 cm ² area of skin	60 m	2-3 hrs
Alerts: Do not apply to mucous membranes or open wounds. If infant age <12 months, apply for no longer than 4 hours. Contraindicated if hypersensitivity to lidocaine or prilocaine. Avoid use in infants <3 months (except circumcision) and those up to 12 months who are also receiving methemoglobin-inducing agents. Comments: May cause methemoglobinemia. Anesthesia lasts 1-2 hrs after removal of cream.				

LET (lidocaine, epinephrine, tetracaine): Formulation: Lidocaine 4%, Epinephrine 1:1000, & Tetracaine 0.5% (3 ml bottle)

Route	Dose	Onset	Duration
Topical	1-2 ml	10 m	1-2 hrs
Alerts: Do not use on fingertips, toes, nose, or penis. Max dose is 8 mg/kg of lidocaine. Contraindicated if hypersensitivity to lidocaine, epinephrine, or tetracaine. Avoid contact with mucous membranes. Comments: For facial lacerations, apply solution with dropper or gauze (gel is better).			

Lidocaine 1% (Xylocaine): Formulation: Lidocaine 1% (10 mg/ml)

Route	Max Dose	Onset	Duration
Infiltration	5.9 ml	Rapid	½-1 hr
Alerts: Do not exceed 4-5 mg/kg due to risk of seizures, or 8 mg/kg if combined with epinephrine. Do not use lidocaine/epinephrine combo on fingertips, toes, nose, or penis. Comments: Buffer lidocaine injection (lidocaine 1%) as a 1:10 mixture of 1 part sodium bicarbonate solution in 9 parts of lidocaine 1% to reduce pain of injection.			

13 kg

Yellow Weight 14 kg Yellow

Heart rate 80 to 125

SBP 100 to 109

Resp 22 to 30

Acetaminophen (Tylenol):

Oral drops: 80 mg/0.8 ml = 100 mg/ml

Oral elixir: 160 mg/5 ml

Suppositories: 120 mg, 325 mg, 650 mg

Route	Dose per kg	Onset	Duration	Dose	ml to give
PO, PR	15 mg/kg	30 m	4 hr	210 mg	6.6 ml of 160 mg/5 ml
Alerts: Check concentration, as there are many different formulations. Comments: Equivalent to NSAID's for pain and fever, but has no anti-inflammatory effect. Oral liquid can be 100 mg/ml infant drops OR children's suspension 160 mg/5ml. Suppository also available as above. Do not exceed 5 doses per day and use with extreme caution in children with hepatic dysfunction.					

Diazepam: Intravenous formulation (same for IV or PR): 5 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV	0.2 mg/kg	1-3 m	0.5 hr	2.8 mg	0.56 ml
PR	0.5 mg/kg	2-15 m	0.5 hr	5 mg (max)	1 ml
Alerts: Resp depression with fast IV push. Rectal gel available at 2.5 mg/ml. Comments: Not a first line drug. Works for status epilepticus, but midazolam or lorazepam preferred. Works for sedation but midazolam or lorazepam preferred. Push slowly IV. May repeat IV dose q 10 minutes prn, with max total dose of 5 mg. Decrease dose by ½ if given with morphine. IV solution can be administered with lubricated TB syringe (no needle) into rectum. Rectal gel easier to insert into rectum, but expensive.					

Etomidate: Intravenous formulation: 2 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV	0.2 mg/kg	30-60 sec	2-15 min	2.8 mg	Sedation dose 1.4 ml
IV	0.3 mg/kg	30-60 sec	5-15 min	4.2 mg	RSI dose 2.1 ml
Alerts: Give lower dose for sedation for imaging. Watch for myoclonus, vomiting. Comments: Use starting dose of 0.2 mg/kg for sedation for imaging. Use with narcotic (e.g., fentanyl) for procedural sedation. Use higher dose of 0.3 mg/kg for induction for rapid sequence intubation. Increase by 0.05 mg/kg every 60-90 seconds to maximum of 0.4 mg/kg (4 mg).					

14 kg

Yellow Weight 14 kg Yellow

Heart rate 80 to 125 SBP 100 to 109 Resp 22 to 30

Fentanyl: IV/IM formulation: 100 mcg/2ml = 50 mcg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV, IM	1 mcg/kg	<1 m IV 7-15 m IM	30-60 m	14 mcg	0.28 ml
Alerts: Resp depression, reversible with naloxone. Avoid rapid infusion, as it may lead to rigid chest syndrome and need for respiratory support. Comments: Start with 1 mcg/kg. Max 100 mcg single dose. May repeat dose q5-10 minutes prn. The respiratory depressant effects may last longer than analgesic effects. Best drug for major trauma cases and possible hypoperfusion.					

Fentanyl (Intranasal): Use IV formulation for intranasal administration:
100 mcg/2ml = 50 mcg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IN	2 mcg/kg	1-2 m	½-2 hr	28 mcg	0.56 ml
Alerts: Atomizer needed to nebulize drug intranasally to maximize absorption. Comments: Put half of each dose in each nostril. May repeat 0.5 mcg/kg dose q 5-10 minutes prn. The respiratory depressant effects may last longer than analgesic effects. Use when vascular access unavailable or unnecessary. Has not been trialed on <3 yo.					

Hydromorphone (Dilaudid): IV/IM formulation: 2 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV, IM	0.02 mg/kg	2-5 m	4-5 hr	0.28 mg	0.14 ml
Alerts: Resp depression possible. Contraindicated in status asthmaticus. Comments: Not recommended for children intolerant or unresponsive to morphine. Excellent alternative to morphine for sickle cell pain. 1 mg hydromorphone = 7 mg morphine.					

Yellow Weight 14 kg Yellow

Heart rate 80 to 125 SBP 100 to 109 Resp 22 to 30

Ibuprofen (Motrin): Formulation: Oral 100 mg/5ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
PO	10 mg/kg	30 m	6 hr	140 mg	7 ml of 100 mg/5 ml

Alerts: Contraindicated if hypersensitive to NSAID's. Use with extreme caution in patients with decreased renal function.

Comments: Excellent first line analgesic and antipyretic. Use when an anti-inflammatory effect is desired in patients with pain or fever.

Ketamine: IV/IM formulation: 50 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV	1-2 mg/kg	30 sec	15-30 m	14-28 mg	0.28-0.56 ml
IM	5 mg/kg	3-5 m	30-90 m	70 mg	1.4 ml

Alerts: Laryngospasm, hypersalivation, vomiting. Contraindicated if increased intracranial or intraocular pressure. Watch for emergence reaction, nausea/vomiting.

Comments: No atropine needed. Do not exceed injection rate of 0.5 mg/kg/min or give the dose in less than 1 minute.

Lorazepam (Ativan): IV/IM formulation: 2 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV, IM	0.05- 0.1 mg/kg	2-3 m	6-8 hrs	0.7-1.4 mg	0.35-0.7 ml

Alerts: Check concentration (4 mg/ml also available). Resp depression, especially with fast IV push.

Comments: Best first seizure drug. Decrease dose by ½ if given with morphine.

Yellow Weight 14 kg Yellow

Heart rate 80 to 125

SBP 100 to 109

Resp 22 to 30

Methohexital (Brevital): IV/ PR (1% solution): 500 mg/ 50 ml = 10 mg/ml

IM (5% solution): 500 mg/10ml = 50 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV	1 mg/kg	1 m	10 m	14 mg	1.4 ml of 10 mg/ml
IM	6 mg/kg	2-10 m	1-1½ hr	84 mg	1.68 ml of 50 mg/ml
Rectal	25 mg/kg	5-15 m	1-1½ hr	350 mg	35 ml of 10 mg/ml

Alerts: Resp depression. Note there is a different dilution for IV/PR versus IM administration. Do not use with hypoperfusion.

Comments: Deep sedation drug. Continuous monitoring essential.

Midazolam (Versed): IV/IM formulation: 1 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV, IM	0.05-0.1 mg/kg	1-5 m	½-1 hr	0.7-1.4 mg	0.7-1.4 ml

Alerts: Check concentration (also available in 5 mg/ml). Watch for resp depression, especially with rapid IV push.

Comments: Decrease dose by ½ if given with morphine. May increase dose by 0.1 mg/kg every 5 minutes, to a **maximum** of 0.4 mg/kg to attain seizure control or sedation. Max 2 mg single dose IV, max total IV dose 6 mg.

Morphine: IV/IM formulations (multiple): 5 or 10 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV, IM	0.05-0.1 mg/kg	1-3 m	1-2 hrs	0.7-1.4 mg	0.14-0.28 ml of 5 mg/ml

Alerts: Check concentration (multiple formulations). Adjust dose for renal impairment. May cause hypotension or resp depression, nausea, emesis, or pruritis.

Comments: May repeat dose q 5-15 minutes to desired effect. Decrease dose by ½ if given with barbiturates, hydroxyzine/diphenhydramine, or with other benzodiazepines.

Yellow Weight 14 kg Yellow

Heart rate 80 to 125 SBP 100 to 109 Resp 22 to 30

Pentobarbital (Nembutal): IV/IM formulation: 50 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV	1-2 mg/kg	3-5 m	15-45 m	14-28 mg	0.28-0.56 ml
IM	5 mg/kg	10 m	1-4 hrs	70 mg	1.4 ml

Alerts: May cause hypotension. Paradoxical excitement may occur when administered (small doses of morphine can ameliorate this effect).

Comments: Not first line drug for imaging sedation—use etomidate. Decrease dose by ½ if given with morphine. Do not inject >50 mg/min. Lasts longer than methohexital.

Yellow Weight 14 kg Yellow

Heart rate 80 to 125 SBP 100 to 109 Resp 22 to 30

Reversal Agents

Flumazenil (Romazicon): IV formulation: 0.1 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV	0.01 mg/kg	1-2 m	20-60 m	0.14 mg	1.4 ml
Alerts: Contraindicated if benzodiazepine addiction or concomitant tricyclic antidepressant overdose.					
Comments: May repeat 0.02 mg/kg q1 min up to a total of 1 mg.					

Naloxone (Narcan): IV/IO/IM/IN/ET formulation: 0.4 mg/ml, or 1 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV, IO, IM, SC, IN, ET	0.1 mg/kg	<2 m (IV, IO), 2-5 m (IM, SC, IN, ET)	30-60 m	1.4 mg	1.4 ml of 1 mg/ml
Alerts: Careful with concentration. Use with extreme caution in neonates to avoid seizures. Contraindicated if hypersensitivity to naloxone.					
Comments: May repeat 0.05 mg/kg q2-3 min up to total 2 mg. Max single dose 2 mg. Titrate dose for either partial or complete opiate reversal.					

Yellow Weight 14 kg Yellow

Heart rate 80 to 125

SBP 100 to 109

Resp 22 to 30

Topical Pain Management

EMLA (Eutectic Mixture of Local Anesthetics): Formulation: lidocaine 2.5% & prilocaine 2.5% cream (5 g tube)

Route	Max dose	Max area of coverage	Onset	Duration
Topical	10 g	100 cm ² area of skin	60 m	2-3 hrs
Alerts: Do not apply to mucous membranes or open wounds. Apply for no longer than 4 hours. Contraindicated if hypersensitivity to lidocaine or prilocaine. Comments: May cause methemoglobinemia. Anesthesia lasts 1-2 hrs after removal of cream.				

LET (lidocaine, epinephrine, tetracaine): Formulation: Lidocaine 4%, Epinephrine 1:1000, & Tetracaine 0.5% (3 ml bottle)

Route	Dose	Onset	Duration
Topical	1-2 ml	10 m	1-2 hrs
Alerts: Do not use on fingertips, toes, nose, or penis. Max dose is 8 mg/kg of lidocaine. Contraindicated if hypersensitivity to lidocaine, epinephrine, or tetracaine. Avoid contact with mucous membranes. Comments: For facial lacerations, apply solution with dropper or gauze (gel is better).			

Lidocaine 1% (Xylocaine): Formulation: Lidocaine 1% (10 mg/ml)

Route	Max Dose	Onset	Duration
Infiltration	6.3 ml	Rapid	½-1 hr
Alerts: Do not exceed 4-5 mg/kg due to risk of seizures, or 8 mg/kg if combined with epinephrine. Do not use lidocaine/epinephrine combo on fingertips, toes, nose, or penis. Comments: Buffer lidocaine injection (lidocaine 1%) as a 1:10 mixture of 1 part sodium bicarbonate solution in 9 parts of lidocaine 1% to reduce pain of injection.			

White Weight 15 kg White

Heart rate 80 to 125

SBP 100 to 109

Resp 22 to 30

Acetaminophen (Tylenol):

Oral drops: 80 mg/0.8 ml = 100 mg/ml

Oral elixir: 160 mg/5 ml

Suppositories: 120 mg, 325 mg, 650 mg

Route	Dose per kg	Onset	Duration	Dose	ml to give
PO, PR	15 mg/kg	30 m	4 hr	225 mg	7 ml of 160 mg/5 ml

Alerts: Check concentration, as there are many different formulations.

Comments: Equivalent to NSAID's for pain and fever, but has no anti-inflammatory effect. Oral liquid can be 100 mg/ml infant drops OR children's suspension 160 mg/5ml. Suppository also available as above. Do not exceed 5 doses per day and use with extreme caution in children with hepatic dysfunction.

Diazepam: Intravenous formulation (same for IV or PR): 5 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV	0.2 mg/kg	1-3 m	0.5 hr	3 mg	0.6 ml
PR	0.5 mg/kg	2-15 m	0.5 hr	5 mg (max)	1 ml

Alerts: Resp depression with fast IV push. Rectal gel available at 2.5 mg/ml.

Comments: Not a first line drug. Works for status epilepticus, but midazolam or lorazepam preferred. Works for sedation but midazolam or lorazepam preferred. Push slowly IV. May repeat IV dose q 10 minutes prn, with max total dose of 5 mg. Decrease dose by ½ if given with morphine. IV solution can be administered with lubricated TB syringe (no needle) into rectum. Rectal gel easier to insert into rectum, but expensive.

Etomidate: Intravenous formulation: 2 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV	0.2 mg/kg	30-60 sec	2-15 min	3 mg	Sedation dose 1.5 ml
IV	0.3 mg/kg	30-60 sec	5-15 min	4.5 mg	RSI dose 2.25 ml

Alerts: Give lower dose for sedation for imaging. Watch for myoclonus, vomiting.

Comments: Use starting dose of 0.2 mg/kg for sedation for imaging.

Use with narcotic (e.g., fentanyl) for procedural sedation.

Use higher dose of 0.3 mg/kg for induction for rapid sequence intubation.

Increase by 0.05 mg/kg every 60-90 seconds to maximum of 0.4 mg/kg (**4 mg**).

15 kg

White Weight 15 kg White

Heart rate 80 to 125

SBP 100 to 109

Resp 22 to 30

Fentanyl: IV/IM formulation: 100 mcg/2ml = 50 mcg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV, IM	1 mcg/kg	<1 m IV 7-15 m IM	30-60 m	15 mcg	0.3 ml
Alerts: Resp depression, reversible with naloxone. Avoid rapid infusion, as it may lead to rigid chest syndrome and need for respiratory support. Comments: Start with 1 mcg/kg. Max 100 mcg single dose. May repeat dose q5-10 minutes prn. The respiratory depressant effects may last longer than analgesic effects. Best drug for major trauma cases and possible hypoperfusion.					

Fentanyl (Intranasal): Use IV formulation for intranasal administration:
100 mcg/2ml = 50 mcg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IN	2 mcg/kg	1-2 m	½-2 hr	30 mcg	0.6 ml
Alerts: Atomizer needed to nebulize drug intranasally to maximize absorption. Comments: Put half of each dose in each nostril. May repeat 0.5 mcg/kg dose q 5-10 minutes prn. The respiratory depressant effects may last longer than analgesic effects. Use when vascular access unavailable or unnecessary. Has not been trialed on <3 yo.					

Hydromorphone (Dilaudid): IV/IM formulation: 2 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV, IM	0.02 mg/kg	2-5 m	4-5 hr	0.3 mg	0.15 ml
Alerts: Resp depression possible. Contraindicated in status asthmaticus. Comments: Not recommended for children intolerant or unresponsive to morphine. Excellent alternative to morphine for sickle cell pain. 1 mg hydromorphone = 7 mg morphine.					

15 kg

White Weight 15 kg White

Heart rate 80 to 125

SBP 100 to 109

Resp 22 to 30

Ibuprofen (Motrin): Formulation: Oral liquid 100 mg/5ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
PO	10 mg/kg	30 m	6 hr	150 mg	7.5 ml of 100 mg/5 ml

Alerts: Contraindicated if hypersensitive to NSAID's. Use with extreme caution in patients with decreased renal function.

Comments: Excellent first line analgesic and antipyretic. Use when an anti-inflammatory effect is desired in patients with pain or fever.

Ketamine: IV/IM formulation: 50 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV	1-2 mg/kg	30 sec	15-30 m	15-30 mg	0.3- 0.6 ml
IM	5 mg/kg	3-5 m	30-90 m	75 mg	1.5 ml

Alerts: Laryngospasm, hypersalivation, vomiting. Contraindicated if increased intracranial or intraocular pressure. Watch for emergence reaction, nausea/vomiting.

Comments: No atropine needed. Do not exceed injection rate of 0.5 mg/kg/min or give the dose in less than 1 minute.

Lorazepam (Ativan): IV/IM formulation: 2 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV, IM	0.05- 0.1 mg/kg	2-3 m	6-8 hrs	0.75-1.5 mg	0.38-0.75 ml

Alerts: Check concentration (4 mg/ml also available). Resp depression, especially with fast IV push.

Comments: Best first seizure drug. Decrease dose by ½ if given with morphine.

White Weight 15 kg White

Heart rate 80 to 125

SBP 100 to 109

Resp 22 to 30

Methohexital (Brevital): IV/ PR (1% solution): 500 mg/ 50 ml = 10 mg/ml

IM (5% solution): 500 mg/10ml = 50 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV	1 mg/kg	1 m	10 m	15 mg	1.5 ml of 10 mg/ml
IM	6 mg/kg	2-10 m	1-1½ hr	90 mg	1.8 ml of 50 mg/ml
Rectal	25 mg/kg	5-15 m	1-1½ hr	375 mg	37.5ml of 10 mg/ml
Alerts: Resp depression. Note there is a different dilution for IV/PR versus IM administration. Do not use with hypoperfusion. Comments: Deep sedation drug. Continuous monitoring essential.					

Midazolam (Versed): IV/IM formulation: 1 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV, IM	0.05-0.1 mg/kg	1-5 m	½-1 hr	0.75-1.5 mg	0.75-1.5 ml
Alerts: Check concentration (also available in 5 mg/ml). Watch for resp depression, especially with rapid IV push. Comments: Decrease dose by ½ if given with morphine. May increase dose by 0.1 mg/kg every 5 minutes, to a maximum of 0.4 mg/kg to attain seizure control or sedation. Max 2 mg single dose IV, max total IV dose 6 mg.					

Morphine: IV/IM formulations (multiple): 5 or 10 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV, IM	0.05-0.1 mg/kg	1-3 m	1-2 hrs	0.75-1.5 mg	0.15-0.3 ml of 5 mg/ml
Alerts: Check concentration (multiple formulations). Adjust dose for renal impairment. May cause hypotension or resp depression, nausea, emesis, or pruritis. Comments: May repeat dose q 5-15 minutes to desired effect. Decrease dose by ½ if given with barbiturates, hydroxyzine/diphenhydramine, or with other benzodiazepines.					

15 kg

White Weight 15 kg White

Heart rate 80 to 125

SBP 100 to 109

Resp 22 to 30

Pentobarbital (Nembutal): IV/IM formulation: 50 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV	1-2 mg/kg	3-5 m	15-45 m	15-30 mg	0.3-0.6 ml
IM	5 mg/kg	10 m	1-4 hrs	75 mg	1.5 ml

Alerts: May cause hypotension. Paradoxical excitement may occur when administered (small doses of morphine can ameliorate this effect).

Comments: Not first line drug for imaging sedation—use etomidate. Decrease dose by ½ if given with morphine. Do not inject >50 mg/min. Lasts longer than methohexital.

White Weight 15 kg White

Heart rate 80 to 125

SBP 100 to 109

Resp 22 to 30

Reversal Agents

Flumazenil (Romazicon): IV formulation: 0.1 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV	0.01 mg/kg	1-2 m	20-60 m	0.15 mg	1.5 ml
Alerts: Contraindicated if benzodiazepine addiction or concomitant tricyclic antidepressant overdose.					
Comments: May repeat 0.02 mg/kg q1 min up to a total of 1 mg.					

Naloxone (Narcan): IV/IO/IM/IN/ET formulation: 0.4 mg/ml, or 1 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV, IO, IM, SC, IN, ET	0.1 mg/kg	<2 m (IV, IO), 2-5 m (IM, SC, IN, ET)	30-60 m	1.5 mg	1.5 ml of 1 mg/ml
Alerts: Careful with concentration. Use with extreme caution in neonates to avoid seizures. Contraindicated if hypersensitivity to naloxone.					
Comments: May repeat 0.05 mg/kg q2-3 min up to total 2 mg. Max single dose 2 mg. Titrate dose for either partial or complete opiate reversal.					

White Weight 15 kg White

Heart rate 80 to 125

SBP 100 to 109

Resp 22 to 30

Topical Pain Management

EMLA (Eutectic Mixture of Local Anesthetics): Formulation: lidocaine 2.5% & prilocaine 2.5% cream (5 g tube)

Route	Max dose	Max area of coverage	Onset	Duration
Topical	10 g	100 cm ² area of skin	60 m	2-3 hrs
Alerts: Do not apply to mucous membranes or open wounds. Apply for no longer than 4 hours. Contraindicated if hypersensitivity to lidocaine or prilocaine. Comments: May cause methemoglobinemia. Anesthesia lasts 1-2 hrs after removal of cream.				

LET (lidocaine, epinephrine, tetracaine): Formulation: Lidocaine 4%, Epinephrine 1:1000, & Tetracaine 0.5% (3 ml bottle)

Route	Dose	Onset	Duration
Topical	1-2 ml	10 m	1-2 hrs
Alerts: Do not use on fingertips, toes, nose, or penis. Max dose is 8 mg/kg of lidocaine. Contraindicated if hypersensitivity to lidocaine, epinephrine, or tetracaine. Avoid contact with mucous membranes. Comments: For facial lacerations, apply solution with dropper or gauze (gel is better).			

Lidocaine 1% (Xylocaine): Formulation: Lidocaine 1% (10 mg/ml)

Route	Max Dose	Onset	Duration
Infiltration	6.8 ml	Rapid	½-1 hr
Alerts: Do not exceed 4-5 mg/kg due to risk of seizures, or 8 mg/kg if combined with epinephrine. Do not use lidocaine/epinephrine combo on fingertips, toes, nose, or penis. Comments: Buffer lidocaine injection (lidocaine 1%) as a 1:10 mixture of 1 part sodium bicarbonate solution in 9 parts of lidocaine 1% to reduce pain of injection.			

15 kg

White Weight 16 kg White

Heart rate 80 to 125

SBP 102 to 111

Resp 20 to 24

Acetaminophen (Tylenol):

Oral elixir: 160 mg/5 ml

Suppositories: 120 mg, 325 mg, 650 mg

Route	Dose per kg	Onset	Duration	Dose	ml to give
PO, PR	15 mg/kg	30 m	4 hr	240 mg	7.5 ml of 160 mg/5 ml

Alerts: Check concentration, as there are many different formulations.

Comments: Equivalent to NSAID's for pain and fever, but has no anti-inflammatory effect. Oral liquid can be 100 mg/ml infant drops OR children's suspension 160 mg/5ml. Suppository also available as above. Do not exceed 5 doses per day and use with extreme caution in children with hepatic dysfunction.

Diazepam: Intravenous formulation (same for IV or PR): 5 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV	0.2 mg/kg	1-3 m	0.5 hr	3.2 mg	0.64 ml
PR	0.5 mg/kg	2-15 m	0.5 hr	5 mg (max)	1 ml

Alerts: Resp depression with fast IV push. Rectal gel available at 2.5 mg/ml.

Comments: Not a first line drug. Works for status epilepticus, but midazolam or lorazepam preferred. Works for sedation but midazolam or lorazepam preferred. Push slowly IV. May repeat IV dose q 10 minutes prn, with max total dose of 5 mg. Decrease dose by ½ if given with morphine. IV solution can be administered with lubricated TB syringe (no needle) into rectum. Rectal gel easier to insert into rectum, but expensive.

Etomidate: Intravenous formulation: 2 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV	0.2 mg/kg	30-60 sec	2-15 min	3.2 mg	Sedation dose 1.6 ml
IV	0.3 mg/kg	30-60 sec	5-15 min	4.8 mg	RSI dose 2.4 ml

Alerts: Give lower dose for sedation for imaging. Watch for myoclonus, vomiting.

Comments: Use starting dose of 0.2 mg/kg for sedation for imaging.

Use with narcotic (e.g., fentanyl) for procedural sedation.

Use higher dose of 0.3 mg/kg for induction for rapid sequence intubation.

Increase by 0.05 mg/kg every 60-90 seconds to maximum of 0.4 mg/kg (4 mg).

16 kg

White Weight 16 kg White

Heart rate 80 to 125

SBP 102 to 111

Resp 20 to 24

Fentanyl: IV/IM formulation: 100 mcg/2ml = 50 mcg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV, IM	1 mcg/kg	<1 m IV 7-15 m IM	30-60 m	16 mcg	0.32 ml
Alerts: Resp depression, reversible with naloxone. Avoid rapid infusion, as it may lead to rigid chest syndrome and need for respiratory support. Comments: Start with 1 mcg/kg. Max 100 mcg single dose. May repeat dose q5-10 minutes prn. The respiratory depressant effects may last longer than analgesic effects. Best drug for major trauma cases and possible hypoperfusion.					

Fentanyl (Intranasal): Use IV formulation for intranasal administration:
100 mcg/2ml = 50 mcg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IN	2 mcg/kg	1-2 m	½-2 hr	32 mcg	0.64 ml
Alerts: Atomizer needed to nebulize drug intranasally to maximize absorption. Comments: Put half of each dose in each nostril. May repeat 0.5 mcg/kg dose q 5-10 minutes prn. The respiratory depressant effects may last longer than analgesic effects. Use when vascular access unavailable or unnecessary. Has not been trialed on <3 yo.					

Hydromorphone (Dilaudid): IV/IM formulation: 2 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV, IM	0.02 mg/kg	2-5 m	4-5 hr	0.32 mg	0.16 ml
Alerts: Resp depression possible. Contraindicated in status asthmaticus. Comments: Not recommended for children intolerant or unresponsive to morphine. Excellent alternative to morphine for sickle cell pain. 1 mg hydromorphone = 7 mg morphine.					

White Weight 16 kg White

Heart rate 80 to 125

SBP 102 to 111

Resp 20 to 24

Ibuprofen (Motrin): Formulation: 100 mg/5ml children's suspension

Route	Dose per kg	Onset	Duration	Dose	ml to give
PO	10 mg/kg	30 m	6 hr	160 mg	8 ml of 100 mg/5 ml
Alerts: Contraindicated if hypersensitive to NSAID's. Use with extreme caution in patients with decreased renal function. Comments: Excellent first line analgesic and antipyretic. Use when an anti-inflammatory effect is desired in patients with pain or fever.					

Ketamine: IV/IM formulation: 50 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV	1-2 mg/kg	30 sec	15-30 m	16-32 mg	0.32-0.64 ml
IM	5 mg/kg	3-5 m	30-90 m	80 mg	1.6 ml
Alerts: Laryngospasm, hypersalivation, vomiting. Contraindicated if increased intracranial or intraocular pressure. Watch for emergence reaction, nausea/vomiting. Comments: No atropine needed. Do not exceed injection rate of 0.5 mg/kg/min or give the dose in less than 1 minute.					

Lorazepam (Ativan): IV/IM formulation: 2 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV, IM	0.05- 0.1 mg/kg	2-3 m	6-8 hrs	0.8-1.6 mg	0.4-0.8 ml
Alerts: Check concentration (4 mg/ml also available). Resp depression, especially with fast IV push. Comments: Best first seizure drug. Decrease dose by ½ if given with morphine.					

White Weight 16 kg White

Heart rate 80 to 125

SBP 102 to 111

Resp 20 to 24

Methohexital (Brevital): IV/ PR (1% solution): 500 mg/ 50 ml = 10 mg/ml

IM (5% solution): 500 mg/10ml = 50 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV	1 mg/kg	1 m	10 m	16 mg	1.6 ml of 10 mg/ml
IM	6 mg/kg	2-10 m	1-1½ hr	96 mg	1.92 ml of 50 mg/ml
Rectal	25 mg/kg	5-15 m	1-1½ hr	400 mg	40 ml of 10 mg/ml
Alerts: Resp depression. Note there is a different dilution for IV/PR versus IM administration. Do not use with hypoperfusion. Comments: Deep sedation drug. Continuous monitoring essential.					

Midazolam (Versed): IV/IM formulation: 1 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV, IM	0.05-0.1 mg/kg	1-5 m	½-1 hr	0.8-1.6 mg	0.8-1.6 ml
Alerts: Check concentration (also available in 5 mg/ml). Watch for resp depression, especially with rapid IV push. Comments: Decrease dose by ½ if given with morphine. May increase dose by 0.1 mg/kg every 5 minutes, to a maximum of 0.4 mg/kg to attain seizure control or sedation. Max 2 mg single dose IV, max total IV dose 6 mg.					

Morphine: IV/IM formulations (multiple): 5 or 10 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV, IM	0.05-0.1 mg/kg	1-3 m	1-2 hrs	0.8-1.6 mg	0.16-0.32 ml of 5 mg/ml
Alerts: Check concentration (multiple formulations). Adjust dose for renal impairment. May cause hypotension or resp depression, nausea, emesis, or pruritis. Comments: May repeat dose q 5-15 minutes to desired effect. Decrease dose by ½ if given with barbiturates, hydroxyzine/diphenhydramine, or with other benzodiazepines.					

16 kg

White Weight 16 kg White

Heart rate 80 to 125

SBP 102 to 111

Resp 20 to 24

Pentobarbital (Nembutal): IV/IM formulation: 50 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV	1-2 mg/kg	3-5 m	15-45 m	16-32 mg	0.32-0.64 ml
IM	5 mg/kg	10 m	1-4 hrs	80 mg	1.6 ml

Alerts: May cause hypotension. Paradoxical excitement may occur when administered (small doses of morphine can ameliorate this effect).

Comments: Not first line drug for imaging sedation—use etomidate. Decrease dose by ½ if given with morphine. Do not inject >50 mg/min. Lasts longer than methohexital.

White Weight 16 kg White

Heart rate 80 to 125

SBP 102 to 111

Resp 20 to 24

Reversal Agents

Flumazenil (Romazicon): IV formulation: 0.1 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV	0.01 mg/kg	1-2 m	20-60 m	0.16 mg	1.6 ml
Alerts: Contraindicated if benzodiazepine addiction or concomitant tricyclic antidepressant overdose.					
Comments: May repeat 0.02 mg/kg q1 min up to a total of 1 mg.					

Naloxone (Narcan): IV/IO/IM/IN/ET formulation: 0.4 mg/ml, or 1 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV, IO, IM, SC, IN, ET	0.1 mg/kg	<2 m (IV, IO), 2-5 m (IM, SC, IN, ET)	30-60 m	1.6 mg	1.6 ml of 1 mg/ml
Alerts: Careful with concentration. Use with extreme caution in neonates to avoid seizures. Contraindicated if hypersensitivity to naloxone.					
Comments: May repeat 0.05 mg/kg q2-3 min up to total 2 mg. Max single dose 2 mg. Titrate dose for either partial or complete opiate reversal.					

White Weight 16 kg White

Heart rate 80 to 125 SBP 102 to 111 Resp 20 to 24

Topical Pain Management

EMLA (Eutectic Mixture of Local Anesthetics): Formulation: lidocaine 2.5% & prilocaine 2.5% cream (5 g tube)

Route	Max dose	Max area of coverage	Onset	Duration
Topical	10 g	100 cm ² area of skin	60 m	2-3 hrs
Alerts: Do not apply to mucous membranes or open wounds. Apply for no longer than 4 hours. Contraindicated if hypersensitivity to lidocaine or prilocaine. Comments: May cause methemoglobinemia. Anesthesia lasts 1-2 hrs after removal of cream.				

LET (lidocaine, epinephrine, tetracaine): Formulation: Lidocaine 4%, Epinephrine 1:1000, & Tetracaine 0.5% (3 ml bottle)

Route	Dose	Onset	Duration
Topical	1-2 ml	10 m	1-2 hrs
Alerts: Do not use on fingertips, toes, nose, or penis. Max dose is 8 mg/kg of lidocaine. Contraindicated if hypersensitivity to lidocaine, epinephrine, or tetracaine. Avoid contact with mucous membranes. Comments: For facial lacerations, apply solution with dropper or gauze (gel is better).			

Lidocaine 1% (Xylocaine): Formulation: Lidocaine 1% (10 mg/ml)

Route	Max Dose	Onset	Duration
Infiltration	7.2 ml	Rapid	½-1 hr
Alerts: Do not exceed 4-5 mg/kg due to risk of seizures, or 8 mg/kg if combined with epinephrine. Do not use lidocaine/epinephrine combo on fingertips, toes, nose, or penis. Comments: Buffer lidocaine injection (lidocaine 1%) as a 1:10 mixture of 1 part sodium bicarbonate solution in 9 parts of lidocaine 1% to reduce pain of injection.			

White Weight 17 kg White

Heart rate 80 to 125

SBP 102 to 111

Resp 20 to 24

Acetaminophen (Tylenol):

Oral elixir: 160 mg/5 ml

Suppositories: 120 mg, 325 mg, 650 mg

Route	Dose per kg	Onset	Duration	Dose	ml to give
PO, PR	15 mg/kg	30 m	4 hr	255 mg	8 ml of 160 mg/5 ml
Alerts: Check concentration, as there are many different formulations. Comments: Equivalent to NSAID's for pain and fever, but has no anti-inflammatory effect. Oral liquid can be 100 mg/ml infant drops OR children's suspension 160 mg/5ml. Suppository also available as above. Do not exceed 5 doses per day and use with extreme caution in children with hepatic dysfunction.					

Diazepam: Intravenous formulation (same for IV or PR): 5 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV	0.2 mg/kg	1-3 m	0.5 hr	3.4 mg	0.68 ml
PR	0.5 mg/kg	2-15 m	0.5 hr	5 mg (max)	1 ml
Alerts: Resp depression with fast IV push. Rectal gel available at 2.5 mg/ml. Comments: Not a first line drug. Works for status epilepticus, but midazolam or lorazepam preferred. Works for sedation but midazolam or lorazepam preferred. Push slowly IV. May repeat IV dose q 10 minutes prn, with max total dose of 5 mg. Decrease dose by ½ if given with morphine. IV solution can be administered with lubricated TB syringe (no needle) into rectum. Rectal gel easier to insert into rectum, but expensive.					

Etomidate: Intravenous formulation: 2 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV	0.2 mg/kg	30-60 sec	2-15 min	3.4 mg	Sedation dose 1.7 ml
IV	0.3 mg/kg	30-60 sec	5-15 min	5.1 mg	RSI dose 2.55 ml
Alerts: Give lower dose for sedation for imaging. Watch for myoclonus, vomiting. Comments: Use starting dose of 0.2 mg/kg for sedation for imaging. Use with narcotic (e.g., fentanyl) for procedural sedation. Use higher dose of 0.3 mg/kg for induction for rapid sequence intubation. Increase by 0.05 mg/kg every 60-90 seconds to maximum of 0.4 mg/kg (4 mg).					

17 kg

White Weight 17 kg White

Heart rate 80 to 125

SBP 102 to 111

Resp 20 to 24

Fentanyl: IV/IM formulation: 100 mcg/2ml = 50 mcg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV, IM	1 mcg/kg	<1 m IV 7-15 m IM	30-60 m	17 mcg	0.34 ml
Alerts: Resp depression, reversible with naloxone. Avoid rapid infusion, as it may lead to rigid chest syndrome and need for respiratory support. Comments: Start with 1 mcg/kg. Max 100 mcg single dose. May repeat dose q5-10 minutes prn. The respiratory depressant effects may last longer than analgesic effects. Best drug for major trauma cases and possible hypoperfusion.					

Fentanyl (Intranasal): Use IV formulation for intranasal administration:
100 mcg/2ml = 50 mcg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IN	2 mcg/kg	1-2 m	½-2 hr	34 mcg	0.68 ml
Alerts: Atomizer needed to nebulize drug intranasally to maximize absorption. Comments: Put half of each dose in each nostril. May repeat 0.5 mcg/kg dose q 5-10 minutes prn. The respiratory depressant effects may last longer than analgesic effects. Use when vascular access unavailable or unnecessary. Has not been trialed on <3 yo.					

Hydromorphone (Dilaudid): IV/IM formulation: 2 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV, IM	0.02 mg/kg	2-5 m	4-5 hr	0.34 mg	0.17 ml
Alerts: Resp depression possible. Contraindicated in status asthmaticus. Comments: Not recommended for children intolerant or unresponsive to morphine. Excellent alternative to morphine for sickle cell pain. 1 mg hydromorphone = 7 mg morphine.					

White Weight 17 kg White

Heart rate 80 to 125

SBP 102 to 111

Resp 20 to 24

Ibuprofen (Motrin): Formulation: 100 mg/5ml children's suspension

Route	Dose per kg	Onset	Duration	Dose	ml to give
PO	10 mg/kg	30 m	6 hr	170 mg	8.5 ml of 100 mg/5 ml
Alerts: Contraindicated if hypersensitive to NSAID's. Use with extreme caution in patients with decreased renal function. Comments: Excellent first line analgesic and antipyretic. Use when an anti-inflammatory effect is desired in patients with pain or fever.					

Ketamine: IV/IM formulation: 50 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV	1-2 mg/kg	30 sec	15-30 m	17-34 mg	0.34-0.68 ml
IM	5 mg/kg	3-5 m	30-90 m	85 mg	1.7 ml
Alerts: Laryngospasm, hypersalivation, vomiting. Contraindicated if increased intracranial or intraocular pressure. Watch for emergence reaction, nausea/vomiting. Comments: No atropine needed. Do not exceed injection rate of 0.5 mg/kg/min or give the dose in less than 1 minute.					

Lorazepam (Ativan): IV/IM formulation: 2 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV, IM	0.05- 0.1 mg/kg	2-3 m	6-8 hrs	0.85-1.7 mg	0.43-0.85 ml
Alerts: Check concentration (4 mg/ml also available). Resp depression, especially with fast IV push. Comments: Best first seizure drug. Decrease dose by ½ if given with morphine.					

White Weight 17 kg White

Heart rate 80 to 125 SBP 102 to 111 Resp 20 to 24

Methohexital (Brevital): IV/ PR (1% solution): 500 mg/ 50 ml = 10 mg/ml
IM (5% solution): 500 mg/10ml = 50 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV	1 mg/kg	1 m	10 m	17mg	1.7 ml of 10 mg/ml
IM	6 mg/kg	2-10 m	1-1½ hr	102 mg	2.04 ml of 50 mg/ml
Rectal	25 mg/kg	5-15 m	1-1½ hr	425 mg	42.5 ml of 10 mg/ml
Alerts: Resp depression. Note there is a different dilution for IV/PR versus IM administration. Do not use with hypoperfusion. Comments: Deep sedation drug. Continuous monitoring essential.					

White Weight 17 kg White

Heart rate 80 to 125

SBP 102 to 111

Resp 20 to 24

Midazolam (Versed): IV/IM formulation: 1 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV, IM	0.05-0.1 mg/kg	1-5 m	½-1 hr	0.85-1.7 mg	0.85-1.7 ml
Alerts: Check concentration (also available in 5 mg/ml). Watch for resp depression, especially with rapid IV push. Comments: Decrease dose by ½ if given with morphine. May increase dose by 0.1 mg/kg every 5 minutes, to a maximum of 0.4 mg/kg to attain seizure control or sedation. Max 2 mg single dose IV, max total IV dose 6 mg.					

Morphine: IV/IM formulations (multiple): 5 or 10 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV, IM	0.05-0.1 mg/kg	1-3 m	1-2 hrs	0.85-1.7 mg	0.17-0.34 ml of 5 mg/ml
Alerts: Check concentration (multiple formulations). Adjust dose for renal impairment. May cause hypotension or resp depression, nausea, emesis, or pruritis. Comments: May repeat dose q 5-15 minutes to desired effect. Decrease dose by ½ if given with barbiturates, hydroxyzine/diphenhydramine, or with other benzodiazepines.					

Pentobarbital (Nembutal): IV/IM formulation: 50 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV	1-2 mg/kg	3-5 m	15-45 m	17-34 mg	0.34-0.68 ml
IM	5 mg/kg	10 m	1-4 hrs	85 mg	1.7 ml
Alerts: May cause hypotension. Paradoxical excitement may occur when administered (small doses of morphine can ameliorate this effect). Comments: Not first line drug for imaging sedation—use etomidate. Decrease dose by ½ if given with morphine. Do not inject >50 mg/min. Lasts longer than methohexital.					

White Weight 17 kg White

Heart rate 80 to 125

SBP 102 to 111

Resp 20 to 24

Reversal Agents

Flumazenil (Romazicon): IV formulation: 0.1 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV	0.01 mg/kg	1-2 m	20-60 m	0.17 mg	1.7 ml
Alerts: Contraindicated if benzodiazepine addiction or concomitant tricyclic antidepressant overdose.					
Comments: May repeat 0.02 mg/kg q1 min up to a total of 1 mg.					

Naloxone (Narcan): IV/IO/IM/IN/ET formulation: 0.4 mg/ml, or 1 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV, IO, IM, SC, IN, ET	0.1 mg/kg	<2 m (IV, IO), 2-5 m (IM, SC, IN, ET)	30-60 m	1.7 mg	1.7 ml of 1 mg/ml
Alerts: Careful with concentration. Use with extreme caution in neonates to avoid seizures. Contraindicated if hypersensitivity to naloxone.					
Comments: May repeat 0.05 mg/kg q2-3 min up to total 2 mg. Max single dose 2 mg. Titrate dose for either partial or complete opiate reversal.					

White Weight 17 kg White

Heart rate 80 to 125

SBP 102 to 111

Resp 20 to 24

Topical Pain Management

EMLA (Eutectic Mixture of Local Anesthetics): Formulation: lidocaine 2.5% & prilocaine 2.5% cream (5 g tube)

Route	Max dose	Max area of coverage	Onset	Duration
Topical	10 g	100 cm ² area of skin	60 m	2-3 hrs
Alerts: Do not apply to mucous membranes or open wounds. Apply for no longer than 4 hours. Contraindicated if hypersensitivity to lidocaine or prilocaine. Comments: May cause methemoglobinemia. Anesthesia lasts 1-2 hrs after removal of cream.				

LET (lidocaine, epinephrine, tetracaine): Formulation: Lidocaine 4%, Epinephrine 1:1000, & Tetracaine 0.5% (3 ml bottle)

Route	Dose	Onset	Duration
Topical	1-2 ml	10 m	1-2 hrs
Alerts: Do not use on fingertips, toes, nose, or penis. Max dose is 8 mg/kg of lidocaine. Contraindicated if hypersensitivity to lidocaine, epinephrine, or tetracaine. Avoid contact with mucous membranes. Comments: For facial lacerations, apply solution with dropper or gauze (gel is better).			

Lidocaine 1% (Xylocaine): Formulation: Lidocaine 1% (10 mg/ml)

Route	Max Dose	Onset	Duration
Infiltration	7.7 ml	Rapid	½-1 hr
Alerts: Do not exceed 4-5 mg/kg due to risk of seizures, or 8 mg/kg if combined with epinephrine. Do not use lidocaine/epinephrine combo on fingertips, toes, nose, or penis. Comments: Buffer lidocaine injection (lidocaine 1%) as a 1:10 mixture of 1 part sodium bicarbonate solution in 9 parts of lidocaine 1% to reduce pain of injection.			

White Weight 18 kg White

Heart rate 70 to 115

SBP 104 to 112

Resp 20 to 24

Acetaminophen (Tylenol):

Oral elixir: 160 mg/5 ml

Suppositories: 120 mg, 325 mg, 650 mg

Route	Dose per kg	Onset	Duration	Dose	ml to give
PO, PR	15 mg/kg	30 m	4 hr	270 mg	8.4 ml of 160 mg/5 ml
Alerts: Check concentration, as there are many different formulations. Comments: Equivalent to NSAID's for pain and fever, but has no anti-inflammatory effect. Oral liquid can be 100 mg/ml infant drops OR children's suspension 160 mg/5ml. Suppository also available as above. Do not exceed 5 doses per day and use with extreme caution in children with hepatic dysfunction.					

Diazepam: Intravenous formulation (same for IV or PR): 5 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV	0.2 mg/kg	1-3 m	0.5 hr	3.6 mg	0.72 ml
PR	0.5 mg/kg	2-15 m	0.5 hr	5 mg (max)	1 ml
Alerts: Resp depression with fast IV push. Rectal gel available at 2.5 mg/ml. Comments: Not a first line drug. Works for status epilepticus, but midazolam or lorazepam preferred. Works for sedation but midazolam or lorazepam preferred. Push slowly IV. May repeat IV dose q 10 minutes prn, with max total dose of 10 mg. Decrease dose by ½ if given with morphine. IV solution can be administered with lubricated TB syringe (no needle) into rectum. Rectal gel easier to insert into rectum, but expensive.					

Etomidate: Intravenous formulation: 2 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV	0.2 mg/kg	30-60 sec	2-15 min	3.6 mg	Sedation dose 1.8 ml
IV	0.3 mg/kg	30-60 sec	5-15 min	5.4 mg	RSI dose 2.7 ml
Alerts: Give lower dose for sedation for imaging. Watch for myoclonus, vomiting. Comments: Use starting dose of 0.2 mg/kg for sedation for imaging. Use with narcotic (e.g., fentanyl) for procedural sedation. Use higher dose of 0.3 mg/kg for induction for rapid sequence intubation. Increase by 0.05 mg/kg every 60-90 seconds to maximum of 0.4 mg/kg (4 mg).					

18 kg

White Weight 18 kg White

Heart rate 70 to 115

SBP 104 to 112

Resp 20 to 24

Fentanyl: IV/IM formulation: 100 mcg/2ml = 50 mcg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV, IM	1 mcg/kg	<1 m IV 7-15 m IM	30-60 m	18 mcg	0.36 ml
<p>Alerts: Resp depression, reversible with naloxone. Avoid rapid infusion, as it may lead to rigid chest syndrome and need for respiratory support.</p> <p>Comments: Start with 1 mcg/kg. Max 100 mcg single dose. May repeat dose q5-10 minutes prn. The respiratory depressant effects may last longer than analgesic effects. Best drug for major trauma cases and possible hypoperfusion.</p>					

Fentanyl (Intranasal): Use IV formulation for intranasal administration:
100 mcg/2ml = 50 mcg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IN	2 mcg/kg	1-2 m	½-2 hr	36 mcg	0.72 ml
<p>Alerts: Atomizer needed to nebulize drug intranasally to maximize absorption.</p> <p>Comments: Put half of each dose in each nostril. May repeat 0.5 mcg/kg dose q 5-10 minutes prn. The respiratory depressant effects may last longer than analgesic effects. Use when vascular access unavailable or unnecessary. Has not been trialed on <3 yo.</p>					

Hydromorphone (Dilaudid): IV/IM formulation: 2 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV, IM	0.02 mg/kg	2-5 m	4-5 hr	0.36 mg	0.18 ml
<p>Alerts: Resp depression possible. Contraindicated in status asthmaticus.</p> <p>Comments: Not recommended for children intolerant or unresponsive to morphine. Excellent alternative to morphine for sickle cell pain. 1 mg hydromorphone = 7 mg morphine.</p>					

White Weight 18 kg White

Heart rate 70 to 115

SBP 104 to 112

Resp 20 to 24

Ibuprofen (Motrin): Formulation: Oral liquid 100 mg/5ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
PO	10 mg/kg	30 m	6 hr	180 mg	9 ml of 100 mg/5 ml
Alerts: Contraindicated if hypersensitive to NSAID's. Use with extreme caution in patients with decreased renal function. Comments: Excellent first line analgesic and antipyretic. Use when an anti-inflammatory effect is desired in patients with pain or fever.					

Ketamine: IV/IM formulation: 50 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV	1-2 mg/kg	30 sec	15-30 m	18-36 mg	0.36-0.72 ml
IM	5 mg/kg	3-5 m	30-90 m	90 mg	1.8 ml
Alerts: Laryngospasm, hypersalivation, vomiting. Contraindicated if increased intracranial or intraocular pressure. Watch for emergence reaction, nausea/vomiting. Comments: No atropine needed. Do not exceed injection rate of 0.5 mg/kg/min or give the dose in less than 1 minute.					

Lorazepam (Ativan): IV/IM formulation: 2 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV, IM	0.05- 0.1 mg/kg	2-3 m	6-8 hrs	0.9-1.8 mg	0.45-0.9 ml
Alerts: Check concentration (4 mg/ml also available). Resp depression, especially with fast IV push. Comments: Best first seizure drug. Decrease dose by ½ if given with morphine.					

White Weight 18 kg White

Heart rate 70 to 115 SBP 104 to 112 Resp 20 to 24

Methohexital (Brevital): IV/ PR (1% solution): 500 mg/ 50 ml = 10 mg/ml

IM (5% solution): 500 mg/10ml = 50 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV	1 mg/kg	1 m	10 m	18 mg	1.8 ml of 10 mg/ml
IM	6 mg/kg	2-10 m	1-1½ hr	108 mg	2.16 ml of 50 mg/ml
Rectal	25 mg/kg	5-15 m	1-1½ hr	450 mg	45 ml of 10 mg/ml

Alerts: Resp depression. Note there is a different dilution for IV/PR versus IM administration. Do not use with hypoperfusion.

Comments: Deep sedation drug. Continuous monitoring essential.

Midazolam (Versed): IV/IM formulation: 1 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV, IM	0.05-0.1 mg/kg	1-5 m	½-1 hr	0.9-1.8 mg	0.9-1.8 ml

Alerts: Check concentration (also available in 5 mg/ml). Watch for resp depression, especially with rapid IV push.

Comments: Decrease dose by ½ if given with morphine. May increase dose by 0.1 mg/kg every 5 minutes, to a **maximum** of 0.4 mg/kg to attain seizure control or sedation. Max 2 mg single dose IV, max total IV dose 6 mg.

Morphine: IV/IM formulations (multiple): 5 or 10 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV, IM	0.05-0.1 mg/kg	1-3 m	1-2 hrs	0.9-1.8 mg	0.18-0.36 ml of 5 mg/ml

Alerts: Check concentration (multiple formulations). Adjust dose for renal impairment. May cause hypotension or resp depression, nausea, emesis, or pruritis.

Comments: May repeat dose q 5-15 minutes to desired effect. Decrease dose by ½ if given with barbiturates, hydroxyzine/diphenhydramine, or with other benzodiazepines.

White Weight 18 kg White

Heart rate 70 to 115

SBP 104 to 112

Resp 20 to 24

Pentobarbital (Nembutal): IV/IM formulation: 50 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV	1-2 mg/kg	3-5 m	15-45 m	18-36 mg	0.36-0.72 ml
IM	5 mg/kg	10 m	1-4 hrs	90 mg	1.8 ml

Alerts: May cause hypotension. Paradoxical excitement may occur when administered (small doses of morphine can ameliorate this effect).

Comments: Not first line drug for imaging sedation—use etomidate. Decrease dose by ½ if given with morphine. Do not inject >50 mg/min. Lasts longer than methohexital.

White Weight 18 kg White

Heart rate 70 to 115

SBP 104 to 112

Resp 20 to 24

Reversal Agents

Flumazenil (Romazicon): IV formulation: 0.1 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV	0.01 mg/kg	1-2 m	20-60 m	0.18 mg	1.8 ml
Alerts: Contraindicated if benzodiazepine addiction or concomitant tricyclic antidepressant overdose.					
Comments: May repeat 0.02 mg/kg q1 min up to a total of 1 mg.					

Naloxone (Narcan): IV/IO/IM/IN/ET formulation: 0.4 mg/ml, or 1 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV, IO, IM, SC, IN, ET	0.1 mg/kg	<2 m (IV, IO), 2-5 m (IM, SC, IN, ET)	30-60 m	1.8 mg	1.8 ml of 1 mg/ml
Alerts: Careful with concentration. Use with extreme caution in neonates to avoid seizures. Contraindicated if hypersensitivity to naloxone.					
Comments: May repeat 0.05 mg/kg q2-3 min up to total 2 mg. Max single dose 2 mg. Titrate dose for either partial or complete opiate reversal.					

White Weight 18 kg White

Heart rate 70 to 115

SBP 104 to 112

Resp 20 to 24

Topical Pain Management

EMLA (Eutectic Mixture of Local Anesthetics): Formulation: lidocaine 2.5% & prilocaine 2.5% cream (5 g tube)

Route	Max dose	Max area of coverage	Onset	Duration
Topical	10 g	100 cm ² area of skin	60 m	2-3 hrs
Alerts: Do not apply to mucous membranes or open wounds. Apply for no longer than 4 hours. Contraindicated if hypersensitivity to lidocaine or prilocaine. Comments: May cause methemoglobinemia. Anesthesia lasts 1-2 hrs after removal of cream.				

LET (lidocaine, epinephrine, tetracaine): Formulation: Lidocaine 4%, Epinephrine 1:1000, & Tetracaine 0.5% (3 ml bottle)

Route	Dose	Onset	Duration
Topical	1-2 ml	10 m	1-2 hrs
Alerts: Do not use on fingertips, toes, nose, or penis. Max dose is 8 mg/kg of lidocaine. Contraindicated if hypersensitivity to lidocaine, epinephrine, or tetracaine. Avoid contact with mucous membranes. Comments: For facial lacerations, apply solution with dropper or gauze (gel is better).			

Lidocaine 1% (Xylocaine): Formulation: Lidocaine 1% (10 mg/ml)

Route	Max Dose	Onset	Duration
Infiltration	8.1 ml	Rapid	½-1 hr
Alerts: Do not exceed 4-5 mg/kg due to risk of seizures, or 8 mg/kg if combined with epinephrine. Do not use lidocaine/epinephrine combo on fingertips, toes, nose, or penis. Comments: Buffer lidocaine injection (lidocaine 1%) as a 1:10 mixture of 1 part sodium bicarbonate solution in 9 parts of lidocaine 1% to reduce pain of injection.			

Blue Weight 19 kg Blue

Heart rate 70 to 115 SBP 104 to 112 Resp 20 to 24

Acetaminophen (Tylenol): Oral liquid: 160 mg/5 ml
Suppository: 120 mg, 325 mg, 650 mg

Route	Dose per kg	Onset	Duration	Dose	ml to give
PO, PR	15 mg/kg	30 m	4 hr	285 mg	8.9 ml of 160 mg/5 ml

Alerts: Check concentration, as there are many different formulations.

Comments: Equivalent to NSAID's for pain and fever, but has no anti-inflammatory effect. Oral liquid can be 100 mg/ml infant drops OR children's suspension 160 mg/5ml. Suppository also available as above. Do not exceed 5 doses per day and use with extreme caution in children with hepatic dysfunction.

Diazepam: Intravenous formulation (same for IV or PR): 5 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV	0.2 mg/kg	1-3 m	0.5 hr	3.8 mg	0.76 ml
PR	0.5 mg/kg	2-15 m	0.5 hr	5 mg (max)	1 ml

Alerts: Resp depression with fast IV push. Rectal gel available at 2.5 mg/ml

Comments: Not a first line drug. Works for status epilepticus, but midazolam or lorazepam preferred. Works for sedation but midazolam or lorazepam preferred. Push slowly IV. May repeat IV dose q 10 minutes prn, with max total dose of 10 mg. Decrease dose by ½ if given with morphine. IV solution can be administered with lubricated TB syringe (no needle) into rectum. Rectal gel easier to insert into rectum, but expensive.

Etomidate: Intravenous formulation: 2 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV	0.2 mg/kg	30-60 sec	2-15 min	3.8 mg	Sedation dose 1.9 ml
IV	0.3 mg/kg	30-60 sec	5-15 min	5.7 mg	RSI dose 2.85 ml

Alerts: Give lower dose for sedation for imaging. Watch for myoclonus, vomiting.

Comments: Use starting dose of 0.2 mg/kg for sedation for imaging.

Use with narcotic (e.g., fentanyl) for procedural sedation.

Use higher dose of 0.3 mg/kg for induction for rapid sequence intubation.

Increase by 0.05 mg/kg every 60-90 seconds to maximum of 0.4 mg/kg.

Blue Weight 19 kg Blue

Heart rate 70 to 115 SBP 104 to 112 Resp 20 to 24

Fentanyl: IV/IM formulation: 100 mcg/2ml = 50 mcg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV, IM	1 mcg/kg	<1 m IV 7-15 m IM	30-60 m	19 mcg	0.38 ml
Alerts: Resp depression, reversible with naloxone. Avoid rapid infusion, as it may lead to rigid chest syndrome and need for respiratory support. Comments: Start with 1 mcg/kg. Max 100 mcg single dose. May repeat dose q5-10 minutes prn. The respiratory depressant effects may last longer than analgesic effects. Best drug for major trauma cases and possible hypoperfusion.					

Fentanyl (Intranasal): Use IV formulation for intranasal administration:
100 mcg/2ml = 50 mcg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IN	2 mcg/kg	1-2 m	½-2 hr	38 mcg	0.76 ml
Alerts: Atomizer needed to nebulize drug intranasally to maximize absorption. Comments: Put half of each dose in each nostril. May repeat 0.5 mcg/kg dose q 5-10 minutes prn. The respiratory depressant effects may last longer than analgesic effects. Use when vascular access unavailable or unnecessary. Has not been trialed on <3 yo.					

Hydromorphone (Dilaudid): IV/IM formulation: 2 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV, IM	0.02 mg/kg	2-5 m	4-5 hr	0.38 mg	0.19 ml
Alerts: Resp depression possible. Contraindicated in status asthmaticus. Comments: Not recommended for children intolerant or unresponsive to morphine. Excellent alternative to morphine for sickle cell pain. 1 mg hydromorphone = 7 mg morphine.					

Blue Weight 19 kg Blue

Heart rate 70 to 115 SBP 104 to 112 Resp 20 to 24

Ibuprofen (Motrin): Formulation: Oral liquid 100 mg/5ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
PO	10 mg/kg	30 m	6 hr	190 mg	9.5 ml of 100 mg/5 ml
Alerts: Contraindicated if hypersensitive to NSAID's. Use with extreme caution in patients with decreased renal function. Comments: Excellent first line analgesic and antipyretic. Use when an anti-inflammatory effect is desired in patients with pain or fever.					

Ketamine: IV/IM formulation: 50 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV	1-2 mg/kg	30 sec	15-30 m	19-38 mg	0.38-0.76 ml
IM	5 mg/kg	3-5 m	30-90 m	95 mg	1.9 ml
Alerts: Laryngospasm, hypersalivation, vomiting. Contraindicated if increased intracranial or intraocular pressure. Watch for emergence reaction, nausea/vomiting. Comments: No atropine needed. Do not exceed injection rate of 0.5 mg/kg/min or give the dose in less than 1 minute.					

Lorazepam (Ativan): IV/IM formulation: 2 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV, IM	0.05- 0.1 mg/kg	2-3 m	6-8 hrs	0.95-1.9 mg	0.48-0.95 ml
Alerts: Check concentration (4 mg/ml also available). Resp depression, especially with fast IV push. Comments: Best first seizure drug. Decrease dose by ½ if given with morphine.					

Blue Weight 19 kg Blue

Heart rate 70 to 115 SBP 104 to 112 Resp 20 to 24

Methohexital (Brevital): IV/ PR (1% solution): 500 mg/ 50 ml = 10 mg/ml

IM (5% solution): 500 mg/10ml = 50 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV	1 mg/kg	1 m	10 m	19 mg	1.9 ml of 10 mg/ml
IM	6 mg/kg	2-10 m	1-1½ hr	114 mg	2.28 ml of 50 mg/ml
Rectal	25 mg/kg	5-15 m	1-1½ hr	475 mg	47.5 ml of 10 mg/ml

Alerts: Resp depression. Note there is a different dilution for IV/PR versus IM administration. Do not use with hypoperfusion.

Comments: Deep sedation drug. Continuous monitoring essential.

Midazolam (Versed): IV/IM formulation: 1 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV, IM	0.05-0.1 mg/kg	1-5 m	½-1 hr	0.9-1.8 mg	0.9-1.8 ml

Alerts: Check concentration (also available in 5 mg/ml). Watch for resp depression, especially with rapid IV push.

Comments: Decrease dose by ½ if given with morphine. May increase dose by 0.1 mg/kg every 5 minutes, to a **maximum** of 0.4 mg/kg to attain seizure control or sedation. Max 2 mg single dose IV, max total IV dose 6 mg.

Morphine: IV/IM formulations (multiple): 5 or 10 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV, IM	0.05-0.1 mg/kg	1-3 m	1-2 hrs	0.9-1.8 mg	0.19-0.38 ml of 5 mg/ml

Alerts: Check concentration (multiple formulations). Adjust dose for renal impairment. May cause hypotension or resp depression, nausea, emesis, or pruritis.

Comments: May repeat dose q 5-15 minutes to desired effect. Decrease dose by ½ if given with barbiturates, hydroxyzine/diphenhydramine, or with other benzodiazepines.

Blue Weight 19 kg Blue

Heart rate 70 to 115 SBP 104 to 112 Resp 20 to 24

Pentobarbital (Nembutal): IV/IM formulation: 50 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV	1-2 mg/kg	3-5 m	15-45 m	19-38 mg	0.38-0.76 ml
IM	5 mg/kg	10 m	1-4 hrs	95 mg	1.9 ml

Alerts: May cause hypotension. Paradoxical excitement may occur when administered (small doses of morphine can ameliorate this effect).

Comments: Not first line drug for imaging sedation—use etomidate. Decrease dose by ½ if given with morphine. Do not inject >50 mg/min. Lasts longer than methohexital.

Blue Weight 19 kg Blue

Heart rate 70 to 115 SBP 104 to 112 Resp 20 to 24

Reversal Agents

Flumazenil (Romazicon): IV formulation: 0.1 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV	0.01 mg/kg	1-2 m	20-60 m	0.19 mg	1.9 ml
Alerts: Contraindicated if benzodiazepine addiction or concomitant tricyclic antidepressant overdose.					
Comments: May repeat 0.02 mg/kg q1 min up to a total of 1 mg.					

Naloxone (Narcan): IV/IO/IM/IN/ET formulation: 0.4 mg/ml, or 1 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV, IO, IM, SC, IN, ET	0.1 mg/kg	<2 m (IV, IO), 2-5 m (IM, SC, IN, ET)	30-60 m	1.9 mg	1.9 ml of 1 mg/ml
Alerts: Careful with concentration. Use with extreme caution in neonates to avoid seizures. Contraindicated if hypersensitivity to naloxone.					
Comments: May repeat 0.05 mg/kg q2-3 min up to total 2 mg. Max single dose 2 mg. Titrate dose for either partial or complete opiate reversal.					

Blue Weight 19 kg Blue

Heart rate 70 to 115 SBP 104 to 112 Resp 20 to 24

Topical Pain Management

EMLA (Eutectic Mixture of Local Anesthetics): Formulation: lidocaine 2.5% & prilocaine 2.5% cream (5 g tube)

Route	Max dose	Max area of coverage	Onset	Duration
Topical	10 g	100 cm ² area of skin	60 m	2-3 hrs
Alerts: Do not apply to mucous membranes or open wounds. Apply for no longer than 4 hours. Contraindicated if hypersensitivity to lidocaine or prilocaine. Comments: May cause methemoglobinemia. Anesthesia lasts 1-2 hrs after removal of cream.				

LET (lidocaine, epinephrine, tetracaine): Formulation: Lidocaine 4%, Epinephrine 1:1000, & Tetracaine 0.5% (3 ml bottle)

Route	Dose	Onset	Duration
Topical	1-2 ml	10 m	1-2 hrs
Alerts: Do not use on fingertips, toes, nose, or penis. Max dose is 8 mg/kg of lidocaine. Contraindicated if hypersensitivity to lidocaine, epinephrine, or tetracaine. Avoid contact with mucous membranes. Comments: For facial lacerations, apply solution with dropper or gauze (gel is better).			

Lidocaine 1% (Xylocaine): Formulation: Lidocaine 1% (10 mg/ml)

Route	Max Dose	Onset	Duration
Infiltration	8.5 ml	Rapid	½-1 hr
Alerts: Do not exceed 4-5 mg/kg due to risk of seizures, or 8 mg/kg if combined with epinephrine. Do not use lidocaine/epinephrine combo on fingertips, toes, nose, or penis. Comments: Buffer lidocaine injection (lidocaine 1%) as a 1:10 mixture of 1 part sodium bicarbonate solution in 9 parts of lidocaine 1% to reduce pain of injection.			

Blue Weight 20 kg Blue

Heart rate 70 to 115 SBP 105 to 114 Resp 20 to 24

Acetaminophen (Tylenol): Oral liquid: 160 mg/5 ml
Suppository: 120 mg, 325 mg, 650 mg

Route	Dose per kg	Onset	Duration	Dose	ml to give
PO, PR	15 mg/kg	30 m	4 hr	300 mg	9.4 ml of 160 mg/5 ml

Alerts: Check concentration, as there are many different formulations.
Comments: Equivalent to NSAID's for pain and fever, but has no anti-inflammatory effect. Oral liquid can be 100 mg/ml infant drops OR children's suspension 160 mg/5ml. Suppository also available as above. Do not exceed 5 doses per day and use with extreme caution in children with hepatic dysfunction.

Diazepam: Intravenous formulation (same for IV or PR): 5 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV	0.2 mg/kg	1-3 m	0.5 hr	4 mg	0.8 ml
PR	0.5 mg/kg	2-15 m	0.5 hr	5 mg (max)	1 ml

Alerts: Resp depression with fast IV push. Rectal gel available at 2.5 mg/ml
Comments: Not a first line drug. Works for status epilepticus, but midazolam or lorazepam preferred. Works for sedation but midazolam or lorazepam preferred. Push slowly IV. May repeat IV dose q 10 minutes prn, with max total dose of 10 mg. Decrease dose by ½ if given with morphine. IV solution can be administered with lubricated TB syringe (no needle) into rectum. Rectal gel easier to insert into rectum, but expensive.

Etomidate: Intravenous formulation: 2 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV	0.2 mg/kg	30-60 sec	2-15 min	4 mg	Sedation dose 2 ml
IV	0.3 mg/kg	30-60 sec	5-15 min	6 mg	RSI dose 3 ml

Alerts: Give lower dose for sedation for imaging. Watch for myoclonus, vomiting.
Comments: Use starting dose of 0.2 mg/kg for sedation for imaging.
Use with narcotic (e.g., fentanyl) for procedural sedation.
Use higher dose of 0.3 mg/kg for induction for rapid sequence intubation.
Increase by 0.05 mg/kg every 60-90 seconds to maximum of 0.4 mg/kg.

Blue Weight 20 kg Blue

Heart rate 70 to 115 SBP 105 to 114 Resp 20 to 24

Fentanyl: IV/IM formulation: 100 mcg/2ml = 50 mcg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV, IM	1 mcg/kg	<1 m IV 7-15 m IM	30-60 m	20 mcg	0.4 ml

Alerts: Resp depression, reversible with naloxone. Avoid rapid infusion, as it may lead to rigid chest syndrome and need for respiratory support.

Comments: Start with 1 mcg/kg. Max 100 mcg single dose. May repeat dose q5-10 minutes prn. The respiratory depressant effects may last longer than analgesic effects. Best drug for major trauma cases and possible hypoperfusion.

Fentanyl (Intranasal): Use IV formulation for intranasal administration:
100 mcg/2ml = 50 mcg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IN	2 mcg/kg	1-2 m	½-2 hr	40 mcg	0.8 ml

Alerts: Atomizer needed to nebulize drug intranasally to maximize absorption.

Comments: Put half of each dose in each nostril. May repeat 0.5 mcg/kg dose q 5-10 minutes prn. The respiratory depressant effects may last longer than analgesic effects. Use when vascular access unavailable or unnecessary. Has not been trialed on <3 yo.

Hydromorphone (Dilaudid): IV/IM formulation: 2 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV, IM	0.02 mg/kg	2-5 m	4-5 hr	0.4 mg	0.2 ml

Alerts: Resp depression possible. Contraindicated in status asthmaticus.

Comments: Not recommended for children intolerant or unresponsive to morphine. Excellent alternative to morphine for sickle cell pain. 1 mg hydromorphone = 7 mg morphine.

Blue Weight 20 kg Blue

Heart rate 70 to 115 SBP 105 to 114 Resp 20 to 24

Ibuprofen (Motrin): Formulation: Oral liquid 100 mg/5ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
PO	10 mg/kg	30 m	6 hr	200 mg	10 ml of 100 mg/5 ml
Alerts: Contraindicated if hypersensitive to NSAID's. Use with extreme caution in patients with decreased renal function. Comments: Excellent first line analgesic and antipyretic. Use when an anti-inflammatory effect is desired in patients with pain or fever.					

Ketamine: IV/IM formulation: 50 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV	1-2 mg/kg	30 sec	15-30 m	20-40 mg	0.4-0.8 ml
IM	5 mg/kg	3-5 m	30-90 m	100 mg	2 ml
Alerts: Laryngospasm, hypersalivation, vomiting. Contraindicated if increased intracranial or intraocular pressure. Watch for emergence reaction, nausea/vomiting. Comments: No atropine needed. Do not exceed injection rate of 0.5 mg/kg/min or give the dose in less than 1 minute.					

Lorazepam (Ativan): IV/IM formulation: 2 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV, IM	0.05- 0.1 mg/kg	2-3 m	6-8 hrs	1-2 mg	0.5-1 ml
Alerts: Check concentration (4 mg/ml also available). Resp depression, especially with fast IV push. Comments: Best first seizure drug. Decrease dose by ½ if given with morphine.					

Blue Weight 20 kg Blue

Heart rate 70 to 115 SBP 105 to 114 Resp 20 to 24

Methohexital (Brevital): IV/ PR (1% solution): 500 mg/ 50 ml = 10 mg/ml
IM (5% solution): 500 mg/10ml = 50 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV	1 mg/kg	1 m	10 m	20 mg	2 ml of 10 mg/ml
IM	6 mg/kg	2-10 m	1-1½ hr	120 mg	2.4 ml of 50 mg/ml
Rectal	25 mg/kg	5-15 m	1-1½ hr	500 mg (max)	50 ml of 10 mg/ml

Alerts: Resp depression. Note there is a different dilution for IV/PR versus IM administration. Do not use with hypoperfusion.

Comments: Deep sedation drug. Continuous monitoring essential.

Midazolam (Versed): IV/IM formulation: 1 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV, IM	0.05-0.1 mg/kg	1-5 m	½-1 hr	1-2 mg	1-2 ml

Alerts: Check concentration (also available in 5 mg/ml). Watch for resp depression, especially with rapid IV push.

Comments: Decrease dose by ½ if given with morphine. May increase dose by 0.1 mg/kg every 5 minutes, to a **maximum** of 0.4 mg/kg to attain seizure control or sedation. Max 2 mg single dose IV, max total IV dose 6 mg.

Morphine: IV/IM formulations (multiple): 5 or 10 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV, IM	0.05-0.1 mg/kg	1-3 m	1-2 hrs	1-2 mg	0.2-0.4 ml of 5 mg/ml

Alerts: Check concentration (multiple formulations). Adjust dose for renal impairment. May cause hypotension or resp depression, nausea, emesis, or pruritis.

Comments: May repeat dose q 5-15 minutes to desired effect. Decrease dose by ½ if given with barbiturates, hydroxyzine/diphenhydramine, or with other benzodiazepines.

Blue Weight 20 kg Blue

Heart rate 70 to 115 SBP 105 to 114 Resp 20 to 24

Pentobarbital (Nembutal): IV/IM formulation: 50 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV	1-2 mg/kg	3-5 m	15-45 m	20-40 mg	0.4-0.8 ml
IM	5 mg/kg	10 m	1-4 hrs	100 mg	2 ml

Alerts: May cause hypotension. Paradoxical excitement may occur when administered (small doses of morphine can ameliorate this effect).

Comments: Not first line drug for imaging sedation—use etomidate. Decrease dose by ½ if given with morphine. Do not inject >50 mg/min. Lasts longer than methohexital.

Blue Weight 20 kg Blue

Heart rate 70 to 115 SBP 105 to 114 Resp 20 to 24

Reversal Agents

Flumazenil (Romazicon): IV formulation: 0.1 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV	0.01 mg/kg	1-2 m	20-60 m	0.2 mg (max)	2 ml
Alerts: Contraindicated if benzodiazepine addiction or concomitant tricyclic antidepressant overdose.					
Comments: May repeat 0.02 mg/kg q1 min up to a total of 1 mg.					

Naloxone (Narcan): IV/IO/IM/IN/ET formulation: 0.4 mg/ml, or 1 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV, IO, IM, SC, IN, ET	0.1 mg/kg	<2 m (IV, IO), 2-5 m (IM, SC, IN, ET)	30-60 m	2 mg (max)	2 ml of 1 mg/ml
Alerts: Careful with concentration. Use with extreme caution in neonates to avoid seizures. Contraindicated if hypersensitivity to naloxone.					
Comments: May repeat 0.05 mg/kg q2-3 min up to total 2 mg. Max single dose 2 mg. Titrate dose for either partial or complete opiate reversal.					

Blue Weight 20 kg Blue

Heart rate 70 to 115 SBP 105 to 114 Resp 20 to 24

Topical Pain Management

EMLA (Eutectic Mixture of Local Anesthetics): Formulation: lidocaine 2.5% & prilocaine 2.5% cream (5 g tube)

Route	Max dose	Max area of coverage	Onset	Duration
Topical	20 g	200 cm ² area of skin	60 m	2-3 hrs
Alerts: Do not apply to mucous membranes or open wounds. Apply for no longer than 4 hours. Contraindicated if hypersensitivity to lidocaine or prilocaine. Comments: May cause methemoglobinemia. Anesthesia lasts 1-2 hrs after removal of cream.				

LET (lidocaine, epinephrine, tetracaine): Formulation: Lidocaine 4%, Epinephrine 1:1000, & Tetracaine 0.5% (3 ml bottle)

Route	Dose	Onset	Duration
Topical	1-2 ml	10 m	1-2 hrs
Alerts: Do not use on fingertips, toes, nose, or penis. Max dose is 8 mg/kg of lidocaine. Contraindicated if hypersensitivity to lidocaine, epinephrine, or tetracaine. Avoid contact with mucous membranes. Comments: For facial lacerations, apply solution with dropper or gauze (gel is better).			

Lidocaine 1% (Xylocaine): Formulation: Lidocaine 1% (10 mg/ml)

Route	Max Dose	Onset	Duration
Infiltration	9 ml	Rapid	½-1 hr
Alerts: Do not exceed 4-5 mg/kg due to risk of seizures, or 8 mg/kg if combined with epinephrine. Do not use lidocaine/epinephrine combo on fingertips, toes, nose, or penis. Comments: Buffer lidocaine injection (lidocaine 1%) as a 1:10 mixture of 1 part sodium bicarbonate solution in 9 parts of lidocaine 1% to reduce pain of injection.			

Blue Weight 22 kg Blue

Heart rate 70 to 110 SBP 105 to 114 Resp 20 to 24

Acetaminophen (Tylenol):

Oral liquid: 160 mg/5 ml

Suppository: 120 mg, 325 mg, 650 mg

Route	Dose per kg	Onset	Duration	Dose	ml to give
PO, PR	15 mg/kg	30 m	4 hr	330 mg	10.3 ml of 160 mg/5 ml

Alerts: Check concentration, as there are many different formulations.

Comments: Equivalent to NSAID's for pain and fever, but has no anti-inflammatory effect. Oral liquid can be 100 mg/ml infant drops OR children's suspension 160 mg/5ml. Suppository also available as above.. Do not exceed 5 doses per day and use with extreme caution in children with hepatic dysfunction.

Diazepam: Intravenous formulation (same for IV or PR): 5 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV	0.2 mg/kg	1-3 m	0.5 hr	4.4 mg	0.88 ml
PR	0.5 mg/kg	2-15 m	0.5 hr	5 mg (max)	1 ml

Alerts: Resp depression with fast IV push. Rectal gel available at 2.5 mg/ml

Comments: Not a first line drug. Works for status epilepticus, but midazolam or lorazepam preferred. Works for sedation but midazolam or lorazepam preferred. Push slowly IV. May repeat IV dose q 10 minutes prn, with max total dose of 10 mg. Decrease dose by ½ if given with morphine. IV solution can be administered with lubricated TB syringe (no needle) into rectum. Rectal gel easier to insert into rectum, but expensive.

Etomidate: Intravenous formulation: 2 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV	0.2 mg/kg	30-60 sec	2-15 min	4.4 mg	Sedation dose 2.2 ml
IV	0.3 mg/kg	30-60 sec	5-15 min	6.6 mg	RSI dose 3.3 ml

Alerts: Give lower dose for sedation for imaging. Watch for myoclonus, vomiting.

Comments: Use starting dose of 0.2 mg/kg for sedation for imaging.

Use with narcotic (e.g., fentanyl) for procedural sedation.

Use higher dose of 0.3 mg/kg for induction for rapid sequence intubation.

Increase by 0.05 mg/kg every 60-90 seconds to maximum of 0.4 mg/kg.

Blue Weight 22 kg Blue

Heart rate 70 to 110 SBP 105 to 114 Resp 20 to 24

Fentanyl: IV/IM formulation: 100 mcg/2ml = 50 mcg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV, IM	1 mcg/kg	<1 m IV 7-15 m IM	30-60 m	22 mcg	0.44 ml
Alerts: Resp depression, reversible with naloxone. Avoid rapid infusion, as it may lead to rigid chest syndrome and need for respiratory support. Comments: Start with 1 mcg/kg. Max 100 mcg single dose. May repeat dose q5-10 minutes prn. The respiratory depressant effects may last longer than analgesic effects. Best drug for major trauma cases and possible hypoperfusion.					

Fentanyl (Intranasal): Use IV formulation for intranasal administration:
100 mcg/2ml = 50 mcg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IN	2 mcg/kg	1-2 m	½-2 hr	44 mcg	0.88 ml
Alerts: Atomizer needed to nebulize drug intranasally to maximize absorption. Comments: Put half of each dose in each nostril. May repeat 0.5 mcg/kg dose q 5-10 minutes prn. The respiratory depressant effects may last longer than analgesic effects. Use when vascular access unavailable or unnecessary. Has not been trialed on <3 yo.					

Hydromorphone (Dilaudid): IV/IM formulation: 2 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV, IM	0.02 mg/kg	2-5 m	4-5 hr	0.44 mg	0.22 ml
Alerts: Resp depression possible. Contraindicated in status asthmaticus. Comments: Not recommended for children intolerant or unresponsive to morphine. Excellent alternative to morphine for sickle cell pain. 1 mg hydromorphone = 7 mg morphine.					

Blue Weight 22 kg Blue

Heart rate 70 to 110 SBP 105 to 114 Resp 20 to 24

Ibuprofen (Motrin): Formulation: Oral liquid 100 mg/5ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
PO	10 mg/kg	30 m	6 hr	220 mg	11 ml of 100 mg/5ml

Alerts: Contraindicated if hypersensitive to NSAID's. Use with extreme caution in patients with decreased renal function.

Comments: Excellent first line analgesic and antipyretic. Use when an anti-inflammatory effect is desired in patients with pain or fever.

Ketamine: IV/IM formulation: 50 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV	1-2 mg/kg	30 sec	15-30 m	22-44 mg	0.44-0.88 ml
IM	5 mg/kg	3-5 m	30-90 m	110 mg	2.2 ml

Alerts: Laryngospasm, hypersalivation, vomiting. Contraindicated if increased intracranial or intraocular pressure. Watch for emergence reaction, nausea/vomiting.

Comments: No atropine needed. Do not exceed injection rate of 0.5 mg/kg/min or give the dose in less than 1 minute.

Lorazepam (Ativan): IV/IM formulation: 2 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV, IM	0.05- 0.1 mg/kg	2-3 m	6-8 hrs	1.1-2 mg	0.55-1 ml

Alerts: Check concentration (4 mg/ml also available). Resp depression, especially with fast IV push.

Comments: Best first seizure drug. Decrease dose by ½ if given with morphine. Max single dose 2 mg.

Blue Weight 22 kg Blue

Heart rate 70 to 110 SBP 105 to 114 Resp 20 to 24

Methohexital (Brevital): IV/ PR (1% solution): 500 mg/ 50 ml = 10 mg/ml
IM (5% solution): 500 mg/10ml = 50 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV	1 mg/kg	1 m	10 m	22 mg	2.2 ml of 10 mg/ml
IM	6 mg/kg	2-10 m	1-1½ hr	132 mg	2.64 ml of 50 mg/ml
Rectal	25 mg/kg	5-15 m	1-1½ hr	500 mg (max)	50ml of 10 mg/ml

Alerts: Resp depression. Note there is a different dilution for IV/PR versus IM administration. Do not use with hypoperfusion.

Comments: Deep sedation drug. Continuous monitoring essential. 500 mg max dose.

Midazolam (Versed): IV/IM formulation: 1 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV, IM	0.05-0.1 mg/kg	1-5 m	½-1 hr	1.1-2 mg	1.1-2 ml

Alerts: Check concentration (also available in 5 mg/ml). Watch for resp depression, especially with rapid IV push.

Comments: Decrease dose by ½ if given with morphine. May increase dose by 0.1 mg/kg every 5 minutes, to a **maximum** of 0.4 mg/kg to attain seizure control or sedation. Max 2 mg single dose IV, max total IV dose 6 mg.

Morphine: IV/IM formulations (multiple): 5 or 10 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV, IM	0.05-0.1 mg/kg	1-3 m	1-2 hrs	1.1-2.2 mg	0.22-0.44 ml of 5 mg/ml

Alerts: Check concentration (multiple formulations). Adjust dose for renal impairment. May cause hypotension or resp depression, nausea, emesis, or pruritis.

Comments: May repeat dose q 5-15 minutes to desired effect. Decrease dose by ½ if given with barbiturates, hydroxyzine/diphenhydramine, or with other benzodiazepines.

Blue Weight 22 kg Blue

Heart rate 70 to 110 SBP 105 to 114 Resp 20 to 24

Pentobarbital (Nembutal): IV/IM formulation: 50 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV	1-2 mg/kg	3-5 m	15-45 m	22-44 mg	0.44-0.88 ml
IM	5 mg/kg	10 m	1-4 hrs	110 mg	2.2 ml

Alerts: May cause hypotension. Paradoxical excitement may occur when administered (small doses of morphine can ameliorate this effect).

Comments: Not first line drug for imaging sedation—use etomidate. Decrease dose by ½ if given with morphine. Do not inject >50 mg/min. Lasts longer than methohexital.

Blue Weight 22 kg Blue

Heart rate 70 to 110 SBP 105 to 114 Resp 20 to 24

Reversal Agents

Flumazenil (Romazicon): IV formulation: 0.1 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV	0.01 mg/kg	1-2 m	20-60 m	0.2 mg (max)	2 ml
Alerts: Contraindicated if benzodiazepine addiction or concomitant tricyclic antidepressant overdose. Comments: May repeat 0.02 mg/kg q1 min up to a total of 1 mg.					

Naloxone (Narcan): IV/IO/IM/IN/ET formulation: 0.4 mg/ml, or 1 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV, IO, IM, SC, IN, ET	0.1 mg/kg	<2 m (IV, IO), 2-5 m (IM, SC, IN, ET)	30-60 m	2 mg (max)	2 ml of 1 mg/ml
Alerts: Careful with concentration. Use with extreme caution in neonates to avoid seizures. Contraindicated if hypersensitivity to naloxone. Comments: May repeat 0.05 mg/kg q2-3 min up to total 2 mg. Max single dose 2 mg. Titrate dose for either partial or complete opiate reversal.					

Blue Weight 22 kg Blue

Heart rate 70 to 110 SBP 105 to 114 Resp 20 to 24

Topical Pain Management

EMLA (Eutectic Mixture of Local Anesthetics): Formulation: lidocaine 2.5% & prilocaine 2.5% cream (5 g tube)

Route	Max dose	Max area of coverage	Onset	Duration
Topical	20 g	200 cm ² area of skin	60 m	2-3 hrs
Alerts: Do not apply to mucous membranes or open wounds. If infant age <12 months, apply for no longer than 4 hours. Contraindicated if hypersensitivity to lidocaine or prilocaine. Avoid use in infants <3 months (except circumcision) and those up to 12 months who are also receiving methemoglobin-inducing agents. Comments: May cause methemoglobinemia. Anesthesia lasts 1-2 hrs after removal of cream.				

LET (lidocaine, epinephrine, tetracaine): Formulation: Lidocaine 4%, Epinephrine 1:1000, & Tetracaine 0.5% (3 ml bottle)

Route	Dose	Onset	Duration
Topical	1-2 ml	10 m	1-2 hrs
Alerts: Do not use on fingertips, toes, nose, or penis. Max dose is 8 mg/kg of lidocaine. Contraindicated if hypersensitivity to lidocaine, epinephrine, or tetracaine. Avoid contact with mucous membranes. Comments: For facial lacerations, apply solution with dropper or gauze (gel is better).			

Lidocaine 1% (Xylocaine): Formulation: Lidocaine 1% (10 mg/ml)

Route	Max Dose	Onset	Duration
Infiltration	10 ml	Rapid	½-1 hr
Alerts: Do not exceed 4-5 mg/kg due to risk of seizures, or 8 mg/kg if combined with epinephrine. Do not use lidocaine/epinephrine combo on fingertips, toes, nose, or penis. Comments: Buffer lidocaine injection (lidocaine 1%) as a 1:10 mixture of 1 part sodium bicarbonate solution in 9 parts of lidocaine 1% to reduce pain of injection.			

Orange Weight 24 kg Orange

Heart rate 70 to 115 SBP 105 to 114 Resp 20 to 24

Acetaminophen (Tylenol): Oral liquid: 160 mg/5 ml
Suppository: 120 mg, 325 mg, 650 mg

Route	Dose per kg	Onset	Duration	Dose	ml to give
PO, PR	15 mg/kg	30 m	4 hr	360 mg	11.3 ml of 160 mg/5 ml

Alerts: Check concentration, as there are many different formulations.

Comments: Equivalent to NSAID's for pain and fever, but has no anti-inflammatory effect. Oral liquid can be 100 mg/ml infant drops OR children's suspension 160 mg/5ml. Suppository also available as above. Do not exceed 5 doses per day and use with extreme caution in children with hepatic dysfunction.

Diazepam: Intravenous formulation (same for IV or PR): 5 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV	0.2 mg/kg	1-3 m	0.5 hr	4.8 mg	0.96 ml
PR	0.5 mg/kg	2-15 m	0.5 hr	5 mg (max)	1 ml

Alerts: Resp depression with fast IV push. Rectal gel available at 2.5 mg/ml

Comments: Not a first line drug. Works for status epilepticus, but midazolam or lorazepam preferred. Works for sedation but midazolam or lorazepam preferred. Push slowly IV. May repeat IV dose q 10 minutes prn, with max total dose of 10 mg. Decrease dose by ½ if given with morphine. IV solution can be administered with lubricated TB syringe (no needle) into rectum. Rectal gel easier to insert into rectum, but expensive.

Etomidate: Intravenous formulation: 2 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV	0.2 mg/kg	30-60 sec	2-15 min	4.8 mg	Sedation dose 2.4 ml
IV	0.3 mg/kg	30-60 sec	5-15 min	7.2 mg	RSI dose 3.6 ml

Alerts: Give lower dose for sedation for imaging. Watch for myoclonus, vomiting.

Comments: Use starting dose of 0.2 mg/kg for sedation for imaging. Use with narcotic (e.g., fentanyl) for procedural sedation. Use higher dose of 0.3 mg/kg for induction for rapid sequence intubation. Increase by 0.05 mg/kg every 60-90 seconds to maximum of 0.4 mg/kg.

Orange Weight 24 kg Orange

Heart rate 70 to 115 SBP 105 to 114 Resp 20 to 24

Fentanyl: IV/IM formulation: 100 mcg/2ml = 50 mcg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV, IM	1 mcg/kg	<1 m IV 7-15 m IM	30-60 m	24 mcg	0.48 ml
Alerts: Resp depression, reversible with naloxone. Avoid rapid infusion, as it may lead to rigid chest syndrome and need for respiratory support. Comments: Start with 1 mcg/kg. Max 100 mcg single dose. May repeat dose q5-10 minutes prn. The respiratory depressant effects may last longer than analgesic effects. Best drug for major trauma cases and possible hypoperfusion.					

Fentanyl (Intranasal): Use IV formulation for intranasal administration:
100 mcg/2ml = 50 mcg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IN	2 mcg/kg	1-2 m	½-2 hr	48 mcg	0.96 ml
Alerts: Atomizer needed to nebulize drug intranasally to maximize absorption. Comments: Put half of each dose in each nostril. May repeat 0.5 mcg/kg dose q 5-10 minutes prn. The respiratory depressant effects may last longer than analgesic effects. Use when vascular access unavailable or unnecessary. Has not been trialed on <3 yo.					

Hydromorphone (Dilaudid): IV/IM formulation: 2 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV, IM	0.02 mg/kg	2-5 m	4-5 hr	0.48 mg	0.24 ml
Alerts: Resp depression possible. Contraindicated in status asthmaticus. Comments: Not recommended for children intolerant or unresponsive to morphine. Excellent alternative to morphine for sickle cell pain. 1 mg hydromorphone = 7 mg morphine.					

Orange Weight 24 kg Orange

Heart rate 70 to 115 SBP 105 to 114 Resp 20 to 24

Ibuprofen (Motrin): Formulation: 100 mg/5ml children's suspension

Route	Dose per kg	Onset	Duration	Dose	ml to give
PO	10 mg/kg	30 m	6 hr	240 mg	12 ml of 100 mg/ 5 ml

Alerts: Contraindicated if hypersensitive to NSAID's. Use with extreme caution in patients with decreased renal function.

Comments: Excellent first line analgesic and antipyretic. Use when an anti-inflammatory effect is desired in patients with pain or fever.

Ketamine: IV/IM formulation: 50 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV	1-2 mg/kg	30 sec	15-30 m	24-48 mg	0.48-0.96 ml
IM	5 mg/kg	3-5 m	30-90 m	120 mg	2.4 ml

Alerts: Laryngospasm, hypersalivation, vomiting. Contraindicated if increased intracranial or intraocular pressure. Watch for emergence reaction, nausea/vomiting.

Comments: No atropine needed. Do not exceed injection rate of 0.5 mg/kg/min or give the dose in less than 1 minute.

Lorazepam (Ativan): IV/IM formulation: 2 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV, IM	0.05- 0.1 mg/kg	2-3 m	6-8 hrs	1.2-2 mg (max at 2mg)	0.6-1 ml

Alerts: Check concentration (4 mg/ml also available). Resp depression, especially with fast IV push.

Comments: Best first seizure drug. Decrease dose by ½ if given with morphine. Max single dose 2 mg.

Orange Weight 24 kg Orange

Heart rate 70 to 115 SBP 105 to 114 Resp 20 to 24

Methohexital (Brevital): IV/ PR (1% solution): 500 mg/ 50 ml = 10 mg/ml
IM (5% solution): 500 mg/10ml = 50 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV	1 mg/kg	1 m	10 m	24 mg	2.4 ml of 10 mg/ml
IM	6 mg/kg	2-10 m	1-1½ hr	144 mg	2.88 ml of 50 mg/ml
Rectal	25 mg/kg	5-15 m	1-1½ hr	500 mg (max)	50 ml of 10 mg/ml
Alerts: Resp depression. Note there is a different dilution for IV/PR versus IM administration. Do not use with hypoperfusion. Comments: Deep sedation drug. Continuous monitoring essential.					

Midazolam (Versed): IV/IM formulation: 1 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV, IM	0.05-0.1 mg/kg	1-5 m	½-1 hr	1.2-2 mg (max at 2mg)	1.2-2 ml
Alerts: Check concentration (also available in 5 mg/ml). Watch for resp depression, especially with rapid IV push. Comments: Decrease dose by ½ if given with morphine. May increase dose by 0.1 mg/kg every 5 minutes, to a maximum of 0.4 mg/kg to attain seizure control or sedation. Max 2 mg single dose IV, max total IV dose 6 mg.					

Morphine: IV/IM formulations (multiple): 5 or 10 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV, IM	0.05-0.1 mg/kg	1-3 m	1-2 hrs	1.2-2.4 mg	0.24-0.48 ml of 5 mg/ml
Alerts: Check concentration (multiple formulations). Adjust dose for renal impairment. May cause hypotension or resp depression, nausea, emesis, or pruritis. Comments: May repeat dose q 5-15 minutes to desired effect. Decrease dose by ½ if given with barbiturates, hydroxyzine/diphenhydramine, or with other benzodiazepines.					

Orange Weight 24 kg Orange

Heart rate 70 to 115 SBP 105 to 114 Resp 20 to 24

Pentobarbital (Nembutal): IV/IM formulation: 50 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV	1-2 mg/kg	3-5 m	15-45 m	24-48 mg	0.48-0.96 ml
IM	5 mg/kg	10 m	1-4 hrs	120 mg	2.4 ml

Alerts: May cause hypotension. Paradoxical excitement may occur when administered (small doses of morphine can ameliorate this effect).

Comments: Not first line drug for imaging sedation—use etomidate. Decrease dose by ½ if given with morphine. Do not inject >50 mg/min. Lasts longer than methohexital.

Orange Weight 24 kg Orange

Heart rate 70 to 115 SBP 105 to 114 Resp 20 to 24

Reversal Agents

Flumazenil (Romazicon): IV formulation: 0.1 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV	0.01 mg/kg	1-2 m	20-60 m	0.2 mg (max)	2 ml
Alerts: Contraindicated if benzodiazepine addiction or concomitant tricyclic antidepressant overdose.					
Comments: May repeat 0.02 mg/kg q1 min up to a total of 1 mg.					

Naloxone (Narcan): IV/IO/IM/IN/ET formulation: 0.4 mg/ml, or 1 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV, IO, IM, SC, IN, ET	0.1 mg/kg	<2 m (IV, IO), 2-5 m (IM, SC, IN, ET)	30-60 m	2 mg (max)	2 ml of 1 mg/ml
Alerts: Careful with concentration. Use with extreme caution in neonates to avoid seizures. Contraindicated if hypersensitivity to naloxone.					
Comments: May repeat 0.05 mg/kg q2-3 min up to total 2 mg. Max single dose 2 mg. Titrate dose for either partial or complete opiate reversal.					

Orange Weight 24 kg Orange

Heart rate 70 to 115 SBP 105 to 114 Resp 20 to 24

Topical Pain Management

EMLA (Eutectic Mixture of Local Anesthetics): Formulation: lidocaine 2.5% & prilocaine 2.5% cream (5 g tube)

Route	Max dose	Max area of coverage	Onset	Duration
Topical	20 g	200 cm ² area of skin	60 m	2-3 hrs
Alerts: Do not apply to mucous membranes or open wounds. Apply for no longer than 4 hours. Contraindicated if hypersensitivity to lidocaine or prilocaine. Comments: May cause methemoglobinemia. Anesthesia lasts 1-2 hrs after removal of cream.				

LET (lidocaine, epinephrine, tetracaine): Formulation: Lidocaine 4%, Epinephrine 1:1000, & Tetracaine 0.5% (3 ml bottle)

Route	Dose	Onset	Duration
Topical	1-2 ml	10 m	1-2 hrs
Alerts: Do not use on fingertips, toes, nose, or penis. Max dose is 8 mg/kg of lidocaine. Contraindicated if hypersensitivity to lidocaine, epinephrine, or tetracaine. Avoid contact with mucous membranes. Comments: For facial lacerations, apply solution with dropper or gauze (gel is better).			

Lidocaine 1% (Xylocaine): Formulation: Lidocaine 1% (10 mg/ml)

Route	Max Dose	Onset	Duration
Infiltration	10.8 ml	Rapid	½-1 hr
Alerts: Do not exceed 4-5 mg/kg due to risk of seizures, or 8 mg/kg if combined with epinephrine. Do not use lidocaine/epinephrine combo on fingertips, toes, nose, or penis. Comments: Buffer lidocaine injection (lidocaine 1%) as a 1:10 mixture of 1 part sodium bicarbonate solution in 9 parts of lidocaine 1% to reduce pain of injection.			

Orange Weight 26 kg Orange

Heart rate 70 to 115 SBP 106 to 115 Resp 20 to 24

Acetaminophen (Tylenol): Oral liquid: 160 mg/5 ml
Suppository: 120 mg, 325mg, 650 mg

Route	Dose per kg	Onset	Duration	Dose	ml to give
PO, PR	15 mg/kg	30 m	4 hr	390 mg	12.2 ml of 160 mg/5 ml

Alerts: Check concentration, as there are many different formulations.

Comments: Equivalent to NSAID's for pain and fever, but has no anti-inflammatory effect. Oral liquid can be 100 mg/ml infant drops OR children's suspension 160 mg/5ml. Suppository also available as above. Do not exceed 5 doses per day and use with extreme caution in children with hepatic dysfunction.

Diazepam: Intravenous formulation (same for IV or PR): 5 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV	0.2 mg/kg	1-3 m	0.5 hr	5 mg (max)	1 ml (max)
PR	0.5 mg/kg	2-15 m	0.5 hr	5 mg (max)	1 ml (max)

Resp depression with fast IV push. Rectal gel available at 2.5 mg/ml

Comments: Not a first line drug. Works for status epilepticus, but midazolam or lorazepam preferred. Works for sedation but midazolam or lorazepam preferred. Push slowly IV. May repeat IV dose q 10 minutes prn, with max total dose of 10 mg. Max single dose 5 mg. Decrease dose by ½ if given with morphine. IV solution can be administered with lubricated TB syringe (no needle) into rectum. Rectal gel easier to insert into rectum, but expensive.

Etomidate: Intravenous formulation: 2 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV	0.2 mg/kg	30-60 sec	2-15 min	5.2 mg	Sedation dose 2.6 ml
IV	0.3 mg/kg	30-60 sec	5-15 min	7.8 mg	RSI dose 3.9 ml

Alerts: Give lower dose for sedation for imaging. Watch for myoclonus, vomiting.

Comments: Use starting dose of 0.2 mg/kg for sedation for imaging. Use with narcotic (e.g., fentanyl) for procedural sedation. Use higher dose of 0.3 mg/kg for induction for rapid sequence intubation. Increase by 0.05 mg/kg every 60-90 seconds to maximum of 0.4 mg/kg.

Orange Weight 26 kg Orange

Heart rate 70 to 115 SBP 106 to 115 Resp 20 to 24

Fentanyl: IV/IM formulation: 100 mcg/2ml = 50 mcg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV, IM	1 mcg/kg	<1 m IV 7-15 m IM	30-60 m	26 mcg	0.52 ml
Alerts: Resp depression, reversible with naloxone. Avoid rapid infusion, as it may lead to rigid chest syndrome and need for respiratory support. Comments: Start with 1 mcg/kg. Max 100 mcg single dose. May repeat dose q5-10 minutes prn. The respiratory depressant effects may last longer than analgesic effects. Best drug for major trauma cases and possible hypoperfusion.					

Fentanyl (Intranasal): Use IV formulation for intranasal administration:
100 mcg/2ml = 50 mcg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IN	2 mcg/kg	1-2 m	½-2 hr	52 mcg	1.04 ml
Alerts: Atomizer needed to nebulize drug intranasally to maximize absorption. Comments: Put half of each dose in each nostril. May repeat 0.5 mcg/kg dose q 5-10 minutes prn. The respiratory depressant effects may last longer than analgesic effects. Use when vascular access unavailable or unnecessary. Has not been trialed on <3 yo.					

Hydromorphone (Dilaudid): IV/IM formulation: 2 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV, IM	0.02 mg/kg	2-5 m	4-5 hr	0.52 mg	0.26 ml
Alerts: Resp depression possible. Contraindicated in status asthmaticus. Comments: Not recommended for children intolerant or unresponsive to morphine. Excellent alternative to morphine for sickle cell pain. 1 mg hydromorphone = 7 mg morphine.					

Orange Weight 26 kg Orange

Heart rate 70 to 115 SBP 106 to 115 Resp 20 to 24

Ibuprofen (Motrin): Formulation: 100 mg/5ml children's suspension

Route	Dose per kg	Onset	Duration	Dose	ml to give
PO	10 mg/kg	30 m	6 hr	260 mg	13 ml of 100 mg/5 ml

Alerts: Contraindicated if hypersensitive to NSAID's. Use with extreme caution in patients with decreased renal function.

Comments: Excellent first line analgesic and antipyretic. Use when an anti-inflammatory effect is desired in patients with pain or fever.

Ketamine: IV/IM formulation: 50 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV	1-2 mg/kg	30 sec	15-30 m	26-52 mg	0.52-1.04 ml
IM	5 mg/kg	3-5 m	30-90 m	130 mg	2.6 ml

Alerts: Laryngospasm, hypersalivation, vomiting. Contraindicated if increased intracranial or intraocular pressure. Watch for emergence reaction, nausea/vomiting.

Comments: No atropine needed. Do not exceed injection rate of 0.5 mg/kg/min or give the dose in less than 1 minute.

Lorazepam (Ativan): IV/IM formulation: 2 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV, IM	0.05- 0.1 mg/kg	2-3 m	6-8 hrs	1.3-2 mg (max at 2 mg)	0.65-1 ml

Alerts: Check concentration (4 mg/ml also available). Resp depression, especially with fast IV push.

Comments: Best first seizure drug. Decrease dose by ½ if given with morphine. Max single dose 2 mg.

Orange Weight 26 kg Orange

Heart rate 70 to 115 SBP 106 to 115 Resp 20 to 24

Methohexital (Brevital): IV/ PR (1% solution): 500 mg/ 50 ml = 10 mg/ml

IM (5% solution): 500 mg/10ml = 50 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV	1 mg/kg	1 m	10 m	26 mg	2.6 ml of 10 mg/ml
IM	6 mg/kg	2-10 m	1-1½ hr	156 mg	3.12 ml of 50 mg/ml
Rectal	25 mg/kg	5-15 m	1-1½ hr	500 mg (max)	50 ml of 10 mg/ml

Alerts: Resp depression. Note there is a different dilution for IV/PR versus IM administration. Do not use with hypoperfusion.

Comments: Deep sedation drug. Continuous monitoring essential.

Midazolam (Versed): IV/IM formulation: 1 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV, IM	0.05-0.1 mg/kg	1-5 m	½-1 hr	1.3-2 mg (max at 2mg)	1.3-2 ml

Alerts: Check concentration (also available in 5 mg/ml). Watch for resp depression, especially with rapid IV push.

Comments: Decrease dose by ½ if given with morphine. May increase dose by 0.1 mg/kg every 5 minutes, to a **maximum** of 0.4 mg/kg to attain seizure control or sedation. Max 2 mg single dose IV, max total IV dose 6 mg.

Morphine: IV/IM formulations (multiple): 5 or 10 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV, IM	0.05-0.1 mg/kg	1-3 m	1-2 hrs	1.3-2.6 mg	0.26-0.52 ml of 5 mg/ml

Alerts: Check concentration (multiple formulations). Adjust dose for renal impairment. May cause hypotension or resp depression, nausea, emesis, or pruritis.

Comments: May repeat dose q 5-15 minutes to desired effect. Decrease dose by ½ if given with barbiturates, hydroxyzine/diphenhydramine, or with other benzodiazepines.

Orange Weight 26 kg Orange

Heart rate 70 to 115 SBP 106 to 115 Resp 20 to 24

Pentobarbital (Nembutal): IV/IM formulation: 50 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV	1-2 mg/kg	3-5 m	15-45 m	26-52 mg	0.52-1.04 ml
IM	5 mg/kg	10 m	1-4 hrs	130 mg	2.6 ml

Alerts: May cause hypotension. Paradoxical excitement may occur when administered (small doses of morphine can ameliorate this effect).

Comments: Not first line drug for imaging sedation—use etomidate. Decrease dose by ½ if given with morphine. Do not inject >50 mg/min. Lasts longer than methohexital.

Orange Weight 26 kg Orange

Heart rate 70 to 115 SBP 106 to 115 Resp 20 to 24

Reversal Agents

Flumazenil (Romazicon): IV formulation: 0.1 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV	0.01 mg/kg	1-2 m	20-60 m	0.2 mg (max)	2 ml
Alerts: Contraindicated if benzodiazepine addiction or concomitant tricyclic antidepressant overdose.					
Comments: May repeat 0.02 mg/kg q1 min up to a total of 1 mg.					

Naloxone (Narcan): IV/IO/IM/IN/ET formulation: 0.4 mg/ml, or 1 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV, IO, IM, SC, IN, ET	0.1 mg/kg	<2 m (IV, IO), 2-5 m (IM, SC, IN, ET)	30-60 m	2 mg (max)	2 ml of 1 mg/ml
Alerts: Careful with concentration. Use with extreme caution in neonates to avoid seizures. Contraindicated if hypersensitivity to naloxone.					
Comments: May repeat 0.05 mg/kg q2-3 min up to total 2 mg. Max single dose 2 mg. Titrate dose for either partial or complete opiate reversal.					

Orange Weight 26 kg Orange

Heart rate 70 to 115 SBP 106 to 115 Resp 20 to 24

Topical Pain Management

EMLA (Eutectic Mixture of Local Anesthetics): Formulation: lidocaine 2.5% & prilocaine 2.5% cream (5 g tube)

Route	Max dose	Max area of coverage	Onset	Duration
Topical	20 g	200 cm ² area of skin	60 m	2-3 hrs
Alerts: Do not apply to mucous membranes or open wounds. Apply for no longer than 4 hours. Contraindicated if hypersensitivity to lidocaine or prilocaine. Comments: May cause methemoglobinemia. Anesthesia lasts 1-2 hrs after removal of cream.				

LET (lidocaine, epinephrine, tetracaine): Formulation: Lidocaine 4%, Epinephrine 1:1000, & Tetracaine 0.5% (3 ml bottle)

Route	Dose	Onset	Duration
Topical	1-2 ml	10 m	1-2 hrs
Alerts: Do not use on fingertips, toes, nose, or penis. Max dose is 8 mg/kg of lidocaine. Contraindicated if hypersensitivity to lidocaine, epinephrine, or tetracaine. Avoid contact with mucous membranes. Comments: For facial lacerations, apply solution with dropper or gauze (gel is better).			

Lidocaine 1% (Xylocaine): Formulation: Lidocaine 1% (10 mg/ml)

Route	Max Dose	Onset	Duration
Infiltration	11.7 ml	Rapid	½-1 hr
Alerts: Do not exceed 4-5 mg/kg due to risk of seizures, or 8 mg/kg if combined with epinephrine. Do not use lidocaine/epinephrine combo on fingertips, toes, nose, or penis. Comments: Buffer lidocaine injection (lidocaine 1%) as a 1:10 mixture of 1 part sodium bicarbonate solution in 9 parts of lidocaine 1% to reduce pain of injection.			

Orange Weight 28 kg Orange

Heart rate 70 to 115 SBP 107 to 116 Resp 20 to 24

Acetaminophen (Tylenol): Oral liquid: 160 mg/5 ml
Suppository: 120 mg, 325 mg, 650 mg

Route	Dose per kg	Onset	Duration	Dose	ml to give
PO, PR	15 mg/kg	30 m	4 hr	420 mg	13.1 ml of 160 mg/5 ml

Alerts: Check concentration, as there are many different formulations.

Comments: Equivalent to NSAID's for pain and fever, but has no anti-inflammatory effect. Oral liquid can be 100 mg/ml infant drops OR children's suspension 160 mg/5ml. Suppository also available as above. Do not exceed 5 doses per day and use with extreme caution in children with hepatic dysfunction.

Diazepam: Intravenous formulation (same for IV or PR): 5 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV	0.2 mg/kg	1-3 m	0.5 hr	5 mg (max)	1 ml (max)
PR	0.5 mg/kg	2-15 m	0.5 hr	5 mg (max)	1 ml (max)

Alerts: Resp depression with fast IV push. Rectal gel available at 2.5 mg/ml

Comments: Not a first line drug. Works for status epilepticus, but midazolam or lorazepam preferred. Works for sedation but midazolam or lorazepam preferred. Push slowly IV. May repeat IV dose q 10 minutes prn, with max total dose of 10 mg. Decrease dose by ½ if given with morphine. IV solution can be administered with lubricated TB syringe (no needle) into rectum. Rectal gel easier to insert into rectum, but expensive.

Etomidate: Intravenous formulation: 2 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV	0.2 mg/kg	30-60 sec	2-15 min	5.6 mg	Sedation dose 2.8 ml
IV	0.3 mg/kg	30-60 sec	5-15 min	8.4 mg	RSI dose 4.2 ml

Alerts: Give lower dose for sedation for imaging. Watch for myoclonus, vomiting.

Comments: Use starting dose of 0.2 mg/kg for sedation for imaging.

Use with narcotic (e.g., fentanyl) for procedural sedation.

Use higher dose of 0.3 mg/kg for induction for rapid sequence intubation.

Increase by 0.05 mg/kg every 60-90 seconds to maximum of 0.4 mg/kg.

Orange Weight 28 kg Orange

Heart rate 70 to 115 SBP 107 to 116 Resp 20 to 24

Fentanyl: IV/IM formulation: 100 mcg/2ml = 50 mcg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV, IM	1 mcg/kg	<1 m IV 7-15 m IM	30-60 m	28 mcg	0.56 ml
Alerts: Resp depression, reversible with naloxone. Avoid rapid infusion, as it may lead to rigid chest syndrome and need for respiratory support. Comments: Start with 1 mcg/kg. Max 100 mcg single dose. May repeat dose q5-10 minutes prn. The respiratory depressant effects may last longer than analgesic effects. Best drug for major trauma cases and possible hypoperfusion.					

Fentanyl (Intranasal): Use IV formulation for intranasal administration:
100 mcg/2ml = 50 mcg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IN	2 mcg/kg	1-2 m	½-2 hr	56 mcg	1.12 ml
Alerts: Atomizer needed to nebulize drug intranasally to maximize absorption. Comments: Put half of each dose in each nostril. May repeat 0.5 mcg/kg dose q 5-10 minutes prn. The respiratory depressant effects may last longer than analgesic effects. Use when vascular access unavailable or unnecessary. Has not been trialed on <3 yo.					

Hydromorphone (Dilaudid): IV/IM formulation: 2 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV, IM	0.02 mg/kg	2-5 m	4-5 hr	0.56 mg	0.28 ml
Alerts: Resp depression possible. Contraindicated in status asthmaticus. Comments: Not recommended for children intolerant or unresponsive to morphine. Excellent alternative to morphine for sickle cell pain. 1 mg hydromorphone = 7 mg morphine.					

Orange Weight 28 kg Orange

Heart rate 70 to 115 SBP 107 to 116 Resp 20 to 24

Ibuprofen (Motrin): Formulation: 100 mg/5ml children's suspension

Route	Dose per kg	Onset	Duration	Dose	ml to give
PO	10 mg/kg	30 m	6 hr	280 mg	14 ml of 100 mg/5 ml

Alerts: Contraindicated if hypersensitive to NSAID's. Use with extreme caution in patients with decreased renal function.

Comments: Excellent first line analgesic and antipyretic. Use when an anti-inflammatory effect is desired in patients with pain or fever.

Ketamine: IV/IM formulation: 50 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV	1-2 mg/kg	30 sec	15-30 m	28-56 mg	0.56-1.12 ml
IM	5 mg/kg	3-5 m	30-90 m	140 mg	2.8 ml

Alerts: Laryngospasm, hypersalivation, vomiting. Contraindicated if increased intracranial or intraocular pressure. Watch for emergence reaction, nausea/vomiting.

Comments: No atropine needed. Do not exceed injection rate of 0.5 mg/kg/min or give the dose in less than 1 minute.

Lorazepam (Ativan): IV/IM formulation: 2 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV, IM	0.05- 0.1 mg/kg	2-3 m	6-8 hrs	1.4-2 mg (max at 2mg)	0.7-1 ml

Alerts: Check concentration (4 mg/ml also available). Resp depression, especially with fast IV push.

Comments: Best first seizure drug. Decrease dose by ½ if given with morphine. Max single dose 2 mg.

Orange Weight 28 kg Orange

Heart rate 70 to 115 SBP 107 to 116 Resp 20 to 24

Methohexital (Brevital): IV/ PR (1% solution): 500 mg/ 50 ml = 10 mg/ml

IM (5% solution): 500 mg/10ml = 50 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV	1 mg/kg	1 m	10 m	28 mg	2.8 ml of 10 mg/ml
IM	6 mg/kg	2-10 m	1-1½ hr	168 mg	3.36 mg of 50 mg/ml
Rectal	25 mg/kg	5-15 m	1-1½ hr	500 mg (max)	50 ml of 10 mg/ml

Alerts: Resp depression. Note there is a different dilution for IV/PR versus IM administration. Do not use with hypoperfusion.

Comments: Deep sedation drug. Continuous monitoring essential.

Midazolam (Versed): IV/IM formulation: 1 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV, IM	0.05-0.1 mg/kg	1-5 m	½-1 hr	1.4-2 mg (max at 2mg)	1.4-2 ml

Alerts: Check concentration (also available in 5 mg/ml). Watch for resp depression, especially with rapid IV push.

Comments: Decrease dose by ½ if given with morphine. May increase dose by 0.1 mg/kg every 5 minutes, to a **maximum** of 0.4 mg/kg to attain seizure control or sedation Max 2 mg single dose IV, max total IV dose 6 mg.

Morphine: IV/IM formulations (multiple): 5 or 10 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV, IM	0.05-0.1 mg/kg	1-3 m	1-2 hrs	1.4-2.8 mg	0.28-0.56 ml of 5 mg/ml

Alerts: Check concentration (multiple formulations). Adjust dose for renal impairment. May cause hypotension or resp depression, nausea, emesis, or pruritis.

Comments: May repeat dose q 5-15 minutes to desired effect. Decrease dose by ½ if given with barbiturates, hydroxyzine/diphenhydramine, or with other benzodiazepines.

Orange Weight 28 kg Orange

Heart rate 70 to 115 SBP 107 to 116 Resp 20 to 24

Pentobarbital (Nembutal): IV/IM formulation: 50 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV	1-2 mg/kg	3-5 m	15-45 m	28-56 mg	0.56-1.12 ml
IM	5 mg/kg	10 m	1-4 hrs	140 mg	2.8 ml

Alerts: May cause hypotension. Paradoxical excitement may occur when administered (small doses of morphine can ameliorate this effect).

Comments: Not first line drug for imaging sedation—use etomidate. Decrease dose by ½ if given with morphine. Do not inject >50 mg/min. Lasts longer than methohexital.

Orange Weight 28 kg Orange

Heart rate 70 to 115 SBP 107 to 116 Resp 20 to 24

Reversal Agents

Flumazenil (Romazicon): IV formulation: 0.1 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV	0.01 mg/kg	1-2 m	20-60 m	0.2 mg (max)	2 ml
Alerts: Contraindicated if benzodiazepine addiction or concomitant tricyclic antidepressant overdose.					
Comments: May repeat 0.02 mg/kg q1 min up to a total of 1 mg.					

Naloxone (Narcan): IV/IO/IM/IN/ET formulation: 0.4 mg/ml, or 1 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV, IO, IM, SC, IN, ET	0.1 mg/kg	<2 m (IV, IO), 2-5 m (IM, SC, IN, ET)	30-60 m	2 mg (max)	2 ml of 1 mg/ml
Alerts: Careful with concentration. Use with extreme caution in neonates to avoid seizures. Contraindicated if hypersensitivity to naloxone.					
Comments: May repeat 0.05 mg/kg q2-3 min up to total 2 mg. Max single dose 2 mg. Titrate dose for either partial or complete opiate reversal.					

Orange Weight 28 kg Orange

Heart rate 70 to 115 SBP 107 to 116 Resp 20 to 24

Topical Pain Management

EMLA (Eutectic Mixture of Local Anesthetics): Formulation: lidocaine 2.5% & prilocaine 2.5% cream (5 g tube)

Route	Max dose	Max area of coverage	Onset	Duration
Topical	20 g	200 cm ² area of skin	60 m	2-3 hrs
Alerts: Do not apply to mucous membranes or open wounds. Apply for no longer than 4 hours. Contraindicated if hypersensitivity to lidocaine or prilocaine. Comments: May cause methemoglobinemia. Anesthesia lasts 1-2 hrs after removal of cream.				

LET (lidocaine, epinephrine, tetracaine): Formulation: Lidocaine 4%, Epinephrine 1:1000, & Tetracaine 0.5% (3 ml bottle)

Route	Dose	Onset	Duration
Topical	1-2 ml	10 m	1-2 hrs
Alerts: Do not use on fingertips, toes, nose, or penis. Max dose is 8 mg/kg of lidocaine. Contraindicated if hypersensitivity to lidocaine, epinephrine, or tetracaine. Avoid contact with mucous membranes. Comments: For facial lacerations, apply solution with dropper or gauze (gel is better).			

Lidocaine 1% (Xylocaine): Formulation: Lidocaine 1% (10 mg/ml)

Route	Max Dose	Onset	Duration
Infiltration	12.6 ml	Rapid	½-1 hr
Alerts: Do not exceed 4-5 mg/kg due to risk of seizures, or 8 mg/kg if combined with epinephrine. Do not use lidocaine/epinephrine combo on fingertips, toes, nose, or penis. Comments: Buffer lidocaine injection (lidocaine 1%) as a 1:10 mixture of 1 part sodium bicarbonate solution in 9 parts of lidocaine 1% to reduce pain of injection.			

Green Weight 30 kg Green

Heart rate 60 to 100 SBP 109 to 117 Resp 16 to 22

Acetaminophen (Tylenol): Oral liquid: 160 mg/5 ml
Suppository: 120 mg, 325 mg, 650 mg

Route	Dose per kg	Onset	Duration	Dose	ml to give
PO, PR	15 mg/kg	30 m	4 hr	450 mg	14 ml of 160 mg/5 ml

Alerts: Check concentration, as there are many different formulations.

Comments: Equivalent to NSAID's for pain and fever, but has no anti-inflammatory effect. Oral liquid can be 100 mg/ml infant drops OR children's suspension 160 mg/5ml. Suppository also available as above. Do not exceed 5 doses per day and use with extreme caution in children with hepatic dysfunction.

Diazepam: Intravenous formulation (same for IV or PR): 5 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV	0.2 mg/kg	1-3 m	0.5 hr	5 mg (max)	1 ml
PR	0.5 mg/kg	2-15 m	0.5 hr	5 mg (max)	1 ml

Alerts: Resp depression with fast IV push. Rectal gel available at 2.5 mg/ml

Comments: Not a first line drug. Works for status epilepticus, but midazolam or lorazepam preferred. Works for sedation but midazolam or lorazepam preferred. Push slowly IV. May repeat IV dose q 10 minutes prn, with max total dose of 10 mg. Decrease dose by ½ if given with morphine. IV solution can be administered with lubricated TB syringe (no needle) into rectum. Rectal gel easier to insert into rectum, but expensive.

Etomidate: Intravenous formulation: 2 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV	0.2 mg/kg	30-60 sec	2-15 min	6 mg	Sedation dose 3 ml
IV	0.3 mg/kg	30-60 sec	5-15 min	9 mg	RSI dose 4.5 ml

Alerts: Give lower dose for sedation for imaging. Watch for myoclonus, vomiting.

Comments: Use starting dose of 0.2 mg/kg for sedation for imaging. Use with narcotic (e.g., fentanyl) for procedural sedation. Use higher dose of 0.3 mg/kg for induction for rapid sequence intubation. Increase by 0.05 mg/kg every 60-90 seconds to maximum of 0.4 mg/kg.

30 kg

Green Weight 30 kg Green

Heart rate 60 to 100 SBP 109 to 117 Resp 16 to 22

Fentanyl: IV/IM formulation: 100 mcg/2ml = 50 mcg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV, IM	1 mcg/kg	<1 m IV 7-15 m IM	30-60 m	30 mcg	0.6 ml
Alerts: Resp depression, reversible with naloxone. Avoid rapid infusion, as it may lead to rigid chest syndrome and need for respiratory support. Comments: Start with 1 mcg/kg. Max 100 mcg single dose. May repeat dose q5-10 minutes prn. The respiratory depressant effects may last longer than analgesic effects. Best drug for major trauma cases and possible hypoperfusion.					

Fentanyl (Intranasal): Use IV formulation for intranasal administration:
100 mcg/2ml = 50 mcg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IN	2 mcg/kg	1-2 m	½-2 hr	60 mcg	1.2 ml
Alerts: Atomizer needed to nebulize drug intranasally to maximize absorption. Comments: Put half of each dose in each nostril. May repeat 0.5 mcg/kg dose q 5-10 minutes prn. The respiratory depressant effects may last longer than analgesic effects. Use when vascular access unavailable or unnecessary. Has not been trialed on <3 yo.					

Hydromorphone (Dilaudid): IV/IM formulation: 2 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV, IM	0.02 mg/kg	2-5 m	4-5 hr	0.6 mg	0.3 ml
Alerts: Resp depression possible. Contraindicated in status asthmaticus. Comments: Not recommended for children intolerant or unresponsive to morphine. Excellent alternative to morphine for sickle cell pain. 1 mg hydromorphone = 7 mg morphine. <i>Recommended IV max for opioid naïve patients is 0.6 mg, for IM dose is 1mg</i>					

Green Weight 30 kg Green

Heart rate 60 to 100 SBP 109 to 117 Resp 16 to 22

Ibuprofen (Motrin): Formulation: Oral liquid 100 mg/5ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
PO	10 mg/kg	30 m	6 hr	300 mg	15 ml of 100 mg/5 ml

Alerts: Contraindicated if hypersensitive to NSAID's. Use with extreme caution in patients with decreased renal function.

Comments: Excellent first line analgesic and antipyretic. Use when an anti-inflammatory effect is desired in patients with pain or fever.

Ketamine: IV/IM formulation: 50 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV	1-2 mg/kg	30 sec	15-30 m	30-60 mg	0.6-1.2 ml
IM	5 mg/kg	3-5 m	30-90 m	150 mg	3 ml

Alerts: Laryngospasm, hypersalivation, vomiting. Contraindicated if increased intracranial or intraocular pressure. Watch for emergence reaction, nausea/vomiting.

Comments: No atropine needed. Do not exceed injection rate of 0.5 mg/kg/min or give the dose in less than 1 minute.

Lorazepam (Ativan): IV/IM formulation: 2 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV, IM	0.05- 0.1 mg/kg	2-3 m	6-8 hrs	1.5-2 mg (max at 2mg)	0.75-1 ml

Alerts: Check concentration (4 mg/ml also available). Resp depression, especially with fast IV push.

Comments: Best first seizure drug. Decrease dose by ½ if given with morphine.

Green Weight 30 kg Green

Heart rate 60 to 100 SBP 109 to 117 Resp 16 to 22

Methohexital (Brevital): IV/ PR (1% solution): 500 mg/50 ml = 10 mg/ml
IM (5% solution): 500 mg/10ml = 50 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV	1 mg/kg	1 m	10 m	30 mg	3 ml of 10 mg/ml
IM	6 mg/kg	2-10 m	1-1½ hr	180 mg	3.6 ml of 50 mg/ml
Rectal	25 mg/kg	5-15 m	1-1½ hr	500 mg (max)	50 ml of 10 mg/ml

Alerts: Resp depression. Note there is a different dilution for IV/PR versus IM administration. Do not use with hypoperfusion.

Comments: Deep sedation drug. Continuous monitoring essential.

Midazolam (Versed): IV/IM formulation: 1 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV, IM	0.05-0.1 mg/kg	1-5 m	½-1 hr	1.5-2 mg (max at 2mg)	1.5-2 ml

Alerts: Check concentration (also available in 5 mg/ml). Watch for resp depression, especially with rapid IV push.

Comments: Decrease dose by ½ if given with morphine. May increase dose by 0.1 mg/kg every 5 minutes, to a **maximum** of 0.4 mg/kg to attain seizure control or sedation. Max 2 mg single dose IV, max total IV dose 6 mg.

Morphine: IV/IM formulations (multiple): 5 or 10 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV, IM	0.05-0.1 mg/kg	1-3 m	1-2 hrs	1.5-3 mg	0.3-0.6 ml of 5 mg/ml

Alerts: Check concentration (multiple formulations). Adjust dose for renal impairment. May cause hypotension or resp depression, nausea, emesis, or pruritis.

Comments: May repeat dose q 5-15 minutes to desired effect. Decrease dose by ½ if given with barbiturates, hydroxyzine/diphenhydramine, or with other benzodiazepines.

Green Weight 30 kg Green

Heart rate 60 to 100 SBP 109 to 117 Resp 16 to 22

Pentobarbital (Nembutal): IV/IM formulation: 50 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV	1-2 mg/kg	3-5 m	15-45 m	30-60 mg	0.6-1.2 ml
IM	5 mg/kg	10 m	1-4 hrs	150 mg	3 ml

Alerts: May cause hypotension. Paradoxical excitement may occur when administered (small doses of morphine can ameliorate this effect).

Comments: Not first line drug for imaging sedation—use etomidate. Decrease dose by ½ if given with morphine. Do not inject >50 mg/min. Lasts longer than methohexital.

Green Weight 30 kg Green

Heart rate 60 to 100

SBP 109 to 117

Resp 16 to 22

Reversal Agents

Flumazenil (Romazicon): IV formulation: 0.1 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV	0.01 mg/kg	1-2 m	20-60 m	0.2 mg (max)	2 ml
Alerts: Contraindicated if benzodiazepine addiction or concomitant tricyclic antidepressant overdose.					
Comments: May repeat 0.02 mg/kg q1 min up to a total of 1 mg.					

Naloxone (Narcan): IV/IO/IM/IN/ET formulation: 0.4 mg/ml, or 1 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV, IO, IM, SC, IN, ET	0.1 mg/kg	<2 m (IV, IO), 2-5 m (IM, SC, IN, ET)	30-60 m	2 mg (max)	2 ml of 1 mg/ml
Alerts: Careful with concentration. Use with extreme caution in neonates to avoid seizures. Contraindicated if hypersensitivity to naloxone.					
Comments: May repeat 0.05 mg/kg q2-3 min up to total 2 mg. Max single dose 2 mg. Titrate dose for either partial or complete opiate reversal.					

Green Weight 30 kg Green

Heart rate 60 to 100

SBP 109 to 117

Resp 16 to 22

Topical Pain Management

EMLA (Eutectic Mixture of Local Anesthetics): Formulation: lidocaine 2.5% & prilocaine 2.5% cream (5 g tube)

Route	Max dose	Max area of coverage	Onset	Duration
Topical	20 g	200 cm ² area of skin	60 m	2-3 hrs
Alerts: Do not apply to mucous membranes or open wounds. If infant age <12 months, apply for no longer than 4 hours. Contraindicated if hypersensitivity to lidocaine or prilocaine. Avoid use in infants <3 months (except circumcision) and those up to 12 months who are also receiving methemoglobin-inducing agents. Comments: May cause methemoglobinemia. Anesthesia lasts 1-2 hrs after removal of cream.				

LET (lidocaine, epinephrine, tetracaine): Formulation: Lidocaine 4%, Epinephrine 1:1000, & Tetracaine 0.5% (3 ml bottle)

Route	Dose	Onset	Duration
Topical	1-2 ml	10 m	1-2 hrs
Alerts: Do not use on fingertips, toes, nose, or penis. Max dose is 8 mg/kg of lidocaine. Contraindicated if hypersensitivity to lidocaine, epinephrine, or tetracaine. Avoid contact with mucous membranes. Comments: For facial lacerations, apply solution with dropper or gauze (gel is better).			

Lidocaine 1% (Xylocaine): Formulation: Lidocaine 1% (10 mg/ml)

Route	Max Dose	Onset	Duration
Infiltration	13.5 ml	Rapid	½-1 hr
Alerts: Do not exceed 4-5 mg/kg due to risk of seizures, or 8 mg/kg if combined with epinephrine. Do not use lidocaine/epinephrine combo on fingertips, toes, nose, or penis. Comments: Buffer lidocaine injection (lidocaine 1%) as a 1:10 mixture of 1 part sodium bicarbonate solution in 9 parts of lidocaine 1% to reduce pain of injection.			

Green Weight 32 kg Green

Heart rate 60 to 100 SBP 109 to 117 Resp 16 to 22

Acetaminophen (Tylenol): Oral liquid: 160 mg/5 ml
Suppository: 120 mg, 325 mg, 650 mg

Route	Dose per kg	Onset	Duration	Dose	ml to give
PO, PR	15 mg/kg	30 m	4 hr	480 mg	15 ml of 160 mg/5 ml

Alerts: Check concentration, as there are many different formulations.

Comments: Equivalent to NSAID's for pain and fever, but has no anti-inflammatory effect. Oral liquid can be 100 mg/ml infant drops OR children's suspension 160 mg/5ml. Suppository also available as above. Do not exceed 5 doses per day and use with extreme caution in children with hepatic dysfunction.

Diazepam: Intravenous formulation (same for IV or PR): 5 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV	0.2 mg/kg	1-3 m	0.5 hr	5 mg (max)	1 ml
PR	0.5 mg/kg	2-15 m	0.5 hr	5 mg (max)	1 ml

Alerts: Resp depression with fast IV push. Rectal gel available at 2.5 mg/ml

Comments: Not a first line drug. Works for status epilepticus, but midazolam or lorazepam preferred. Works for sedation but midazolam or lorazepam preferred. Push slowly IV. May repeat IV dose q 10 minutes prn, with max total dose of 10 mg. Decrease dose by ½ if given with morphine. IV solution can be administered with lubricated TB syringe (no needle) into rectum. Rectal gel easier to insert into rectum, but expensive.

Etomidate: Intravenous formulation: 2 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV	0.2 mg/kg	30-60 sec	2-15 min	6.4 mg	Sedation dose 3.2 ml
IV	0.3 mg/kg	30-60 sec	5-15 min	9.6 mg	RSI dose 4.8 ml

Alerts: Give lower dose for sedation for imaging. Watch for myoclonus, vomiting.

Comments: Use starting dose of 0.2 mg/kg for sedation for imaging.
Use with narcotic (e.g., fentanyl) for procedural sedation.
Use higher dose of 0.3 mg/kg for induction for rapid sequence intubation.
Increase by 0.05 mg/kg every 60-90 seconds to maximum of 0.4 mg/kg (**4 mg**).

32 kg

Green Weight 32 kg Green

Heart rate 60 to 100 SBP 109 to 117 Resp 16 to 22

Fentanyl: IV/IM formulation: 100 mcg/2ml = 50 mcg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV, IM	1 mcg/kg	<1 m IV 7-15 m IM	30-60 m	32 mcg	0.64 ml
Alerts: Resp depression, reversible with naloxone. Avoid rapid infusion, as it may lead to rigid chest syndrome and need for respiratory support. Comments: Start with 1 mcg/kg. Max 100 mcg single dose. May repeat dose q5-10 minutes prn. The respiratory depressant effects may last longer than analgesic effects. Best drug for major trauma cases and possible hypoperfusion.					

Fentanyl (Intranasal): Use IV formulation for intranasal administration:
100 mcg/2ml = 50 mcg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IN	2 mcg/kg	1-2 m	½-2 hr	64 mcg	1.28 ml
Alerts: Atomizer needed to nebulize drug intranasally to maximize absorption. Comments: Put half of each dose in each nostril. May repeat 0.5 mcg/kg dose q 5-10 minutes prn. The respiratory depressant effects may last longer than analgesic effects. Use when vascular access unavailable or unnecessary. Has not been trialed on <3 yo.					

Hydromorphone (Dilaudid): IV/IM formulation: 2 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV, IM	0.02 mg/kg	2-5 m	4-5 hr	0.6 mg	0.3 ml
Alerts: Resp depression possible. Contraindicated in status asthmaticus. Comments: Not recommended for children intolerant or unresponsive to morphine. Excellent alternative to morphine for sickle cell pain. 1 mg hydromorphone = 7 mg morphine. <i>Recommended IV max for opioid naïve patients is 0.6 mg, for IM dose is 1mg</i>					

Green Weight 32 kg Green

Heart rate 60 to 100

SBP 109 to 117

Resp 16 to 22

Ibuprofen (Motrin): Formulation: Oral liquid 100 mg/5ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
PO	10 mg/kg	30 m	6 hr	320 mg	16 ml of 100 mg/5 ml
Alerts: Contraindicated if hypersensitive to NSAID's. Use with extreme caution in patients with decreased renal function. Comments: Excellent first line analgesic and antipyretic. Use when an anti-inflammatory effect is desired in patients with pain or fever.					

Ketamine: IV/IM formulation: 50 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV	1-2 mg/kg	30 sec	15-30 m	32-64 mg	0.64-1.28 ml
IM	5 mg/kg	3-5 m	30-90 m	160 mg	3.2 ml
Alerts: Laryngospasm, hypersalivation, vomiting. Contraindicated if increased intracranial or intraocular pressure. Watch for emergence reaction, nausea/vomiting. Comments: No atropine needed. Do not exceed injection rate of 0.5 mg/kg/min or give the dose in less than 1 minute.					

Lorazepam (Ativan): IV/IM formulation: 2 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV, IM	0.05- 0.1 mg/kg	2-3 m	6-8 hrs	1.6-2 mg (max at 2mg)	0.8-1 ml
Alerts: Check concentration (2 and 4 mg/ml syringe available). Resp depression, especially with fast IV push. Comments: Best first seizure drug. Decrease dose by ½ if given with morphine.					

Green Weight 32 kg Green

Heart rate 60 to 100 SBP 109 to 117 Resp 16 to 22

Methohexital (Brevital): IV/ PR (1% solution): 500 mg/ 50 ml = 10 mg/ml
IM (5% solution): 500 mg/10ml = 50 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV	1 mg/kg	1 m	10 m	32 mg	3.2 ml of 10 mg/ml
IM	6 mg/kg	2-10 m	1-1½ hr	192 mg	3.84 ml of 50 mg/ml
Rectal	25 mg/kg	5-15 m	1-1½ hr	500 mg (max)	50 ml of 10 mg/ml
Alerts: Resp depression. Note there is a different dilution for IV/PR versus IM administration. Do not use with hypoperfusion. Comments: Deep sedation drug. Continuous monitoring essential.					

Midazolam (Versed): IV/IM formulation: 1 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV, IM	0.05-0.1 mg/kg	1-5 m	½-1 hr	1.6-2 mg (max at 2mg)	1.6-2 ml
Alerts: Check concentration (also available in 5 mg/ml). Watch for resp depression, especially with rapid IV push. Comments: Decrease dose by ½ if given with morphine. May increase dose by 0.1 mg/kg every 5 minutes, to a maximum of 0.4 mg/kg to attain seizure control or sedation. Max 2 mg single dose IV, max total IV dose 6 mg.					

Morphine: IV/IM formulations (multiple): 5 or 10 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV, IM	0.05-0.1 mg/kg	1-3 m	1-2 hrs	1.6-3.2 mg	0.32-0.64 ml of 5 mg/ml
Alerts: Check concentration (multiple formulations). Adjust dose for renal impairment. May cause hypotension or resp depression, nausea, emesis, or pruritis. Comments: May repeat dose q 5-15 minutes to desired effect. Decrease dose by ½ if given with barbiturates, hydroxyzine/diphenhydramine, or with other benzodiazepines.					

Green Weight 32 kg Green

Heart rate 60 to 100

SBP 109 to 117

Resp 16 to 22

Pentobarbital (Nembutal): IV/IM formulation: 50 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV	1-2 mg/kg	3-5 m	15-45 m	32-64 mg	0.64-1.28 ml
IM	5 mg/kg	10 m	1-4 hrs	160 mg	3.2 ml

Alerts: May cause hypotension. Paradoxical excitement may occur when administered (small doses of morphine can ameliorate this effect).

Comments: Not first line drug for imaging sedation—use etomidate. Decrease dose by ½ if given with morphine. Do not inject >50 mg/min. Lasts longer than methohexital.

Green Weight 32 kg Green

Heart rate 60 to 100 SBP 109 to 117 Resp 16 to 22

Reversal Agents

Flumazenil (Romazicon): IV formulation: 0.1 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV	0.01 mg/kg	1-2 m	20-60 m	0.2 mg (max)	2 ml
Alerts: Contraindicated if benzodiazepine addiction or concomitant tricyclic antidepressant overdose.					
Comments: May repeat 0.02 mg/kg q1 min up to a total of 1 mg.					

Naloxone (Narcan): IV/IO/IM/IN/ET formulation: 0.4 mg/ml, or 1 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV, IO, IM, SC, IN, ET	0.1 mg/kg	<2 m (IV, IO), 2-5 m (IM, SC, IN, ET)	30-60 m	2 mg (max)	2 ml of 1 mg/ml
Alerts: Careful with concentration. Use with extreme caution in neonates to avoid seizures. Contraindicated if hypersensitivity to naloxone.					
Comments: May repeat 0.05 mg/kg q2-3 min up to total 2 mg. Max single dose 2 mg. Titrate dose for either partial or complete opiate reversal.					

Green Weight 32 kg Green

Heart rate 60 to 100

SBP 109 to 117

Resp 16 to 22

Topical Pain Management

EMLA (Eutectic Mixture of Local Anesthetics): Formulation: lidocaine 2.5% & prilocaine 2.5% cream (5 g tube)

Route	Max dose	Max area of coverage	Onset	Duration
Topical	20 g	200 cm ² area of skin	60 m	2-3 hrs
Alerts: Do not apply to mucous membranes or open wounds. Apply for no longer than 4 hours. Contraindicated if hypersensitivity to lidocaine or prilocaine. Comments: May cause methemoglobinemia. Anesthesia lasts 1-2 hrs after removal of cream.				

LET (lidocaine, epinephrine, tetracaine): Formulation: Lidocaine 4%, Epinephrine 1:1000, & Tetracaine 0.5% (3 ml bottle)

Route	Dose	Onset	Duration
Topical	1-2 ml	10 m	1-2 hrs
Alerts: Do not use on fingertips, toes, nose, or penis. Max dose is 8 mg/kg of lidocaine. Contraindicated if hypersensitivity to lidocaine, epinephrine, or tetracaine. Avoid contact with mucous membranes. Comments: For facial lacerations, apply solution with dropper or gauze (gel is better).			

Lidocaine 1% (Xylocaine): Formulation: Lidocaine 1% (10 mg/ml)

Route	Max Dose	Onset	Duration
Infiltration	14.4 ml	Rapid	½-1 hr
Alerts: Do not exceed 4-5 mg/kg due to risk of seizures, or 8 mg/kg if combined with epinephrine. Do not use lidocaine/epinephrine combo on fingertips, toes, nose, or penis. Comments: Buffer lidocaine injection (lidocaine 1%) as a 1:10 mixture of 1 part sodium bicarbonate solution in 9 parts of lidocaine 1% to reduce pain of injection.			

Green Weight 34 kg Green

Heart rate 60 to 100

SBP 110 to 119

Resp 16 to 22

Acetaminophen (Tylenol):

Oral liquid: 160 mg/5 ml

Suppository: 120 mg, 325 mg, 650 mg

Route	Dose per kg	Onset	Duration	Dose	ml to give
PO, PR	15 mg/kg	30 m	4 hr	510 mg	15.9 ml of 160 mg/5 ml

Alerts: Check concentration

Comments: Equivalent to NSAID's for pain and fever, but has no anti-inflammatory effect. Oral liquid can be 100 mg/ml infant drops OR children's suspension 160 mg/5ml Suppository also available as above. Do not exceed 5 doses per day and use with extreme caution in children with hepatic dysfunction.

Diazepam: Intravenous formulation (same for IV or PR): 5 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV	0.2 mg/kg	1-3 m	0.5 hr	5 mg (max)	1 ml
PR	0.5 mg/kg	2-15 m	0.5 hr	5 mg (max)	1 ml

Alerts: Resp depression with fast IV push. Rectal gel available at 2.5 mg/ml

Comments: Not a first line drug. Works for status epilepticus, but midazolam or lorazepam preferred. Works for sedation but midazolam or lorazepam preferred. Push slowly IV. May repeat IV dose q 10 minutes prn, with max total dose of 10 mg. Decrease dose by ½ if given with morphine. IV solution can be administered with lubricated TB syringe (no needle) into rectum. Rectal gel easier to insert into rectum, but expensive.

Etomidate: Intravenous formulation: 2 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV	0.2 mg/kg	30-60 sec	2-15 min	6.8 mg	Sedation dose 3.4 ml
IV	0.3 mg/kg	30-60 sec	5-15 min	10.2 mg	RSI dose 5.1 ml

Alerts: Give lower dose for sedation for imaging. Watch for myoclonus, vomiting.

Comments: Use starting dose of 0.2 mg/kg for sedation for imaging.

Use with narcotic (e.g., fentanyl) for procedural sedation.

Use higher dose of 0.3 mg/kg for induction for rapid sequence intubation.

Increase by 0.05 mg/kg every 60-90 seconds to maximum of 0.4 mg/kg (**4 mg**).

34 kg

Green Weight 34 kg Green

Heart rate 60 to 100

SBP 110 to 119

Resp 16 to 22

Fentanyl: IV/IM formulation: 100 mcg/2ml = 50 mcg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV, IM	1 mcg/kg	<1 m IV 7-15 m IM	30-60 m	34 mcg	0.68 ml
Alerts: Resp depression, reversible with naloxone. Avoid rapid infusion, as it may lead to rigid chest syndrome and need for respiratory support. Comments: Start with 1 mcg/kg. Max 100 mcg single dose. May repeat dose q5-10 minutes prn. The respiratory depressant effects may last longer than analgesic effects. Best drug for major trauma cases and possible hypoperfusion.					

Fentanyl (Intranasal): Use IV formulation for intranasal administration:
100 mcg/2ml = 50 mcg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IN	2 mcg/kg	1-2 m	½-2 hr	68 mcg	1.36 ml
Alerts: Atomizer needed to nebulize drug intranasally to maximize absorption. Comments: Put half of each dose in each nostril. May repeat 0.5 mcg/kg dose q 5-10 minutes prn. The respiratory depressant effects may last longer than analgesic effects. Use when vascular access unavailable or unnecessary. Has not been trialed on <3 yo.					

Hydromorphone (Dilaudid): IV/IM formulation: 2 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV, IM	0.02 mg/kg	2-5 m	4-5 hr	0.6 mg	0.3 ml
Alerts: Resp depression possible. Contraindicated in status asthmaticus. Comments: Not recommended for children intolerant or unresponsive to morphine. Excellent alternative to morphine for sickle cell pain. 1 mg hydromorphone = 7 mg morphine. <i>Recommended IV max for opioid naïve patients is 0.6 mg, for IM dose is 1mg</i>					

Green Weight 34 kg Green

Heart rate 60 to 100

SBP 110 to 119

Resp 16 to 22

Ibuprofen (Motrin): Formulation: Oral liquid 100 mg/5ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
PO	10 mg/kg	30 m	6 hr	340 mg	17 ml of 100 mg/5 ml
Alerts: Contraindicated if hypersensitive to NSAID's. Use with extreme caution in patients with decreased renal function. Comments: Excellent first line analgesic and antipyretic. Use when an anti-inflammatory effect is desired in patients with pain or fever.					

Ketamine: IV/IM formulation: 50 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV	1-2 mg/kg	30 sec	15-30 m	34-68 mg	0.68- 1.36 ml
IM	5 mg/kg	3-5 m	30-90 m	170 mg	3.4 ml
Alerts: Laryngospasm, hypersalivation, vomiting. Contraindicated if increased intracranial or intraocular pressure. Watch for emergence reaction, nausea/vomiting. Comments: No atropine needed. Do not exceed injection rate of 0.5 mg/kg/min or give the dose in less than 1 minute.					

Lorazepam (Ativan): IV/IM formulation: 2 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV, IM	0.05- 0.1 mg/kg	2-3 m	6-8 hrs	1.7- 2 mg (max at 2mg)	0.85 -1 ml
Alerts: Check concentration (2 and 4 mg/ml syringe available). Resp depression, especially with fast IV push. Comments: Best first seizure drug. Decrease dose by ½ if given with morphine.					

Green Weight 34 kg Green

Heart rate 60 to 100 SBP 110 to 119 Resp 16 to 22

Methohexital (Brevital): IV/PR (1% solution): 500 mg/50 ml = 10 mg/ml

IM (5% solution): 500 mg/10 ml = 50 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV	1 mg/kg	1 m	10 m	34 mg	3.4 ml of 10 mg/ml
IM	6 mg/kg	2-10 m	1-1½ hr	204 mg	4.08 ml of 50 mg/ml
PR	25 mg/kg	5-15 m	1-1½ hr	500 mg (max)	50 ml of 10 mg/ml

Alerts: Resp depression. Note there is a different dilution for IV/PR versus IM administration. Do not use with hypoperfusion.

Comments: Deep sedation drug. Continuous monitoring essential.

Midazolam (Versed): IV/IM formulation: 1 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV, IM	0.05-0.1 mg/kg	1-5 m	½-1 hr	1.7-2 mg (max at 2 mg)	1.7-2 ml

Alerts: Check concentration (also available in 5 mg/ml). Watch for resp depression, especially with rapid IV push.

Comments: Decrease dose by ½ if given with morphine. May increase dose by 0.1 mg/kg every 5 minutes, to a **maximum** of 0.4 mg/kg to attain seizure control or sedation. Max 2 mg single dose IV, max total IV dose 6 mg.

Morphine: IV/IM formulations (multiple): 5 or 10 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV, IM	0.05-0.1 mg/kg	1-3 m	1-2 hrs	1.7-3.4 mg	0.34-0.68 ml of 5 mg/ml

Alerts: Check concentration (multiple formulations). Adjust dose for renal impairment. May cause hypotension or resp depression, nausea, emesis, or pruritis.

Comments: May repeat dose q 5-15 minutes to desired effect. Decrease dose by ½ if given with barbiturates, hydroxyzine/diphenhydramine, or with other benzodiazepines.

Green Weight 34 kg Green

Heart rate 60 to 100

SBP 110 to 119

Resp 16 to 22

Pentobarbital (Nembutal): IV/IM formulation: 50 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV	1-2 mg/kg	3-5 m	15-45 m	34-68 mg	0.68-1.36 ml
IM	5 mg/kg	10 m	1-4 hrs	170 mg	3.4 ml

Alerts: May cause hypotension. Paradoxical excitement may occur when administered (small doses of morphine can ameliorate this effect).

Comments: Not first line drug for imaging sedation—use etomidate. Decrease dose by ½ if given with morphine. Do not inject >50 mg/min. Lasts longer than methohexital.

Green Weight 34 kg Green

Heart rate 60 to 100

SBP 110 to 119

Resp 16 to 22

Reversal Agents

Flumazenil (Romazicon): IV formulation: 0.1 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV	0.01 mg/kg	1-2 m	20-60 m	0.2 mg (max)	2 ml
Alerts: Contraindicated if benzodiazepine addiction or concomitant tricyclic antidepressant overdose.					
Comments: May repeat 0.02 mg/kg q1 min up to a total of 1 mg.					

Naloxone (Narcan): IV/IO/IM/IN/ET formulation: 0.4 mg/ml, or 1 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV, IO, IM, SC, IN, ET	0.1 mg/kg	<2 m (IV, IO), 2-5 m (IM, SC, IN, ET)	30-60 m	2 mg (max)	2 ml of 1 mg/ml
Alerts: Careful with concentration. Use with extreme caution in neonates to avoid seizures. Contraindicated if hypersensitivity to naloxone.					
Comments: May repeat 0.05 mg/kg q2-3 min up to total 2 mg. Max single dose 2 mg. Titrate dose for either partial or complete opiate reversal.					

Green Weight 34 kg Green

Heart rate 60 to 100

SBP 110 to 119

Resp 16 to 22

Topical Pain Management

EMLA (Eutectic Mixture of Local Anesthetics): Formulation: lidocaine 2.5% & prilocaine 2.5% cream (5 g tube)

Route	Max dose	Max area of coverage	Onset	Duration
Topical	20 g	200 cm ² area of skin	60 m	2-3 hrs
Alerts: Do not apply to mucous membranes or open wounds. Apply for no longer than 4 hours. Contraindicated if hypersensitivity to lidocaine or prilocaine. Comments: May cause methemoglobinemia. Anesthesia lasts 1-2 hrs after removal of cream.				

LET (lidocaine, epinephrine, tetracaine): Formulation: Lidocaine 4%, Epinephrine 1:1000, & Tetracaine 0.5% (3 ml bottle)

Route	Dose	Onset	Duration
Topical	1-2 ml	10 m	1-2 hrs
Alerts: Do not use on fingertips, toes, nose, or penis. Max dose is 8 mg/kg of lidocaine. Contraindicated if hypersensitivity to lidocaine, epinephrine, or tetracaine. Avoid contact with mucous membranes. Comments: For facial lacerations, apply solution with dropper or gauze (gel is better).			

Lidocaine 1% (Xylocaine): Formulation: Lidocaine 1% (10 mg/ml)

Route	Max Dose	Onset	Duration
Infiltration	15.3 ml	Rapid	½-1 hr
Alerts: Do not exceed 4-5 mg/kg due to risk of seizures, or 8 mg/kg if combined with epinephrine. Do not use lidocaine/epinephrine combo on fingertips, toes, nose, or penis. Comments: Buffer lidocaine injection (lidocaine 1%) as a 1:10 mixture of 1 part sodium bicarbonate solution in 9 parts of lidocaine 1% to reduce pain of injection.			

Green Weight 36 kg Green

Heart rate 60 to 100 SBP 110 to 119 Resp 16 to 22

Acetaminophen (Tylenol): Oral liquid: 160 mg/5 ml
Suppository: 120 mg, 325 mg, 650 mg

Route	Dose per kg	Onset	Duration	Dose	ml to give
PO, PR	15 mg/kg	30 m	4 hr	540 mg	16.9 ml of 160 mg/5 ml
Alerts: Check concentration Comments: Equivalent to NSAID's for pain and fever, but has no anti-inflammatory effect. Oral liquid can be 100 mg/ml infant drops OR children's suspension 160 mg/5ml. Suppository also available as above. Do not exceed 5 doses per day and use with extreme caution in children with hepatic dysfunction.					

Diazepam: Intravenous formulation (same for IV or PR): 5 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV	0.2 mg/kg	1-3 m	0.5 hr	5 mg (max)	1 ml
PR	0.5 mg/kg	2-15 m	0.5 hr	5 mg (max)	1 ml
Alerts: Resp depression with fast IV push. Rectal gel available at 2.5 mg/ml Comments: Not a first line drug. Works for status epilepticus, but midazolam or lorazepam preferred. Works for sedation but midazolam or lorazepam preferred. Push slowly IV. May repeat IV dose q 10 minutes prn, with max total dose of 10 mg. Decrease dose by ½ if given with morphine. IV solution can be administered with lubricated TB syringe (no needle) into rectum. Rectal gel easier to insert into rectum, but expensive.					

Etomidate: Intravenous formulation: 2 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV	0.2 mg/kg	30-60 sec	2-15 min	7.2 mg	Sedation dose 3.6 ml
IV	0.3 mg/kg	30-60 sec	5-15 min	10.8 mg	RSI dose 5.4 ml
Alerts: Give lower dose for sedation for imaging. Watch for myoclonus, vomiting. Comments: Use starting dose of 0.2 mg/kg for sedation for imaging. Use with narcotic (e.g., fentanyl) for procedural sedation. Use higher dose of 0.3 mg/kg for induction for rapid sequence intubation. Increase by 0.05 mg/kg every 60-90 seconds to maximum of 0.4 mg/kg (4 mg).					

36 kg

Green Weight 36 kg Green

Heart rate 60 to 100

SBP 110 to 119

Resp 16 to 22

Fentanyl: IV/IM formulation: 100 mcg/2ml = 50 mcg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV, IM	1 mcg/kg	<1 m IV 7-15 m IM	30-60 m	36 mcg	0.72 ml
Alerts: Resp depression, reversible with naloxone. Avoid rapid infusion, as it may lead to rigid chest syndrome and need for respiratory support. Comments: Start with 1 mcg/kg. Max 100 mcg single dose. May repeat dose q5-10 minutes prn. The respiratory depressant effects may last longer than analgesic effects. Best drug for major trauma cases and possible hypoperfusion.					

Fentanyl (Intranasal): Use IV formulation for intranasal administration:
100 mcg/2ml = 50 mcg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IN	2 mcg/kg	1-2 m	½-2 hr	72 mcg	1.44 ml
Alerts: Atomizer needed to nebulize drug intranasally to maximize absorption. Comments: Put half of each dose in each nostril. May repeat 0.5 mcg/kg dose q 5-10 minutes prn. The respiratory depressant effects may last longer than analgesic effects. Use when vascular access unavailable or unnecessary. Has not been trialed on <3 yo.					

Hydromorphone (Dilaudid): IV/IM formulation: 2 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV, IM	0.02 mg/kg	2-5 m	4-5 hr	0.6 mg	0.3 ml
Alerts: Resp depression possible. Contraindicated in status asthmaticus. Comments: Not recommended for children intolerant or unresponsive to morphine. Excellent alternative to morphine for sickle cell pain. 1 mg hydromorphone = 7 mg morphine. <i>Recommended IV max for opioid naïve patients is 0.6 mg, for IM dose is 1mg</i>					

Green Weight 36 kg Green

Heart rate 60 to 100

SBP 110 to 119

Resp 16 to 22

Ibuprofen (Motrin): Formulation: Oral liquid 100 mg/5ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
PO	10 mg/kg	30 m	6 hr	360 mg	18 ml of 100 mg/5 ml
Alerts: Contraindicated if hypersensitive to NSAID's. Use with extreme caution in patients with decreased renal function. Comments: Excellent first line analgesic and antipyretic. Use when an anti-inflammatory effect is desired in patients with pain or fever.					

Ketamine: IV/IM formulation: 50 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV	1-2 mg/kg	30 sec	15-30 m	36-72 mg	0.72-1.44 ml
IM	5 mg/kg	3-5 m	30-90 m	180 mg	3.6 ml
Alerts: Laryngospasm, hypersalivation, vomiting. Contraindicated if increased intracranial or intraocular pressure. Watch for emergence reaction, nausea/vomiting. Comments: No atropine needed. Do not exceed injection rate of 0.5 mg/kg/min or give the dose in less than 1 minute.					

Lorazepam (Ativan): IV/IM formulation: 2 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV, IM	0.05 - 0.1 mg/kg	2-3 m	6-8 hrs	1.8- 2 mg (max at 2mg)	0.9 - 1 ml
Alerts: Check concentration (2 and 4 mg/ml syringe available). Resp depression, especially with fast IV push. Comments: Best first seizure drug. Decrease dose by ½ if given with morphine.					

Green Weight 36 kg Green

Heart rate 60 to 100 SBP 110 to 119 Resp 16 to 22

Methohexital (Brevital): IV/PR (1% solution): 500 mg/50 ml = 10 mg/ml

IM (5% solution): 500 mg/10 ml = 50 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV	1 mg/kg	1 m	10 m	36 mg	3.6 ml of 10 mg/ml
IM	6 mg/kg	2-10 m	1-1½ hr	216 mg	4.32 ml of 50 mg/ml
PR	25 mg/kg	5-15 m	1-1½ hr	500 mg (max)	50 ml of 10 mg/ml
Alerts: Resp depression. Note there is a different dilution for IV/PR versus IM administration. Do not use with hypoperfusion.					
Comments: Deep sedation drug. Continuous monitoring essential.					

Midazolam (Versed): IV/IM formulation: 1 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV, IM	0.05-0.1 mg/kg	1-5 m	½-1 hr	1.8-2 mg (max at 2mg)	1.8-2 ml
Alerts: Check concentration (also available in 5 mg/ml). Watch for resp depression, especially with rapid IV push.					
Comments: Decrease dose by ½ if given with morphine. May increase dose by 0.1 mg/kg every 5 minutes, to a maximum of 0.4 mg/kg to attain seizure control or sedation. Max 2 mg single dose IV, max total IV dose 6 mg.					

Morphine: IV/IM formulations (multiple): 5 or 10 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV, IM	0.05-0.1 mg/kg	1-3 m	1-2 hrs	1.8-3.6 mg	0.36-0.72 ml of 5 mg/ml
Alerts: Check concentration (multiple formulations). Adjust dose for renal impairment. May cause hypotension or resp depression, nausea, emesis, or pruritis.					
Comments: May repeat dose q 5-15 minutes to desired effect. Decrease dose by ½ if given with barbiturates, hydroxyzine/diphenhydramine, or with other benzodiazepines.					

Green Weight 36 kg Green

Heart rate 60 to 100 SBP 110 to 119 Resp 16 to 22

Pentobarbital (Nembutal): IV/IM formulation: 50 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV	1-2 mg/kg	3-5 m	15-45 m	36-72 mg	0.72-1.44 ml
IM	5 mg/kg	10 m	1-4 hrs	180 mg	3.6 ml

Alerts: May cause hypotension. Paradoxical excitement may occur when administered (small doses of morphine can ameliorate this effect).

Comments: Not first line drug for imaging sedation—use etomidate. Decrease dose by ½ if given with morphine. Do not inject >50 mg/min. Lasts longer than methohexital.

Green Weight 36 kg Green

Heart rate 60 to 100

SBP 110 to 119

Resp 16 to 22

Reversal Agents

Flumazenil (Romazicon): IV formulation: 0.1 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV	0.01 mg/kg	1-2 m	20-60 m	0.2 mg (max)	2 ml
Alerts: Contraindicated if benzodiazepine addiction or concomitant tricyclic antidepressant overdose.					
Comments: May repeat 0.02 mg/kg q1 min up to a total of 1 mg.					

Naloxone (Narcan): IV/IO/IM/IN/ET formulation: 0.4 mg/ml, or 1 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV, IO, IM, SC, IN, ET	0.1 mg/kg	<2 m (IV, IO), 2-5 m (IM, SC, IN, ET)	30-60 m	2 mg (max)	2 ml of 1 mg/ml
Alerts: Careful with concentration. Use with extreme caution in neonates to avoid seizures. Contraindicated if hypersensitivity to naloxone.					
Comments: May repeat 0.05 mg/kg q2-3 min up to total 2 mg. Max single dose 2 mg. Titrate dose for either partial or complete opiate reversal.					

Green Weight 36 kg Green

Heart rate 60 to 100

SBP 110 to 119

Resp 16 to 22

Topical Pain Management

EMLA (Eutectic Mixture of Local Anesthetics): Formulation: lidocaine 2.5% & prilocaine 2.5% cream (5 g tube)

Route	Max dose	Max area of coverage	Onset	Duration
Topical	20 g	200 cm ² area of skin	60 m	2-3 hrs
Alerts: Do not apply to mucous membranes or open wounds. Apply for no longer than 4 hours. Contraindicated if hypersensitivity to lidocaine or prilocaine. Comments: May cause methemoglobinemia. Anesthesia lasts 1-2 hrs after removal of cream.				

LET (lidocaine, epinephrine, tetracaine): Formulation: Lidocaine 4%, Epinephrine 1:1000, & Tetracaine 0.5% (3 ml bottle)

Route	Dose	Onset	Duration
Topical	1-2 ml	10 m	1-2 hrs
Alerts: Do not use on fingertips, toes, nose, or penis. Max dose is 8 mg/kg of lidocaine. Contraindicated if hypersensitivity to lidocaine, epinephrine, or tetracaine. Avoid contact with mucous membranes. Comments: For facial lacerations, apply solution with dropper or gauze (gel is better).			

Lidocaine 1% (Xylocaine): Formulation: Lidocaine 1% (10 mg/ml)

Route	Max Dose	Onset	Duration
Infiltration	16.2 ml	Rapid	½-1 hr
Alerts: Do not exceed 4-5 mg/kg due to risk of seizures, or 8 mg/kg if combined with epinephrine. Do not use lidocaine/epinephrine combo on fingertips, toes, nose, or penis. Comments: Buffer lidocaine injection (lidocaine 1%) as a 1:10 mixture of 1 part sodium bicarbonate solution in 9 parts of lidocaine 1% to reduce pain of injection.			

GreenWeight 37-43 kgGreen

Heart rate 60 to 100 SBP 110 to 119 Resp 16 to 22

Acetaminophen (Tylenol): Oral liquid: 160 mg/5 ml
Suppository: 120 mg, 325mg, 650 mg

Route	Dose per kg	Onset	Duration	Dose	ml to give
PO, PR	15 mg/kg	30 m	4 hr	600 mg	19 ml of 160 mg/5 ml

Alerts: Check concentration

Comments: Equivalent to NSAID's for pain and fever, but has no anti-inflammatory effect. Oral liquid can be 100 mg/ml infant drops OR children's suspension 160 mg/5ml. Suppository also available as above. Do not exceed 5 doses per day and use with extreme caution in children with hepatic dysfunction.

Diazepam: Intravenous formulation (same for IV or PR): 5 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV	0.2 mg/kg	1-3 m	0.5 hr	5 mg (max)	1 ml
PR	0.5 mg/kg	2-15 m	0.5 hr	5 mg (max)	1 ml

Alerts: Resp depression with fast IV push. Rectal gel available at 2.5 mg/ml

Comments: Not a first line drug. Works for status epilepticus, but midazolam or lorazepam preferred. Works for sedation but midazolam or lorazepam preferred. Push slowly IV. May repeat IV dose q 10 minutes prn, with max total dose of 10 mg. Decrease dose by ½ if given with morphine. IV solution can be administered with lubricated TB syringe (no needle) into rectum. Rectal gel easier to insert into rectum, but expensive.

Etomidate: Intravenous formulation: 2 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV	0.2 mg/kg	30-60 sec	2-15 min	8 mg	Sedation dose 4 ml
IV	0.3 mg/kg	30-60 sec	5-15 min	12 mg	RSI dose 6 ml

Alerts: Give lower dose for sedation for imaging. Watch for myoclonus, vomiting.

Comments: Use starting dose of 0.2 mg/kg for sedation for imaging.
Use with narcotic (e.g., fentanyl) for procedural sedation.
Use higher dose of 0.3 mg/kg for induction for rapid sequence intubation.
Increase by 0.05 mg/kg every 60-90 seconds to maximum of 0.4 mg/kg (**4 mg**).

37-43 kg

Green Weight 37-43 kg Green

Heart rate 60 to 100 SBP 110 to 119 Resp 16 to 22

Fentanyl: IV/IM formulation: 100 mcg/2ml = 50 mcg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV, IM	1 mcg/kg	<1 m IV 7-15 m IM	30-60 m	40 mcg	0.8 ml

Alerts: Resp depression, reversible with naloxone. Avoid rapid infusion, as it may lead to rigid chest syndrome and need for respiratory support.

Comments: Start with 1 mcg/kg. Max 100 mcg single dose. May repeat dose q5-10 minutes prn. The respiratory depressant effects may last longer than analgesic effects. Best drug for major trauma cases and possible hypoperfusion.

Fentanyl (Intranasal): Use IV formulation for intranasal administration:
100 mcg/2ml = 50 mcg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IN	2 mcg/kg	1-2 m	½-2 hr	80 mcg	1.6 ml

Alerts: Atomizer needed to nebulize drug intranasally to maximize absorption.

Comments: Put half of each dose in each nostril. May repeat 0.5 mcg/kg dose q 5-10 minutes prn. The respiratory depressant effects may last longer than analgesic effects. Use when vascular access unavailable or unnecessary. Has not been trialed on <3 yo.

Hydromorphone (Dilaudid): IV/IM formulation: 2 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV	0.02 mg/kg	2-5 m	4-5 hr	0.6 mg	0.3 ml
IM	0.02 mg/kg	2-5 m	4-5 hr	0.8 mg	0.4 ml

Alerts: Resp depression possible. Contraindicated in status asthmaticus.

Comments: Not recommended for children intolerant or unresponsive to morphine. Excellent alternative to morphine for sickle cell pain. 1 mg hydromorphone = 7 mg morphine.

Recommended IV max for opioid naïve patients is 0.6 mg, for IM dose is 1mg

Green Weight 37-43 kg Green

Heart rate 60 to 100 SBP 110 to 119 Resp 16 to 22

Ibuprofen (Motrin): Formulation: Oral liquid 100 mg/5ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
PO	10 mg/kg	30 m	6 hr	400 mg	20 ml of 100 mg/5 ml

Alerts: Contraindicated if hypersensitive to NSAID's. Use with extreme caution in patients with decreased renal function.

Comments: Excellent first line analgesic and antipyretic. Use when an anti-inflammatory effect is desired in patients with pain or fever.

Ketamine: IV/IM formulation: 50 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV	1-2 mg/kg	30 sec	15-30 m	40-80 mg	0.8-1.6 ml
IM	5 mg/kg	3-5 m	30-90 m	200 mg	4 ml

Alerts: Laryngospasm, hypersalivation, vomiting. Contraindicated if increased intracranial or intraocular pressure. Watch for emergence reaction, nausea/vomiting.

Comments: No atropine needed. Do not exceed injection rate of 0.5 mg/kg/min or give the dose in less than 1 minute.

Lorazepam (Ativan): IV/IM formulation: 2 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV, IM	0.05 - 0.1 mg/kg	2-3 m	6-8 hrs	1-2 mg (max at 2mg)	0.5 -1 ml

Alerts: Check concentration (2 and 4 mg/ml syringe available). Resp depression, especially with fast IV push.

Comments: Best first seizure drug. Decrease dose by ½ if given with morphine.

Green Weight 37-43 kg Green

Heart rate 60 to 100 SBP 110 to 119 Resp 16 to 22

Methohexital (Brevital): IV/PR (1% solution): 500 mg/50 ml = 10 mg/ml

IM (5% solution): 500 mg/10 ml = 50 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV	1 mg/kg	1 m	10 m	40 mg	4 ml of 10 mg/ml
IM	6 mg/kg	2-10 m	1-1½ hr	240 mg	4.8 ml of 50 mg/ml
PR	25 mg/kg	5-15 m	1-1½ hr	500 mg (max)	50 ml of 10 mg/ml

Alerts: Resp depression. Note there is a different dilution for IV/PR versus IM administration. Do not use with hypoperfusion.

Comments: Deep sedation drug. Continuous monitoring essential.

Midazolam (Versed): IV/IM formulation: 1 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV, IM	0.05-0.1 mg/kg	1-5 m	½-1 hr	1-2 mg (max at 2mg)	1-2 ml

Alerts: Check concentration (also available in 5 mg/ml). Watch for resp depression, especially with rapid IV push.

Comments: Decrease dose by ½ if given with morphine. May increase dose by 0.1 mg/kg every 5 minutes, to a **maximum** of 0.4 mg/kg to attain seizure control or sedation. Max 2 mg single dose IV, max total IV dose 6 mg.

Morphine: IV/IM formulations (multiple): 5 or 10 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV, IM	0.05-0.1 mg/kg	1-3 m	1-2 hrs	2-4 mg	0.4-0.8 ml of 5 mg/ml

Alerts: Check concentration (multiple formulations). Adjust dose for renal impairment. May cause hypotension or resp depression, nausea, emesis, or pruritis.

Comments: May repeat dose q 5-15 minutes to desired effect. Decrease dose by ½ if given with barbiturates, hydroxyzine/diphenhydramine, or with other benzodiazepines.

Green Weight 37-43 kg Green

Heart rate 60 to 100 SBP 110 to 119 Resp 16 to 22

Pentobarbital (Nembutal): IV/IM formulation: 50 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV	1-2 mg/kg	3-5 m	15-45 m	40-80 mg	0.8-1.6 ml
IM	5 mg/kg	10 m	1-4 hrs	200 mg	4 ml

Alerts: May cause hypotension. Paradoxical excitement may occur when administered (small doses of morphine can ameliorate this effect).

Comments: Not first line drug for imaging sedation—use etomidate. Decrease dose by ½ if given with morphine. Do not inject >50 mg/min. Lasts longer than methohexital.

Green Weight 37-43 kg Green

Heart rate 60 to 100

SBP 110 to 119

Resp 16 to 22

Reversal Agents

Flumazenil (Romazicon): IV formulation: 0.1 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV	0.01 mg/kg	1-2 m	20-60 m	0.2 mg (max)	2 ml
Alerts: Contraindicated if benzodiazepine addiction or concomitant tricyclic antidepressant overdose.					
Comments: May repeat 0.02 mg/kg q1 min up to a total of 1 mg.					

Naloxone (Narcan): IV/IO/IM/IN/ET formulation: 0.4 mg/ml, or 1 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV, IO, IM, SC, IN, ET	0.1 mg/kg	<2 m (IV, IO), 2-5 m (IM, SC, IN, ET)	30-60 m	2 mg (max)	2 ml of 1 mg/ml
Alerts: Careful with concentration. Use with extreme caution in neonates to avoid seizures. Contraindicated if hypersensitivity to naloxone.					
Comments: May repeat 0.05 mg/kg q2-3 min up to total 2 mg. Max single dose 2 mg. Titrate dose for either partial or complete opiate reversal.					

Green Weight 37-43 kg Green

Heart rate 60 to 100

SBP 110 to 119

Resp 16 to 22

Topical Pain Management

EMLA (Eutectic Mixture of Local Anesthetics): Formulation: lidocaine 2.5% & prilocaine 2.5% cream (5 g tube)

Route	Max dose	Max area of coverage	Onset	Duration
Topical	20 g	200 cm ² area of skin	60 m	2-3 hrs
Alerts: Do not apply to mucous membranes or open wounds. Apply for no longer than 4 hours. Contraindicated if hypersensitivity to lidocaine or prilocaine. Comments: May cause methemoglobinemia. Anesthesia lasts 1-2 hrs after removal of cream.				

LET (lidocaine, epinephrine, tetracaine): Formulation: Lidocaine 4%, Epinephrine 1:1000, & Tetracaine 0.5% (3 ml bottle)

Route	Dose	Onset	Duration
Topical	1-3 ml	10 m	1-2 hrs
Alerts: Do not use on fingertips, toes, nose, or penis. Max dose is 8 mg/kg of lidocaine. Contraindicated if hypersensitivity to lidocaine, epinephrine, or tetracaine. Avoid contact with mucous membranes. Comments: For facial lacerations, apply solution with dropper or gauze (gel is better).			

Lidocaine 1% (Xylocaine): Formulation: Lidocaine 1% (10 mg/ml)

Route	Max Dose	Onset	Duration
Infiltration	18 ml	Rapid	½-1 hr
Alerts: Do not exceed 4-5 mg/kg due to risk of seizures, or 8 mg/kg if combined with epinephrine. Do not use lidocaine/epinephrine combo on fingertips, toes, nose, or penis. Comments: Buffer lidocaine injection (lidocaine 1%) as a 1:10 mixture of 1 part sodium bicarbonate solution in 9 parts of lidocaine 1% to reduce pain of injection.			

GreenWeight 44-50 kgGreen

Heart rate 60 to 100

SBP 110 to 119

Resp 16 to 22

Acetaminophen (Tylenol):

Oral liquid: 160 mg/5 ml

Suppository: 120 mg, 325 mg, 650 mg

Route	Dose per kg	Onset	Duration	Dose	ml to give
PO, PR	15 mg/kg	30 m	4 hr	650 mg	20 ml of 160 mg/5 ml

Alerts: Check concentration

Comments: Equivalent to NSAID's for pain and fever, but has no anti-inflammatory effect. Oral liquid can be 100 mg/ml infant drops OR children's suspension 160 mg/5ml. Suppository also available as above. Do not exceed 5 doses per day and use with extreme caution in children with hepatic dysfunction.

Diazepam: Intravenous formulation (same for IV or PR): 5 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV	0.2 mg/kg	1-3 m	0.5 hr	5 mg (max)	1 ml
PR	0.5 mg/kg	2-15 m	0.5 hr	5 mg (max)	1 ml

Alerts: Resp depression with fast IV push. Rectal gel available at 2.5 mg/ml

Comments: Not a first line drug. Works for status epilepticus, but midazolam or lorazepam preferred. Works for sedation but midazolam or lorazepam preferred. Push slowly IV. May repeat IV dose q 10 minutes prn, with max total dose of 10 mg. Decrease dose by ½ if given with morphine. IV solution can be administered with lubricated TB syringe (no needle) into rectum. Rectal gel easier to insert into rectum, but expensive.

Etomidate: Intravenous formulation: 2 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV	0.2 mg/kg	30-60 sec	2-15 min	9.5 mg	Sedation dose 4.7 ml
IV	0.3 mg/kg	30-60 sec	5-15 min	14 mg	RSI dose 7 ml

Alerts: Give lower dose for sedation for imaging. Watch for myoclonus, vomiting.

Comments: Use starting dose of 0.2 mg/kg for sedation for imaging.

Use with narcotic (e.g., fentanyl) for procedural sedation.

Use higher dose of 0.3 mg/kg for induction for rapid sequence intubation.

Increase by 0.05 mg/kg every 60-90 seconds to maximum of 0.4 mg/kg (**4 mg**).

44-50 kg

GreenWeight 44-50 kgGreen

Heart rate 60 to 100 SBP 110 to 119 Resp 16 to 22

Fentanyl: IV/IM formulation: 100 mcg/2ml = 50 mcg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV, IM	1 mcg/kg	<1 m IV 7-15 m IM	30-60 m	47 mcg	0.95 ml

Alerts: Resp depression, reversible with naloxone. Avoid rapid infusion, as it may lead to rigid chest syndrome and need for respiratory support.

Comments: Start with 1 mcg/kg. Max 100 mcg single dose. May repeat dose q5-10 minutes prn. The respiratory depressant effects may last longer than analgesic effects. Best drug for major trauma cases and possible hypoperfusion.

Fentanyl (Intranasal): Use IV formulation for intranasal administration:
100 mcg/2ml = 50 mcg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IN	2 mcg/kg	1-2 m	½-2 hr	94 mcg	1.9 ml

Alerts: Atomizer needed to nebulize drug intranasally to maximize absorption.

Comments: Put half of each dose in each nostril. May repeat 0.5 mcg/kg dose q 5-10 minutes prn. The respiratory depressant effects may last longer than analgesic effects. Use when vascular access unavailable or unnecessary. Has not been trialed on <3 yo.

Hydromorphone (Dilaudid): IV/IM formulation: 2 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV	0.02 mg/kg	2-5 m	4-5 hr	0.6 mg	0.3 ml
IM	0.02 mg/kg	2-5 m	4-5 hr	1 mg	0.5 ml

Alerts: Resp depression possible. Contraindicated in status asthmaticus.

Comments: Not recommended for children intolerant or unresponsive to morphine. Excellent alternative to morphine for sickle cell pain. 1 mg hydromorphone = 7 mg morphine.

Recommended IV max for opioid naïve patients is 0.6 mg, for IM dose is 1mg

GreenWeight 44-50 kgGreen

Heart rate 60 to 100 SBP 110 to 119 Resp 16 to 22

Ibuprofen (Motrin): Formulation: Oral liquid 100 mg/5ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
PO	10 mg/kg	30 m	6 hr	450 mg	23 ml of 100 mg/5 ml

Alerts: Contraindicated if hypersensitive to NSAID's. Use with extreme caution in patients with decreased renal function.

Comments: Excellent first line analgesic and antipyretic. Use when an anti-inflammatory effect is desired in patients with pain or fever.

Ketamine: IV/IM formulation: 50 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV	1-2 mg/kg	30 sec	15-30 m	47-94 mg	0.9-1.9 ml
IM	5 mg/kg	3-5 m	30-90 m	235 mg	4.7 ml

Alerts: Laryngospasm, hypersalivation, vomiting. Contraindicated if increased intracranial or intraocular pressure. Watch for emergence reaction, nausea/vomiting.

Comments: No atropine needed. Do not exceed injection rate of 0.5 mg/kg/min or give the dose in less than 1 minute.

Lorazepam (Ativan): IV/IM formulation: 2 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV, IM	0.05 - 0.1 mg/kg	2-3 m	6-8 hrs	2 mg (max)	1 ml

Alerts: Check concentration (2 and 4 mg/ml syringe available). Resp depression, especially with fast IV push.

Comments: Best first seizure drug. Decrease dose by ½ if given with morphine.

GreenWeight 44-50 kgGreen

Heart rate 60 to 100 SBP 110 to 119 Resp 16 to 22

Methohexital (Brevital): IV/PR (1% solution): 500 mg/50 ml = 10 mg/ml

IM (5% solution): 500 mg/10 ml = 50 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV	1 mg/kg	1 m	10 m	47 mg	4.7 ml of 10 mg/ml
IM	6 mg/kg	2-10 m	1-1½ hr	280 mg	5.6 ml of 50 mg/ml
PR	25 mg/kg	5-15 m	1-1½ hr	500 mg (max)	50 ml of 10 mg/ml
Alerts: Resp depression. Note there is a different dilution for IV/PR versus IM administration. Do not use with hypoperfusion. Comments: Deep sedation drug. Continuous monitoring essential.					

Midazolam (Versed): IV/IM formulation: 1 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV, IM	0.05-0.1 mg/kg	1-5 m	½-1 hr	2 mg (max)	2 ml
Alerts: Check concentration (also available in 5 mg/ml). Watch for resp depression, especially with rapid IV push. Comments: Decrease dose by ½ if given with morphine. May increase dose by 0.1 mg/kg every 5 minutes, to a maximum of 0.4 mg/kg to attain seizure control or sedation. Max 2 mg single dose IV, max total IV dose 6 mg.					

Morphine: IV/IM formulations (multiple): 5 or 10 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV, IM	0.05-0.1 mg/kg	1-3 m	1-2 hrs	4.5 mg	0.9 ml of 5 mg/ml
Alerts: Check concentration (multiple formulations). Adjust dose for renal impairment. May cause hypotension or resp depression, nausea, emesis, or pruritis. Comments: May repeat dose q 5-15 minutes to desired effect. Decrease dose by ½ if given with barbiturates, hydroxyzine/diphenhydramine, or with other benzodiazepines.					

Green Weight 44-50 kg Green

Heart rate 60 to 100 SBP 110 to 119 Resp 16 to 22

Pentobarbital (Nembutal): IV/IM formulation: 50 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV	1-2 mg/kg	3-5 m	15-45 m	47-94 mg	0.95-1.9 ml
IM	5 mg/kg	10 m	1-4 hrs	235 mg	4.7 ml

Alerts: May cause hypotension. Paradoxical excitement may occur when administered (small doses of morphine can ameliorate this effect).

Comments: Not first line drug for imaging sedation—use etomidate. Decrease dose by ½ if given with morphine. Do not inject >50 mg/min. Lasts longer than methohexital.

GreenWeight 44-50 kgGreen

Heart rate 60 to 100

SBP 110 to 119

Resp 16 to 22

Reversal Agents

Flumazenil (Romazicon): IV formulation: 0.1 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV	0.01 mg/kg	1-2 m	20-60 m	0.2 mg (max)	2 ml
Alerts: Contraindicated if benzodiazepine addiction or concomitant tricyclic antidepressant overdose.					
Comments: May repeat 0.02 mg/kg q1 min up to a total of 1 mg.					

Naloxone (Narcan): IV/IO/IM/IN/ET formulation: 0.4 mg/ml, or 1 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV, IO, IM, SC, IN, ET	0.1 mg/kg	<2 m (IV, IO), 2-5 m (IM, SC, IN, ET)	30-60 m	2 mg (max)	2 ml of 1 mg/ml
Alerts: Careful with concentration. Use with extreme caution in neonates to avoid seizures. Contraindicated if hypersensitivity to naloxone.					
Comments: May repeat 0.05 mg/kg q2-3 min up to total 2 mg. Max single dose 2 mg. Titrate dose for either partial or complete opiate reversal.					

GreenWeight 44-50 kgGreen

Heart rate 60 to 100

SBP 110 to 119

Resp 16 to 22

Topical Pain Management

EMLA (Eutectic Mixture of Local Anesthetics): Formulation: lidocaine 2.5% & prilocaine 2.5% cream (5 g tube)

Route	Max dose	Max area of coverage	Onset	Duration
Topical	20 g	200 cm ² area of skin	60 m	2-3 hrs
Alerts: Do not apply to mucous membranes or open wounds. Apply for no longer than 4 hours. Contraindicated if hypersensitivity to lidocaine or prilocaine. Comments: May cause methemoglobinemia. Anesthesia lasts 1-2 hrs after removal of cream.				

LET (lidocaine, epinephrine, tetracaine): Formulation: Lidocaine 4%, Epinephrine 1:1000, & Tetracaine 0.5% (3 ml bottle)

Route	Dose	Onset	Duration
Topical	1-3 ml	10 m	1-2 hrs
Alerts: Do not use on fingertips, toes, nose, or penis. Max dose is 8 mg/kg of lidocaine. Contraindicated if hypersensitivity to lidocaine, epinephrine, or tetracaine. Avoid contact with mucous membranes. Comments: For facial lacerations, apply solution with dropper or gauze (gel is better).			

Lidocaine 1% (Xylocaine): Formulation: Lidocaine 1% (10 mg/ml)

Route	Max Dose	Onset	Duration
Infiltration	18 ml	Rapid	½-1 hr
Alerts: Do not exceed 4-5 mg/kg due to risk of seizures, or 8 mg/kg if combined with epinephrine. Do not use lidocaine/epinephrine combo on fingertips, toes, nose, or penis. Comments: Buffer lidocaine injection (lidocaine 1%) as a 1:10 mixture of 1 part sodium bicarbonate solution in 9 parts of lidocaine 1% to reduce pain of injection.			

Green Weight > 50 kg Green

Heart rate 60 to 100

SBP 110 to 119

Resp 16 to 22

Acetaminophen (Tylenol):

Oral liquid: 160 mg/5 ml

Suppository: 120 mg, 325 mg, 650 mg

Route	Dose per kg	Onset	Duration	Dose	ml to give
PO, PR	15 mg/kg	30 m	4 hr	650 mg	20 ml of 160 mg/5 ml

Alerts: Check concentration

Comments: Equivalent to NSAID's for pain and fever, but has no anti-inflammatory effect. Oral liquid can be 100 mg/ml infant drops OR children's suspension 160 mg/5ml. Suppository also available as above. Do not exceed 5 doses per day and use with extreme caution in children with hepatic dysfunction.

Diazepam: Intravenous formulation (same for IV or PR): 5 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV	0.2 mg/kg	1-3 m	0.5 hr	10 mg (max)	2 ml
PR	0.5 mg/kg	2-15 m	0.5 hr	10 mg (max)	2 ml

Alerts: Resp depression with fast IV push. Rectal gel available at 2.5 mg/ml

Comments: Not a first line drug. Works for status epilepticus, but midazolam or lorazepam preferred. Works for sedation but midazolam or lorazepam preferred. Push slowly IV. May repeat IV dose q 10 minutes prn, with max total dose of 10 mg. Decrease dose by ½ if given with morphine. IV solution can be administered with lubricated TB syringe (no needle) into rectum. Rectal gel easier to insert into rectum, but expensive.

Etomidate: Intravenous formulation: 2 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV	0.2 mg/kg	30-60 sec	2-15 min	10 mg	Sedation dose 5 ml
IV	0.3 mg/kg	30-60 sec	5-15 min	15 mg	RSI dose 7.5 ml

Alerts: Give lower dose for sedation for imaging. Watch for myoclonus, vomiting.

Comments: Use starting dose of 0.2 mg/kg for sedation for imaging.

Use with narcotic (e.g., fentanyl) for procedural sedation.

Use higher dose of 0.3 mg/kg for induction for rapid sequence intubation.

Increase by 0.05 mg/kg every 60-90 seconds to maximum of 0.4 mg/kg (**4 mg**).

Green Weight > 50 kg Green

Heart rate 60 to 100 SBP 110 to 119 Resp 16 to 22

Fentanyl: IV/IM formulation: 100 mcg/2ml = 50 mcg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV, IM	1 mcg/kg	<1 m IV 7-15 m IM	30-60 m	50 mcg	1 ml

Alerts: Resp depression, reversible with naloxone. Avoid rapid infusion, as it may lead to rigid chest syndrome and need for respiratory support.

Comments: Start with 1 mcg/kg. Max 100 mcg single dose. May repeat dose q5-10 minutes prn. The respiratory depressant effects may last longer than analgesic effects. Best drug for major trauma cases and possible hypoperfusion.

Fentanyl (Intranasal): Use IV formulation for intranasal administration:
100 mcg/2ml = 50 mcg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IN	2 mcg/kg	1-2 m	½-2 hr	100 mcg	2 ml

Alerts: Atomizer needed to nebulize drug intranasally to maximize absorption.

Comments: Put half of each dose in each nostril. May repeat 0.5 mcg/kg dose q 5-10 minutes prn. The respiratory depressant effects may last longer than analgesic effects. Use when vascular access unavailable or unnecessary. Has not been trialed on <3 yo.

Hydromorphone (Dilaudid): IV/IM formulation: 2 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV	0.02 mg/kg	2-5 m	4-5 hr	0.6 mg	0.3 ml
IM	0.02 mg/kg	2-5 m	4-5 hr	1 mg	0.5 ml

Alerts: Resp depression possible. Contraindicated in status asthmaticus.

Comments: Not recommended for children intolerant or unresponsive to morphine. Excellent alternative to morphine for sickle cell pain. 1 mg hydromorphone = 7 mg morphine.

Green Weight > 50 kg Green

Heart rate 60 to 100 SBP 110 to 119 Resp 16 to 22

Ibuprofen (Motrin): Formulation: Oral liquid 100 mg/5ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
PO	10 mg/kg	30 m	6 hr	600 mg	30 ml of 100 mg/5 ml
Alerts: Contraindicated if hypersensitive to NSAID's. Use with extreme caution in patients with decreased renal function. Comments: Excellent first line analgesic and antipyretic. Use when an anti-inflammatory effect is desired in patients with pain or fever.					

Ketamine: IV/IM formulation: 50 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV	1-2 mg/kg	30 sec	15-30 m	50-100 mg	1-2 ml
IM	5 mg/kg	3-5 m	30-90 m	250 mg	5 ml
Alerts: Laryngospasm, hypersalivation, vomiting. Contraindicated if increased intracranial or intraocular pressure. Watch for emergence reaction, nausea/vomiting. Comments: No atropine needed. Do not exceed injection rate of 0.5 mg/kg/min or give the dose in less than 1 minute.					

Lorazepam (Ativan): IV/IM formulation: 2 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV, IM	0.05 - 0.1 mg/kg	2-3 m	6-8 hrs	2 mg (max)	1 ml
Alerts: Check concentration (2 and 4 mg/ml syringe available). Resp depression, especially with fast IV push. Comments: Best first seizure drug. Decrease dose by ½ if given with morphine.					

Green Weight > 50 kg Green

Heart rate 60 to 100 SBP 110 to 119 Resp 16 to 22

Methohexital (Brevital): IV/PR (1% solution): 500 mg/50 ml = 10 mg/ml

IM (5% solution): 500 mg/10 ml = 50 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV	1 mg/kg	1 m	10 m	50 mg	5 ml of 10 mg/ml
IM	6 mg/kg	2-10 m	1-1½ hr	300 mg	6 ml of 50 mg/ml
PR	25 mg/kg	5-15 m	1-1½ hr	500 mg (max)	50 ml of 10 mg/ml

Alerts: Resp depression. Note there is a different dilution for IV/PR versus IM administration. Do not use with hypoperfusion.

Comments: Deep sedation drug. Continuous monitoring essential.

Midazolam (Versed): IV/IM formulation: 1 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV, IM	0.05-0.1 mg/kg	1-5 m	½-1 hr	2 mg (max)	2 ml

Alerts: Check concentration (also available in 5 mg/ml). Watch for resp depression, especially with rapid IV push.

Comments: Decrease dose by ½ if given with morphine. May increase dose by 0.1 mg/kg every 5 minutes, to a **maximum** of 0.4 mg/kg to attain seizure control or sedation. Max 2 mg single dose IV, max total IV dose 6 mg.

Morphine: IV/IM formulations (multiple): 5 or 10 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV, IM	0.05-0.1 mg/kg	1-3 m	1-2 hrs	2.5-5 mg	0.5-1 ml of 5 mg/ml

Alerts: Check concentration (multiple formulations). Adjust dose for renal impairment. May cause hypotension or resp depression, nausea, emesis, or pruritis.

Comments: May repeat dose q 5-15 minutes to desired effect. Decrease dose by ½ if given with barbiturates, hydroxyzine/diphenhydramine, or with other benzodiazepines.

Green Weight > 50 kg Green

Heart rate 60 to 100 SBP 110 to 119 Resp 16 to 22

Pentobarbital (Nembutal): IV/IM formulation: 50 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV	1-2 mg/kg	3-5 m	15-45 m	50-100 mg	1-2 ml
IM	5 mg/kg	10 m	1-4 hrs	250 mg	5 ml

Alerts: May cause hypotension. Paradoxical excitement may occur when administered (small doses of morphine can ameliorate this effect).

Comments: Not first line drug for imaging sedation—use etomidate. Decrease dose by ½ if given with morphine. Do not inject >50 mg/min. Lasts longer than methohexital.

Green Weight > 50 kg Green

Heart rate 60 to 100

SBP 110 to 119

Resp 16 to 22

Reversal Agents

Flumazenil (Romazicon): IV formulation: 0.1 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV	0.01 mg/kg	1-2 m	20-60 m	0.2 mg (max)	2 ml
Alerts: Contraindicated if benzodiazepine addiction or concomitant tricyclic antidepressant overdose.					
Comments: May repeat 0.02 mg/kg q1 min up to a total of 1 mg.					

Naloxone (Narcan): IV/IO/IM/IN/ET formulation: 0.4 mg/ml, or 1 mg/ml

Route	Dose per kg	Onset	Duration	Dose	ml to give
IV, IO, IM, SC, IN, ET	0.1 mg/kg	<2 m (IV, IO), 2-5 m (IM, SC, IN, ET)	30-60 m	2 mg (max)	2 ml of 1 mg/ml
Alerts: Careful with concentration. Use with extreme caution in neonates to avoid seizures. Contraindicated if hypersensitivity to naloxone.					
Comments: May repeat 0.05 mg/kg q2-3 min up to total 2 mg. Max single dose 2 mg. Titrate dose for either partial or complete opiate reversal.					

Green Weight > 50 kg Green

Heart rate 60 to 100 SBP 110 to 119 Resp 16 to 22

Topical Pain Management

EMLA (Eutectic Mixture of Local Anesthetics): Formulation: lidocaine 2.5% & prilocaine 2.5% cream (5 g tube)

Route	Max dose	Max area of coverage	Onset	Duration
Topical	20 g	200 cm ² area of skin	60 m	2-3 hrs
Alerts: Do not apply to mucous membranes or open wounds. Apply for no longer than 4 hours. Contraindicated if hypersensitivity to lidocaine or prilocaine. Comments: May cause methemoglobinemia. Anesthesia lasts 1-2 hrs after removal of cream.				

LET (lidocaine, epinephrine, tetracaine): Formulation: Lidocaine 4%, Epinephrine 1:1000, & Tetracaine 0.5% (3 ml bottle)

Route	Dose	Onset	Duration
Topical	1-3 ml	10 m	1-2 hrs
Alerts: Do not use on fingertips, toes, nose, or penis. Max dose is 8 mg/kg of lidocaine. Contraindicated if hypersensitivity to lidocaine, epinephrine, or tetracaine. Avoid contact with mucous membranes. Comments: For facial lacerations, apply solution with dropper or gauze (gel is better).			

Lidocaine 1% (Xylocaine): Formulation: Lidocaine 1% (10 mg/ml)

Route	Max Dose	Onset	Duration
Infiltration	21 ml	Rapid	½-1 hr
Alerts: Do not exceed 4-5 mg/kg due to risk of seizures, or 8 mg/kg if combined with epinephrine. Do not use lidocaine/epinephrine combo on fingertips, toes, nose, or penis. Comments: Buffer lidocaine injection (lidocaine 1%) as a 1:10 mixture of 1 part sodium bicarbonate solution in 9 parts of lidocaine 1% to reduce pain of injection.			