

Surgery Lab Drug Calculation Table: Hernia Repair

Sex: Female
 Species: Caprine
 Breed: Anglo Nubian mix
 AGE: 4 months
 ID: Kid Rock

BCS: 1.5-2/5
 Temperature: 39.5 °C (normal)
 Pulse: 136 beats/min) Slightly elevated

Respiration rate: (28 breaths/min) normal
 MM: (Pink/moist) normal
 CRT: (<2 secs) normal
 ASA grade: 2

Calculating CRI

Step 1

**CONSTANT RATE INFUSIONS (CRI)
 – WHY?**

1. A more stable plane of analgesia with less incidence of break-through pain (which can be difficult to treat);
2. A lower drug dosage delivered at any given time, resulting in a lower incidence of dose-related side effects;
3. Greater control over drug administration (easy to change the dose);
4. Decreased need for stimulation of resting patients to administer drugs;
5. Decreased cost (when compared to technician time, needles, and syringes required for repeat injections).

Step 2

CONSTANT RATE INFUSIONS (CRI) – HOW? The Rules

Need to know two doses plus one rate:

- Loading dose (mg/kg)**
- CRI dose (mg/kg/hr)**
- Fluid rate (ml/kg/hr)**

Step 3

**CONSTANT RATE INFUSIONS – RULES
 CATTLE, SHEEP & GOAT**

- **Need to know two doses:**
 - Loading – eg. Xylazine 0.05 mg/kg IM, Ketamine 5 mg/kg IV & Lidocaine 1mg/kg
 - CRI – eg. Xylazine 0.05mg/kg/hr & Ketamine 5 mg/kg/hr
 - Lidocaine 1mg/kg/hr
 - Fluid rate – for surgery 5-10 ml/kg/hr
- **Choices:**
 - Use formula –
 - Made easy rule:
 - 60mg of any drug in 1L
 - X Flow Rate in ml/kg/hr delivers X mcg/kg/min of drug

Drug (mg) = [Infusion rate of the drug (mg/kg/hour) + Fluid infusion rate (ml/kg/hour)] x diluent volume (ml)

Formula for CRI

$$M = \frac{(D)(W)(V)}{(R)(16.67)}$$

M = number of mg of drug to add to delivery fluid
 D = dosage of drug in mcg/kg/min
 W = patient body weight in kg
 V = volume in ml of delivery fluid
 R = rate of delivery in ml/hr
 16.67 = conversion factor

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Step 4

CRI Drug (mg) = [Infusion rate of the drug (mg/kg/hour) ÷ Fluid infusion rate (ml/kg/hour)] x diluent volume (ml)

MAINTENANCE RATE = 1-2 ml/kg/hr SURGICAL RATE = 5-10 ml/kg/hr

DRUG	CONCENTRATION	DOSE Sheep/goat	CALCULATION (infusion rate 5ml/kg/hr)
Xylazine	20mg/ml	0.05mg/kg/hr	$(0.05/5) \times 1000 = 10\text{mg} = 0.5\text{mls}$
Ketamine	100mg/ml	5mg/kg/hr	$(5/5) \times 1000 = 1000 = 10 \text{ mls}$
Lidocaine	20mg/ml	1mg /kg/hr	$(1/5) \times 1000 = 200 = 10\text{mls}$

Calculated of Drip Rate in drops per sec - $(\text{ml}/\text{min} \times \text{drip factor})/60 = \text{drops}/\text{sec}$

50kg Sheep drop/sec = $(50\text{kg} \times 5\text{ml}/\text{kg}/\text{hr} \times 20 \text{ drops}/\text{ml}) / (60\text{min}/\text{hr} \times 60\text{sec}/\text{min}) = 1.4\text{d}/\text{sec}$

CALCULATIONS

Type of drug	Dose (mg/kg)	Conc. (mg/ml)	Weight / kg	Volume (ml)	Time given
<i>Sedative/Anaesthetic</i>					
Step 1: Loading dose/CRI dose					
Xylazine	0.05	20 (2%)	8.4	$V = \frac{0.05 \times 8.4}{20} = 0.021$	
Ketamine	5	100 (10%)	8.4	$V = \frac{5 \times 8.4}{100} = 0.42$	
Lidocaine	1	20 (2%)	8.4	$V = \frac{1 \times 8.4}{20} = 0.42$ Same volume was used for lumbosacral epidural.	
Lidocaine toxic dose	10	20 (2%)	8.4	$V = \frac{10 \times 8.4}{20} = 4.2$ Half toxic dose= 2.1 ml	

Loading dose and CRI dose is the same for this Lab.

Dilution for Xylazine to new concentration of 1mg/kg and volume of 10 ml.

$$V_1C_1 = V_2C_2 \rightarrow V_1 \times 20 = 10 \times 1$$

$$V_1 = \frac{10 \times 1}{20} = 0.5 \text{ ml. Add 9.5ml of normal saline to make up volume.}$$

Fluid rate for short procedures = 10 ml/kg/hr

Fluid rate for long procedures= 5 ml/kg/hr. (Used in this lab)

Normal infusion set: 20 drops = 1ml

Paediatric infusion set: 60 drops=1ml

One bag of sodium chloride=1000 ml

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Step 2: Fluid rate

Drug	Conc. (mg/ml)	Dose (ml/kg/hr)	Infusion rate (5ml/kg/hr)
Xylazine	20	0.05	$V = \frac{0.05}{5} \times 1000 = 10 \rightarrow \frac{10}{20} = 0.5\text{ml}$
Ketamine	100	5	$V = \frac{5}{5} \times 1000 = 1000 \rightarrow \frac{1000}{100} = 10\text{ml}$
Lidocaine	20	1	$V = \frac{1}{5} \times 1000 = 200 \rightarrow \frac{200}{20} = 10\text{ml}$

Step 3: Calculation of drip rate

$$\text{Normal line} = \frac{8.4\text{kg} \times 5\text{mg/kg/hr} \times 20\text{drops/ml}}{60 \times 60} = \frac{840}{3600} = 0.233 \text{ drops/sec}$$

$$\text{Paediatric line} = \frac{8.4\text{kg} \times 5\text{mg/kg/hr} \times 60\text{drops/ml}}{60 \times 60} = \frac{2520}{3600} = 0.7 \text{ drops/sec}$$

To ensure that the drip rate is accurate remove volume equivalent to the volume of drugs to be placed in the infusion bag.

<i>Antibiotics</i>					
Type of Drug	Dose (mg/kg)	Conc. (mg/ml)	Weight / kg	Volume (ml)	Time given
Pen Strep	20,000	200,000 IU	8.4	$V = \frac{20,000 \times 8.4}{200,000} = 0.84$	
<i>Anti-inflammatory/Analgesic</i>					
Flunixin	1.1	50 (5%)	8.4	$V = \frac{1.1 \times 8.4}{50} = 0.1848 (0.2)$	
<i>Reversal / Emergency</i>					
Tolazoline	4 x (0.05)	100 (10%)	8.4	$V = \frac{4(0.05) \times 8.4}{100} = 0.0168 (0.02)$	
Atropine	1.8	15	8.4	$V = \frac{1.8 \times 8.4}{15} = 1.008$	
Epinephrine	0.2	1 (0.1%)	8.4	$V = \frac{0.2 \times 8.4}{1} = 1.68$	
Toxic dose for Lidocaine	10	20 (2%)	8.4	$V = \frac{10 \times 8.4}{20} = 4.2$ Half toxic dose= 2.1 ml	
<i>Other drugs</i>					
Diazepam	2.4	10	8.4	$V = \frac{2.4 \times 8.4}{10} = 2$	
Ketamine	24	100 (10%)	8.4	$V = \frac{24 \times 8.4}{100} = 2.016$	

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