

Supplemental Table 1. Opioid, benzodiazepine, neuromuscular blockade, NSAID, and steroid drug conversion factors

Opioid Drugs	Equivalent Dose
IV morphine	1 mg
IV fentanyl	0.01 mg
IV hydromorphone	0.15 mg
Oral oxycodone	3 mg
IV nalbuphine	1 mg
Oral codeine	20 mg
Benzodiazepines	Equivalent Dose
IV midazolam	1 mg
IV lorazepam	0.5 mg
Neuromuscular Blockers	Equivalent Dose
IV vecuronium	1 mg
IV cisatracurium	1 mg
NSAIDs	Equivalent Dose
IV ketorolac	1 mg
Oral ibuprofen	20 mg
Oral naproxen	45 mg
Oral aspirin	7 mg
Steroids	Equivalent Dose
IV hydrocortisone	1 mg
IV dexamethasone	0.025 mg
IV methylprednisolone	0.20 mg
Oral prednisone	0.20 mg
Oral prednisolone	0.20 mg

Supplemental Table 2. Subgroup demographics

	Infants		Children	
	No Down Syndrome (N=50)	Down Syndrome (N=33)	No Down Syndrome (N=27)	Down Syndrome (N=11)
Age (months) ^a	5.0 ± 2.2 (0.4 – 11.5)	4.8 ± 2.4 (0.2 – 10.4)	90 ± 64 (14 – 207)	53 ± 33 (12 – 103)
Male ^b	30 (60%)	15 (45%)	13 (48%)	6 (55%)
Weight (kg) ^a	6.0 ± 1.2 (3.1 – 8.1)	5.2 ± 1.6 (2.2 – 9.1)	31.5 ± 24.8 (8.6 – 96.9)	14.1 ± 5.0 (7.0 – 21.7)
Primary Diagnosis ^b				
AVSD	6 (12%)	25 (76%)	6 (22%)	4 (36%)
Tetralogy of Fallot	31 (62%)	1 (3%)	4 (15%)	1 (9%)
Ventricular Septal Defect	12 (24%)	6 (18%)	5 (19%)	1 (9%)
Atrial Septal Defect	0 (0%)	0 (0%)	8 (30%)	3 (27%)
Other ^c	1 (2%)	1 (3%)	4 (15%)	2 (18%)
Bypass Time (min) ^a	101 ± 25 (38 – 171)	101 ± 42 (0 – 178)	94 ± 51 (0 – 215)	100 ± 52 (0 – 212)
Creatinine (mg/dL) ^a	0.5 ± 0.1 (0.3 – 0.9)	0.6 ± 0.1 (0.3 – 0.9)	0.7 ± 0.3 (0.4 – 1.8)	0.6 ± 0.1 (0.4 – 0.81)
Peak Pain Score in first 24 hours ^a	4 ± 3 (0 – 10)	4 ± 3 (0 – 10)	5 ± 3 (0 – 10)	4 ± 2 (0 – 8)
Mean Peak Pain Score in first 96 hours ^a	5 ± 2 (0 – 10)	4 ± 2 (0 – 8)	5 ± 2 (1 – 10)	4 ± 1 (1 – 6)
Time to Extubation (days) ^a	1.4 ± 1.5 (0 – 6)	1.9 ± 2.9 (0 – 14)	0.3 ± 1.0 (0 – 5)	0.5 ± 0.7 (0 – 2)
^a Mean ± SD (Min - Max) ^b N (Column %) ^c Other includes Mitral Valve Stenosis, Vascular Rings, and Aortic Arch Hypoplasia				

Supplemental Table 3. Opioid agents administered

Opioid Drugs	Patients Exposed in First 24 Hours	Patients exposed in First 96 Hours
Fentanyl Infusion	55	56
Intermittent Fentanyl	104	107
Any Fentanyl	109	109
Intermittent Hydromorphone	1	6
Morphine Infusion	7	8
Intermittent Morphine	88	111
Any Morphine	90	111
Nalbuphine	0	1
Oral Codeine	0	4
Oral Oxycodone	26	85

Supplemental Table 4. Ratios of geometric means for linear regression with dichotomous medication covariates

	First 24 Hours ^a	First 96 Hours ^a
Age (years)	0.88 (0.84 – 0.92)	0.88 (0.83 – 0.92)
Gender	0.87 (0.64 – 1.20)	1.02 (0.73 – 1.41)
Down Syndrome Status	1.14 (0.81 – 1.61)	0.96 (0.67 – 1.37)
Bypass Time (quarter hours)	1.15 (1.08 – 1.22)	1.16 (1.08 – 1.24)
Pain Score	0.95 (0.89 – 1.02)	0.95 (0.87 – 1.04)
Creatinine (mg/dL)	1.28 (0.42 – 3.88)	2.02 (0.65 – 6.22)
Benzodiazepine Exposure	2.07 (1.47 – 2.91)	2.07 (1.42 – 3.04)
Acetaminophen Exposure	1.03 (0.70 – 1.50)	0.85 (0.48 – 1.51)
Neuromuscular Blocker Exposure	1.98 (1.24 – 3.16)	2.24 (1.38 – 3.62)
Dexmedetomidine Exposure	0.74 (0.53 – 1.03)	0.71 (0.51 – 0.99)
^a Ratios of geometric means (95% confidence interval). Covariates with significant correlation to the outcome of cumulative mg/kg opioid dose are in bold. Models: 24 hours $R^2 = 0.54$, $F(10, 109) = 14.97$, $P < 0.001$; 96 hours $R^2 = 0.59$, $F(10, 105) = 14.95$, $P < 0.001$		

Supplemental Table 5. Effect of Down syndrome on post-operative opioid dose among infants (< 1 year old) and children (> 1 year old)

	24 hours		96 hours	
Infants	No Down Syndrome (N=50)	Down Syndrome (N=33)	No Down Syndrome (N=50)	Down Syndrome (N=33)
Cumulative opioid (mg/kg) Median (IQR)	4.0 (2.1 – 8.8)	4.3 (1.3 – 8.5)	5.1 (2.6 – 12.1)	5.1 (2.1 – 13.4)
Differences of Medians (95% CI)	-0.36 (-1.82 to +1.39)		-0.17 (-2.06 to +2.29)	
Unadjusted P-value ^a	0.58		0.81	
Adjusted P-value ^b	0.97		0.85	
Children	No Down Syndrome (N=27)	Down Syndrome (N=11)	No Down Syndrome (N=27)	Down Syndrome (N=11)
Cumulative opioid (mg/kg) Median (IQR)	0.6 (0.3 – 1.1)	1.4 (0.5 – 4.6)	0.9 (0.7 – 1.4)	1.5 (0.7 – 6.0)
Differences of Medians (95% CI)	+0.47 (-0.02 to +1.39)		+0.45 (-0.18 to +1.77)	
Unadjusted P-value ^a	0.07		0.19	
Adjusted P-value ^b	0.19		0.13	
^a Wilcoxon Rank-Sum test				
^b For Down Syndrome in linear regression modeling, adjusting only for age and bypass time				