

Table S1. Top 50 Prescribed Medications in All Patients Supported by ECMO and Supporting Pharmacokinetics and Pharmacodynamics Literature (N=254)

Medications (% Children Exposed)	Study	Population Studied* (Number of Subjects and Age)	Study Design	Dosing Guidance (for Normal SCR Values)
Heparin (97%)	Peverini et al. (1) Green et al. (2) Nankervis et al. (3) Bembea et al. (4) Green et al. (5) Moynihan et al. (6) Anton-Martin et al. (7) O'Meara et al. (8) Bingham et al. (9) Kessel et al. (10) Irby et al. (11) Baird et al. (12) Liveris et al. (13) Reed et al. (14) Maul et al. (15) Mehta et al. (16)	(1) 58 infants** (2) 5 neonates (1-7d) (3) 12 neonates** (4) 34 children (median 10 days, IQR 2d-10y) (5) 9 infants ($\leq$ 7d-120d) (6) 31 children (median 17d, IQR 2d-764d) (7) 2 groups of 36 children (0-158m and 0-203m) (8) 20 children (1d-17y) (9) 35 children (median 39d, IQR 7.5d-392.5d) (10) 18 children (1d-17y) (11) 62 patients (0y-20.7y) (12) 604 children (median 3d, IQR 1-52d) (13) 17 children (1d-13.9y) (14) 29 children (median 2m) (15) 47 children (0-18y)	Retrospective population PK (1) Retrospective PK (2) Prospective PD (3-5) Retrospective PD (6-15) In vitro (16)	Yes, but not readily accessible (1) No (2-16)
Morphine (92%)	Peters et al. (17) Geiduschek et al. (18) Peters et al. (19) Krekels et al. (20) Dagan et al. (21) Michel et al. (22) Dagan et al. (23) Hartan et al. (24) Mehta et al. (16) Nasr et al. (25) Raffaelli et al. (26) Bhatt-Meht et al. (27)	(17) 14 neonates ($<$ 7d) (18) 11 neonates (0-9d) (19) 14 neonates ($<$ 7d) (20) 30 neonates (0-26d) (21) 7 infants (1d-12m) (22) 17 infants (0-3.3m)	Prospective population PK (17-20) Prospective PK (21) Prospective PD (22) In vitro (16, 23-27)	No (16-27)
Midazolam (86%)	Ahsman et al. (28) Mulla et al. (29) Mulla et al. (30) Michel et al. (22) Hartan et al. (24) Nasr et al. (25) Raffaelli et al. (26) Mulla et al. (31)	(28) 20 neonates (0-6d) (29) 20 neonates (0-18d) (30) 20 neonates (0-18d) (22) 17 infants (0-3.3m)	Prospective population PK (28, 29) Prospective PK/PD (30) Prospective PD (22) In vitro (24-26, 31)	(28) 0.3 mg/kg/h for 6h and 0.15 mg/kg/h thereafter (29) 0.35 mg/kg/h for 6h and 0.05 mcg/kg/h thereafter No (22, 24-26, 29, 31)
Furosemide (83%)	Van der Vorst et al. (32) Van der Vorst et al. (33)	(32) 31 neonates (0-16d) (33) 7 neonates (0-136d)	(32) Retrospective PD (33) Prospective PK/PD	No (32, 33)

Vecuronium (80%)				
Vancomycin (67%)	Cies et al. (34) Moffett et al. (35) Mulla et al. (36) Amaker et al. (37) Buck et al. (38) Hoie et al. (39) Ashman et al. (40) Zylbersztajn et al. (41) Lonabaugh et al. (42) Dagan et al. (23) Mehta et al. (16) Lemaitre et al. (43)	(34) 12 neonates (0-28d) (35) 93 children (median 0.6y, IQR 0.07y-6.7y) (36) 45 patients (0-61.5y) (37) 12 neonates (0-6d) (38) 15 neonates (mean 12.7d $\pm$ 5.1) (39) 6 neonates (1-4d) (40) 1 neonate** (41) 40 children (1m-14y) (42) 28 children (0-11y)	Prospective population PK (34) Retrospective population PK (35) Retrospective and prospective population PK (36) Prospective PK/PD (37-39) Prospective PK (40) Retrospective PK/PD (41, 42) In vitro (16, 23, 43)	(34) 10-12.5 mg/kg every 8h; 12.5-20 mg/kg every 12h or continuous infusion of 20-30 mg/kg/24h (35) 25-30 mg/kg every 12-24h (36) 10-20 mg/kg every 6-8h based on age (37) 20 mg/kg every 24h (39) 20 mg/kg every 18h (41) 10 mg/kg every 6h (42) 15 mg/kg every 12h No (16, 23, 38, 40, 43)
Dopamine (61%)	Mehta et al. (16)		In vitro (16)	No (16)
Cefazolin (57%)	Mehta et al. (16) Wildschut et al. (44)		In vitro (16, 44)	No (16, 44)
Cefepime (55%)	Zuppa et al. (45)	(45) 17 children (1.3m-22.2m)	Prospective population PK (45)	No (45)
Milrinone (45%)				
Fentanyl (44%)	Arnold et al. (46) Leuschen et al. (47) Arnold et al. (48) Hartan et al. (24) Mehta et al. (16) Nasr et al. (25) Raffaelli et al. (26) Preston et al. (49)	(46) 8 neonates (1-14d) (47) 12 infants (1-42d) (48) 37 neonates (5 neonates with PK samples)**	Prospective PK/PD (46, 47) Retrospective and prospective PK/PD (48) In vitro (16, 24-26, 49)	(47) Bolus of 5-10 μ g/kg and continuous infusion of 1-5 μ g/kg/h thereafter No (16, 24-26, 46-49)
Hydrocortisone (43%)	Mehta et al. (16)		In vitro (16)	No (16)
Pantoprazole (40%)				
Epinephrine (35%)	Mehta et al. (16)		In vitro (16)	No (16)
Acetaminophen (33%)	Wildschut et al. (44)		In vitro (44)	No (44)
Chlorothiazide (33%)				
Ampicillin (31%)	Mehta et al. (16)		In vitro (16)	No (16)
Dexmedetomidine (28%)	Nasr et al. (25)		In vitro (25)	No (25)
Ranitidine (25%)	Wells et al. (50) Crill et al. (51)	(50) 13 neonates (includes 12 neonates < 4d) (51) 13 neonates (1-7d)	Prospective PK/PD (50) Retrospective PD (51)	(50) Bolus of 2 mg/kg and continuous infusion of 2 mg/kg/24h No (51)

Gentamicin (24%)	Dodge et al. (52) Cohen et al. (53) Moffett et al. (54) Southgate et al. (55) Munzenberger et al. (56) Bhatt-Mehta et al. (57) Dagan et al. (23)	(52) 11 neonates (PCA 37-42w) (53) 18 neonates (2-8d) (54) 37 infants (median of 0.17m – IQR 0.12-0.82) (53) (55) 10 infants** (56) 15 neonates** (57) 29 neonates**	Prospective population PK (52, 53) Retrospective population PK (54) Prospective PK/PD (55, 56) Retrospective PK/PD (57) In vitro (23)	(52) Loading dose of 4.3 mg/kg and 3.7 mg/kg every 18-24h thereafter (53) 3 mg/kg every 18h if BW <3.5 kg and 2.5 mg/kg every 18h if BW >3.5kg (54) 4-5 mg/kg every 24h (55) 2.5 mg/kg followed by TDM (57) 2.5 mg/kg every 18h No (23, 56)
Hydromorphone (23%)	Reiter (58)	(58) 12 children (0-17y)	Retrospective PD study (58)	No (58)
Albuterol (22%)				
Ketamine (20%)				
Nicardipine (17%)	Liviskie et al. (59) McBride et al. (60) Tobias et al. (61)	(59) 8 neonates (median GA 36.5 weeks - IQR: 35.3-38) (60) 1 neonate (6d) (61) 1 children (19m)	Retrospective PD (59) Case report (60, 61)	(60) 0.5 µg/kg/min titrated to effect (61) 5 µg/kg/min titrated to effect No (59)
Pentobarbital (17%)				
Hydralazine (16%)	Martin et al. (62)	(62) 23 infants**	Prospective PD (62)	No (62)
Dexamethasone (15%)				
Piperacillin-Tazobactam (15%)				
Alprostadi (14%)	Stone et al. (63)	(63) 1 neonate**	Case report (63)	No (63)
Aminocaproic Acid (14%)	Horwitz et al. (64) Wilson et al. (65) Downard et al. (66)	(64) 13 neonates** (65) 42 children** (66) 298 children (4 groups with medians of 1d, 70d, 2y and 19y)	Prospective PD (64) Retrospective PD (65, 66)	No (64-66)
Levetiracetam (14%)				
Methylprednisolone (13%)				
Lorazepam (12%)	Bhatt-Mehta et al. (27) Mulla et al. (31)		In vitro (27, 31)	No (27, 31)
Phenobarbital (12%)	Pokorna et al. (67) Elliott et al. (68) Dagan et al. (23) Mehta et al. (16)	(67) 7 neonates and 9 infants** (68) 1 neonate (2d)	Retrospective population PK (67) Case report (68) In vitro (16, 23)	(67) 15 mg/kg bolus and 4 mg/kg daily thereafter No (16, 23, 68)
Vasopressin (12%)				
Diphenhydramine (11%)				
Lidocaine (11%)				
Insulin (10%)				
Norepinephrine (10%)				

Acetazolamide (9%)				
Acyclovir (9%)	Cies et al. (69)	(69) 1 neonate (14d)	Case report (69)	No (69)
Docusate Sodium (9%)				
Rocuronium (9%)				
Sennosides (9%)				
Treprostinil (9%)				
Amiodarone (7%)	Kendrick et al. (70)	(70) 1 infant (4d)	Case report (70)	(70) 20 µg/kg/min as a continuous infusion
Bumetanide (7%)	Wells et al. (71)	(71) 11 neonates (1-7d)	Prospective PK/PD (71)	No (71)
Cisatracurium (7%)				
Fluconazole (7%)	Watt et al. (72) Watt et al. (73) Minette et al. (74) Watt et al. (75)	(72) 40 children (1-6498d) (73) 10 infants (1-113d) (74) 1 neonate (16d)	Prospective population PK study (72) Prospective PK/PD study (73) Case report (74) In vitro (75)	(72) loading dose of 12 mg/kg and 6 mg/kg daily thereafter (prophylaxis); loading dose of 35 mg/kg and 12 mg/kg daily thereafter (treatment) (73) 25 mg/kg weekly (prophylaxis) No (74, 75)
Meropenem (7%)	Cies et al. (76) Cies et al. (77) Di Nardo et al. (78) Wildschut et al. (44)	(76) 1 infant (8m) (77) 1 neonate (10d) (78) 2 infants (175d ± 10d)	Case report (76-78) In vitro study (44)	(76) Loading dose of 40 mg/kg and continuous infusion of 200 mg/kg/24h thereafter (77) Loading dose of 40 mg/kg and continuous infusion of 240 mg/kg/24h thereafter No (44, 78)

BW: birth weight, GA: gestational age, PCA: postconceptual age, PD: pharmacodynamics,

PK: pharmacokinetics, SCR: serum creatinine, TDM: Therapeutic Drug Monitoring

*When applicable; age range otherwise specified; age in days (d), months (m) or years(y)

**Age not specified

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