Final Response

ATIPP Request # 23-186

Source of Records: Community and Primary Care

Health and Social Services

From: Sheila.Thompson
To: Andrea.Cook-HSS
Subject: FW: VIHA updates
Date: October 5, 2021 5:32:43 PM
Attachments: UPDATES TO VIHA AUGUST 2020.docx
alprostadil 10 mcg_mL Rev Aug 2019.xlsx
amiodarone 1,800 mcg_mL Rev Aug 2019.xlsx
dexmedetomidine 4 mcg_ml Rev Aug 2019.xlsx
DOBUTamine 2,000 mcg_ml Nov 2019.xlsx
DOPamine 1,600 mcg_ml Rev Aug 2019.xlsx
EPINEPHrine 50 mcg_ml Rev Aug 2019.xlsx
epoprostenol 2,000 ng_ml Rev Apr 2020.xlsx
esmolol 10,000 mcg_ml Rev Aug 2019.xlsx
fentaNYL 10 mcg_ml Rev Aug 2019.xlsx
furosemide 2 mg_ml Rev May 2020.xlsx
glucagon 40 mcg_ml Rev Apr 2020.xlsx
heparin 50 units_ml Aug 2019.xlsx
insulin 0.1 units_ml Rev Apr 2020.xlsx
isoproterenol 20 mcg_ml Rev Aug 2019.xlsx
lidocaine 4 mg_mL CARDIAC Aug 2019.xlsx
lidocaine 4 mg_mL SEIZURE Aug 2019.xlsx
midazolam 0.5 mg_ml Rev Apr 2020.xlsx
milrinone 100 mcg_mL Rev Apr 2020.xlsx
morphine 50 mcg_ml Rev Aug 2019.xlsx
norepinephrine 50 mcg_mL Rev Aug 2019.xlsx
octreotide 10 mcg_mL Rev Aug 2019.xlsx
pantoprazole 0.8 mg_mL Aug 2019.xlsx
procainamide 2,000 mcg_mL Rev Apr 2020.xlsx
rocuronium 2 mg_mL Apr 2020.xlsx
vasopressin 0.2 units_mL Rev Apr 2020.xlsx
bevacizumab Rev Dec 2019 V2.docx
ciprofloxacin Rev Jun 2018 neo dosing 2020.docx
dexmedetomidine 2_70 kg Rev Apr 2020.xlsx
fentaNYL IV Rev Mar 2019 neo dosing 2020.docx
heparin Rev Mar 2018 neo dosing 2020.docx
inFLIXimab Rev Dec 2019 V2.docx
ketamine 2-70 kg 2 mg per mL Mar 2020.xlsx
levETIRAcetam info sheet Mar 2020 V2 for status epi.docx
lidocaine Rev Jun 2017 v2 neo dosing 2020.docx
methotrexate Rev Jun 2016v2.docx
morphine IV Nov 2018 neo dosing 2020.docx
naloxone 2-70 kg 200 mcg per mL Mar 2020.xlsx
naloxone Rev Mar 2017 v2 peds dosing 2020.docx
norepinephrine 32 mcg_mL Rev Jun 2020.xlsx
norepinephrine 64 mcg_mL Rev Jun 2020.xlsx
norepinephrine Rev Feb 2019 neo dosing 2019v2.docx
pantoprazole Rev Oct 2018 neo dosing 2020.docx
pembrolizumab Rev Mar 2019 V2.docx
phenytoin Rev Apr 2020.docx
phytonadione Rev Oct 2015 neo dosing 2020.docx
rocuronium Rev Sep 2018 neo dosing 2020.docx
sodium bicarbonate Rev Feb 2016 neo dosing 2020.docx
succinylcholine Rev Apr 2017 V2.docx
tigecycline Rev Mar 2014 peds dosing 2020.docx
tranexamic acid 20 2-62.5 kg or greater Rev May 2020.xlsx
trastuzumab Rev Jan 2020 V2.docx
NICU IM SC Chart Final April 29 2020.docx
NICU VGH IV recon chart Jul 27 2020.docx
Pediatric Syringe Pump_Reconstitution and Dilution Table - May 2020.docx
image002.png
image003.png

FYI

Sheila Thompson
Director
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I respectfully acknowledge that I work within the Traditional Territories of the Kwanlin Dün First Nation and the Ta'an Kwäch'än Council.

From: Phil.Perrin <Phil.Perrin@yukon.ca>
Sent: Tuesday, October 5, 2021 3:06 PM
To: Sheila.Thompson <Sheila.Thompson@yukon.ca>
Subject: FW: VIHA updates

Hi Sheila

Some of these updates are from 2019. I will get these sent over to communications ASAP for printing and out to the communities.

Phil Perrin BAH, RN
Nursing Practice Consultant Supervisor
Health and Social Services| Community Nursing
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From: Jennifer.Wallace <Jennifer.Wallace@wgh.yk.ca>
Sent: Tuesday, October 5, 2021 1:57 PM
To: Phil.Perrin <Phil.Perrin@yukon.ca>
Subject: FW: VIHA updates

Sorry about this Phil, you only missed 2 updates. There will likely be another one within the month

From: Jennifer.Wallace
Sent: Thursday, August 20, 2020 3:17 PM
To: Ann-Marie.Paquet <Ann-Marie.Paquet@gov.yk.ca>
Subject: VIHA updates

Please find attached the most recent updates to the VIHA manual. Let me know if you have any questions.

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UPDATES TO VIHA PARENTERAL MONOGRAPHS-AUGUST 2020

bevacizumab (information on biosimilar brands)
ciprofloxacin (updated neonatal dosing)
fentaNYL (updated neonatal dosing)
heparin (updated neonatal dosing)
inFLIXimab (information on biosimilar brands)
levETIRAcetam (new information sheet-not a full monograph)
lidocaine (updated neonatal dosing)
methotrexate (minor changes to pediatric dosing, references)
morphine (updated neonatal dosing)
naloxone (minor changes to pediatric dosing)
norepinephrine (revised stability)
pantoprazole (updated neonatal dosing)
pembrolizumab (revised dosing as per BCCA protocols)
phenytoin (revised neonatal information)
phytonadione (updated neonatal dosing)
rocuronium (updated neonatal dosing)
sodium bicarbonate (updated neonatal dosing)
succinylcholine (updated neonatal dosing)
tigecycline (addition of pediatric dosing)
trastuzumab (information on biosimilar brands)

ARCHIVED MONOGRAPHS

clodronate (remove – product discontinued)

UPDATED INFUSION CHARTS

Adult:
replace norepinephrine 32 mcg/mL
replace norepinephrine 64 mcg/mL

Neonatal:
replace neonatal alprostadil
replace neonatal amiodarone
replace neonatal dexmedetomidine
remove neonatal DOBUTamine 1000mcg/mL (archived)
replace neonatal DOBUTamine 2000 mcg/mL
replace neonatal DOPamine
replace neonatal EPINEPHrine
replace neonatal epoprostenol
replace neonatal esmolol
replace neonatal fentaNYL
remove neonatal furosemide 1mg/mL (archived)
add neonatal furosemide 2mg/mL
replace neonatal glucagon
add neonatal heparin
replace neonatal insulin
remove neonatal isoproterenol 50 mcg/mL
add neonatal isoproterenol 20 mcg/mL
add neonatal lidocaine chart for cardiac
add neonatal lidocaine chart for seizures
replace neonatal midazolam
replace neonatal milrinone
replace neonatal morphine
replace neonatal norepinephrine
replace neonatal octreotide

add neonatal pantoprazole
replace neonatal procainamide
add neonatal rocuronium
replace neonatal vasopressin

Pediatric:
replace pediatric dexmedetomidine
add pediatric ketamine infusion (new)
add pediatric naloxone (new)
replace pediatric tranexamic acid

ADDITIONAL DOCUMENTS

replace Pediatric Syringe Pump Reconstitution and Dilution Table
add NICU IM and subcut reconstitution and dilution table
replace VGH NICU IV reconstitution and dilution table

Neonatal
alprostadil infusion

(Prostaglandin E1)

Concentration: 10 mcg/mL

Admixture:

Dilute 1 mL of 500 mcg/mL solution with 49 mL of NS or D5W for a total volume of 50 mL

	PATIENT WEIGHT (kg)																			
DOSE	**0.5**	**0.6**	**0.7**	**0.8**	**0.9**	**1**	**1.25**	**1.5**	**1.75**	**2**	**2.25**	**2.5**	**2.75**	**3**	**3.25**	**3.5**	**3.75**	**4**	**4.25**	**4.5**
(mcg/kg/min)	INFUSION RATE (mL/hr)																			
0.01	0.03	0.04	0.04	0.05	0.05	0.06	0.08	0.09	0.11	0.12	0.14	0.15	0.17	0.18	0.2	0.21	0.23	0.24	0.26	0.27
0.02	0.06	0.07	0.08	0.1	0.11	0.12	0.15	0.18	0.21	0.24	0.27	0.3	0.33	0.36	0.39	0.42	0.45	0.48	0.51	0.54
0.03	0.09	0.11	0.13	0.14	0.16	0.18	0.23	0.27	0.32	0.36	0.41	0.45	0.5	0.54	0.59	0.63	0.68	0.72	0.77	0.81
0.04	0.12	0.14	0.17	0.19	0.22	0.24	0.3	0.36	0.42	0.48	0.54	0.6	0.66	0.72	0.78	0.84	0.9	0.96	1.02	1.08
0.05	0.15	0.18	0.21	0.24	0.27	0.3	0.38	0.45	0.53	0.6	0.68	0.75	0.83	0.9	0.98	1.05	1.13	1.2	1.28	1.35
0.06	0.18	0.22	0.25	0.29	0.32	0.36	0.45	0.54	0.63	0.72	0.81	0.9	0.99	1.08	1.17	1.26	1.35	1.44	1.53	1.62
0.07	0.21	0.25	0.29	0.34	0.38	0.42	0.53	0.63	0.74	0.84	0.95	1.05	1.16	1.26	1.37	1.47	1.58	1.68	1.79	1.89
0.08	0.24	0.29	0.34	0.38	0.43	0.48	0.6	0.72	0.84	0.96	1.08	1.2	1.32	1.44	1.56	1.68	1.8	1.92	2.04	2.16
0.09	0.27	0.32	0.38	0.43	0.49	0.54	0.68	0.81	0.95	1.08	1.22	1.35	1.49	1.62	1.76	1.89	2.03	2.16	2.3	2.43
0.1	0.3	0.36	0.42	0.48	0.54	0.6	0.75	0.9	1.05	1.2	1.35	1.5	1.65	1.8	1.95	2.1	2.25	2.4	2.55	2.7

Values have been rounded off

Date created: Nov 2004
Revised: Aug 2019

Neonatal
amiodarone infusion

Concentration: 1,800 mcg/mL

Admixture:
Dilute 1.8 mL of 50 mg/mL solution with 48.2 mL D5W for a total volume of 50 mL

	PATIENT WEIGHT (kg)																			
DOSE	**0.5**	**0.6**	**0.7**	**0.8**	**0.9**	**1**	**1.25**	**1.5**	**1.75**	**2**	**2.25**	**2.5**	**2.75**	**3**	**3.25**	**3.5**	**3.75**	**4**	**4.25**	**4.5**
(mcg/kg/min)	INFUSION RATE (mL/hr)																			
2.5	0.04	0.05	0.06	0.07	0.08	0.08	0.1	0.13	0.15	0.17	0.19	0.21	0.23	0.25	0.27	0.29	0.31	0.33	0.35	0.38
5	0.08	0.1	0.12	0.13	0.15	0.17	0.21	0.25	0.29	0.33	0.38	0.42	0.46	0.5	0.54	0.58	0.63	0.67	0.71	0.75
7.5	0.13	0.15	0.18	0.2	0.23	0.25	0.31	0.38	0.44	0.5	0.56	0.63	0.69	0.75	0.81	0.88	0.94	1	1.06	1.13
10	0.17	0.2	0.23	0.27	0.3	0.33	0.42	0.50	0.58	0.67	0.75	0.83	0.92	1	1.08	1.17	1.25	1.33	1.42	1.5
12.5	0.21	0.25	0.29	0.33	0.38	0.42	0.52	0.63	0.73	0.83	0.94	1.04	1.15	1.25	1.35	1.46	1.56	1.67	1.77	1.88
15	0.25	0.3	0.35	0.4	0.45	0.5	0.63	0.75	0.88	1	1.13	1.25	1.38	1.5	1.63	1.75	1.88	2	2.13	2.25

Values have been rounded off

Neonatal
dexmedetomidine infusion

Concentration: 4 mcg/mL

Admixture:
Dilute 2 mL of 100 mcg/mL solution with 48 mL NS for a total volume of 50 mL

	PATIENT WEIGHT (kg)																			
DOSE	**0.5**	**0.6**	**0.7**	**0.8**	**0.9**	**1**	**1.25**	**1.5**	**1.75**	**2**	**2.25**	**2.5**	**2.75**	**3**	**3.25**	**3.5**	**3.75**	**4**	**4.25**	**4.5**
(mcg/kg/hr)	INFUSION RATE (mL/hr)																			
0.2	0.03	0.03	0.04	0.04	0.05	0.05	0.06	0.08	0.09	0.1	0.11	0.13	0.14	0.15	0.16	0.18	0.19	0.2	0.21	0.23
0.25	0.03	0.04	0.04	0.05	0.06	0.06	0.08	0.09	0.11	0.13	0.14	0.16	0.17	0.19	0.2	0.22	0.23	0.25	0.27	0.28
0.3	0.04	0.05	0.05	0.06	0.07	0.08	0.09	0.11	0.13	0.15	0.17	0.19	0.21	0.23	0.24	0.26	0.28	0.3	0.32	0.34
0.35	0.04	0.05	0.06	0.07	0.08	0.09	0.11	0.13	0.15	0.18	0.2	0.22	0.24	0.26	0.28	0.31	0.33	0.35	0.37	0.39
0.4	0.05	0.06	0.07	0.08	0.09	0.1	0.13	0.15	0.18	0.2	0.23	0.25	0.28	0.3	0.33	0.35	0.38	0.4	0.43	0.45
0.45	0.06	0.07	0.08	0.09	0.1	0.11	0.14	0.17	0.2	0.23	0.25	0.28	0.31	0.34	0.37	0.39	0.42	0.45	0.48	0.51
0.5	0.06	0.08	0.09	0.1	0.11	0.13	0.16	0.19	0.22	0.25	0.28	0.31	0.34	0.38	0.41	0.44	0.47	0.5	0.53	0.56
0.55	0.07	0.08	0.1	0.11	0.12	0.14	0.17	0.21	0.24	0.28	0.31	0.34	0.38	0.41	0.45	0.48	0.52	0.55	0.58	0.62
0.6	0.08	0.09	0.11	0.12	0.14	0.15	0.19	0.23	0.26	0.3	0.34	0.38	0.41	0.45	0.49	0.53	0.56	0.6	0.64	0.68
0.65	0.08	0.1	0.11	0.13	0.15	0.16	0.2	0.24	0.28	0.33	0.37	0.41	0.45	0.49	0.53	0.57	0.61	0.65	0.69	0.73
0.7	0.09	0.11	0.12	0.14	0.16	0.18	0.22	0.26	0.31	0.35	0.39	0.44	0.48	0.53	0.57	0.61	0.66	0.7	0.74	0.79

Values have been rounded off

Neonatal

DOBUTamine infusion

Concentration: 2,000 mcg/mL

Admixture:

Dilute 4 mL of 12.5 mg/mL solution with 21 mL D5W or NS for a total volume of 25 mL

	PATIENT WEIGHT (kg)																			
DOSE	**0.5**	**0.6**	**0.7**	**0.8**	**0.9**	**1**	**1.25**	**1.5**	**1.75**	**2**	**2.25**	**2.5**	**2.75**	**3**	**3.25**	**3.5**	**3.75**	**4**	**4.25**	**4.5**
(mcg/kg/min)	INFUSION RATE (mL/hr)																			
2	0.03	0.04	0.04	0.05	0.05	0.06	0.08	0.09	0.11	0.12	0.14	0.15	0.17	0.18	0.2	0.21	0.23	0.24	0.26	0.27
4	0.06	0.07	0.08	0.1	0.11	0.12	0.15	0.18	0.21	0.24	0.27	0.3	0.33	0.36	0.39	0.42	0.45	0.48	0.51	0.54
6	0.09	0.11	0.13	0.14	0.16	0.18	0.23	0.27	0.32	0.36	0.41	0.45	0.5	0.54	0.59	0.63	0.68	0.72	0.77	0.81
8	0.12	0.14	0.17	0.19	0.22	0.24	0.3	0.36	0.42	0.48	0.54	0.6	0.66	0.72	0.78	0.84	0.9	0.96	1.02	1.08
10	0.15	0.18	0.21	0.24	0.27	0.3	0.38	0.45	0.53	0.6	0.68	0.75	0.83	0.9	0.98	1.05	1.13	1.2	1.28	1.35
12	0.18	0.22	0.25	0.29	0.32	0.36	0.45	0.54	0.63	0.72	0.81	0.9	0.99	1.08	1.17	1.26	1.35	1.44	1.53	1.62
14	0.21	0.25	0.29	0.34	0.38	0.42	0.53	0.63	0.74	0.84	0.95	1.05	1.16	1.26	1.37	1.47	1.58	1.68	1.79	1.89
16	0.24	0.29	0.34	0.38	0.43	0.48	0.6	0.72	0.84	0.96	1.08	1.2	1.32	1.44	1.56	1.68	1.8	1.92	2.04	2.16
18	0.27	0.32	0.38	0.43	0.49	0.54	0.68	0.81	0.95	1.08	1.22	1.35	1.49	1.62	1.76	1.89	2.03	2.16	2.3	2.43
20	0.3	0.36	0.42	0.48	0.54	0.6	0.75	0.9	1.05	1.2	1.35	1.5	1.65	1.8	1.95	2.1	2.25	2.4	2.55	2.7
22	0.33	0.4	0.46	0.53	0.59	0.66	0.83	0.99	1.16	1.32	1.49	1.65	1.82	1.98	2.15	2.31	2.48	2.64	2.81	2.97
24	0.36	0.43	0.5	0.58	0.65	0.72	0.9	1.08	1.26	1.44	1.62	1.8	1.98	2.16	2.34	2.52	2.7	2.88	3.06	3.24
26	0.39	0.47	0.55	0.62	0.7	0.78	0.98	1.17	1.37	1.56	1.76	1.95	2.15	2.34	2.54	2.73	2.93	3.12	3.32	3.51

Values have been rounded off

Neonatal

DOPamine infusion

Concentration: 1,600 mcg/mL

Admixture:
Using pre-mixed solution; 400 mg/250 mL = 1,600 mcg/mL

	PATIENT WEIGHT (kg)																			
DOSE	**0.5**	**0.6**	**0.7**	**0.8**	**0.9**	**1**	**1.25**	**1.5**	**1.75**	**2**	**2.25**	**2.5**	**2.75**	**3**	**3.25**	**3.5**	**3.75**	**4**	**4.25**	**4.5**
(mcg/kg/min)	INFUSION RATE (mL/hr)																			
1	0.02	0.02	0.03	0.03	0.03	0.04	0.05	0.06	0.07	0.08	0.08	0.09	0.1	0.11	0.12	0.13	0.14	0.15	0.16	0.17
2	0.04	0.05	0.05	0.06	0.07	0.08	0.09	0.11	0.13	0.15	0.17	0.19	0.21	0.23	0.24	0.26	0.28	0.3	0.32	0.34
3	0.06	0.07	0.08	0.09	0.1	0.11	0.14	0.17	0.2	0.23	0.25	0.28	0.31	0.34	0.37	0.39	0.42	0.45	0.48	0.51
4	0.08	0.09	0.11	0.12	0.14	0.15	0.19	0.23	0.26	0.3	0.34	0.38	0.41	0.45	0.49	0.53	0.56	0.6	0.64	0.68
5	0.09	0.11	0.13	0.15	0.17	0.19	0.23	0.28	0.33	0.38	0.42	0.47	0.52	0.56	0.61	0.66	0.7	0.75	0.8	0.84
6	0.11	0.14	0.16	0.18	0.2	0.23	0.28	0.34	0.39	0.45	0.51	0.56	0.62	0.68	0.73	0.79	0.84	0.9	0.96	1.01
7	0.13	0.16	0.18	0.21	0.24	0.26	0.33	0.39	0.46	0.53	0.59	0.66	0.72	0.79	0.85	0.92	0.98	1.05	1.12	1.18
8	0.15	0.18	0.21	0.24	0.27	0.3	0.38	0.45	0.53	0.6	0.68	0.75	0.83	0.9	0.98	1.05	1.13	1.2	1.28	1.35
9	0.17	0.2	0.24	0.27	0.3	0.34	0.42	0.51	0.59	0.68	0.76	0.84	0.93	1.01	1.1	1.18	1.27	1.35	1.43	1.52
10	0.19	0.23	0.26	0.3	0.34	0.38	0.47	0.56	0.66	0.75	0.84	0.94	1.03	1.13	1.22	1.31	1.41	1.5	1.59	1.69
11	0.21	0.25	0.29	0.33	0.37	0.41	0.52	0.62	0.72	0.83	0.93	1.03	1.13	1.24	1.34	1.44	1.55	1.65	1.75	1.86
12	0.23	0.27	0.32	0.36	0.41	0.45	0.56	0.68	0.79	0.9	1.01	1.13	1.24	1.35	1.46	1.58	1.69	1.8	1.91	2.03
13	0.24	0.29	0.34	0.39	0.44	0.49	0.61	0.73	0.85	0.98	1.1	1.22	1.34	1.46	1.58	1.71	1.83	1.95	2.07	2.19
14	0.26	0.32	0.37	0.42	0.47	0.53	0.66	0.79	0.92	1.05	1.18	1.31	1.44	1.58	1.71	1.84	1.97	2.1	2.23	2.36
15	0.28	0.34	0.39	0.45	0.51	0.56	0.7	0.84	0.98	1.13	1.27	1.41	1.55	1.69	1.83	1.97	2.11	2.25	2.39	2.53
16	0.3	0.36	0.42	0.48	0.54	0.6	0.75	0.9	1.05	1.2	1.35	1.5	1.65	1.8	1.95	2.1	2.25	2.4	2.55	2.7
17	0.32	0.38	0.45	0.51	0.57	0.64	0.8	0.96	1.12	1.28	1.43	1.59	1.75	1.91	2.07	2.23	2.39	2.55	2.71	2.87
18	0.34	0.41	0.47	0.54	0.61	0.68	0.84	1.01	1.18	1.35	1.52	1.69	1.86	2.03	2.19	2.36	2.53	2.7	2.87	3.04
19	0.36	0.43	0.5	0.57	0.64	0.71	0.89	1.07	1.25	1.43	1.6	1.78	1.96	2.14	2.32	2.49	2.67	2.85	3.03	3.21
20	0.38	0.45	0.53	0.6	0.68	0.75	0.94	1.13	1.31	1.5	1.69	1.88	2.06	2.25	2.44	2.63	2.81	3	3.19	3.38

Values have been rounded off

Neonatal

EPINEPHrine infusion

Concentration: 50 mcg/mL

Admixture:
Dilute 1 mL of 1 mg/mL solution with 19 mL D5W for a total volume of 20 mL

	PATIENT WEIGHT (kg)																			
DOSE	**0.5**	**0.6**	**0.7**	**0.8**	**0.9**	**1**	**1.25**	**1.5**	**1.75**	**2**	**2.25**	**2.5**	**2.75**	**3**	**3.25**	**3.5**	**3.75**	**4**	**4.25**	**4.5**
(mcg/kg/min)	INFUSION RATE (mL/hr)																			
0.1	0.06	0.07	0.08	0.1	0.11	0.12	0.15	0.18	0.21	0.24	0.27	0.3	0.33	0.36	0.39	0.42	0.45	0.48	0.51	0.54
0.15	0.09	0.11	0.13	0.14	0.16	0.18	0.23	0.27	0.32	0.36	0.41	0.45	0.5	0.54	0.59	0.63	0.68	0.72	0.77	0.81
0.2	0.12	0.14	0.17	0.19	0.22	0.24	0.3	0.36	0.42	0.48	0.54	0.6	0.66	0.72	0.78	0.84	0.9	0.96	1.02	1.08
0.25	0.15	0.18	0.21	0.24	0.27	0.30	0.38	0.45	0.53	0.6	0.68	0.75	0.83	0.9	0.98	1.05	1.13	1.2	1.28	1.35
0.3	0.18	0.22	0.25	0.29	0.32	0.36	0.45	0.54	0.63	0.72	0.81	0.9	0.99	1.08	1.17	1.26	1.35	1.44	1.53	1.62
0.35	0.21	0.25	0.29	0.34	0.38	0.42	0.53	0.63	0.74	0.84	0.95	1.05	1.16	1.26	1.37	1.47	1.58	1.68	1.79	1.89
0.4	0.24	0.29	0.34	0.38	0.43	0.48	0.6	0.72	0.84	0.96	1.08	1.2	1.32	1.44	1.56	1.68	1.8	1.92	2.04	2.16
0.45	0.27	0.32	0.38	0.43	0.49	0.54	0.68	0.81	0.95	1.08	1.22	1.35	1.49	1.62	1.76	1.89	2.03	2.16	2.3	2.43
0.5	0.3	0.36	0.42	0.48	0.54	0.6	0.75	0.9	1.05	1.2	1.35	1.5	1.65	1.8	1.95	2.1	2.25	2.4	2.55	2.7
0.55	0.33	0.4	0.46	0.53	0.59	0.66	0.83	0.99	1.16	1.32	1.49	1.65	1.82	1.98	2.15	2.31	2.48	2.64	2.81	2.97
0.6	0.36	0.43	0.5	0.58	0.65	0.72	0.9	1.08	1.26	1.44	1.62	1.8	1.98	2.16	2.34	2.52	2.7	2.88	3.06	3.24
0.65	0.39	0.47	0.55	0.62	0.7	0.78	0.98	1.17	1.37	1.56	1.76	1.95	2.15	2.34	2.54	2.73	2.93	3.12	3.32	3.51
0.7	0.42	0.5	0.59	0.67	0.76	0.84	1.05	1.26	1.47	1.68	1.89	2.1	2.31	2.52	2.73	2.94	3.15	3.36	3.57	3.78
0.75	0.45	0.54	0.63	0.72	0.81	0.9	1.13	1.35	1.58	1.8	2.03	2.25	2.48	2.7	2.93	3.15	3.38	3.6	3.83	4.05
0.8	0.48	0.58	0.67	0.77	0.86	0.96	1.2	1.44	1.68	1.92	2.16	2.4	2.64	2.88	3.12	3.36	3.6	3.84	4.08	4.32
0.85	0.51	0.61	0.71	0.82	0.92	1.02	1.28	1.53	1.79	2.04	2.3	2.55	2.81	3.06	3.32	3.57	3.83	4.08	4.34	4.59
0.9	0.54	0.65	0.76	0.86	0.97	1.08	1.35	1.62	1.89	2.16	2.43	2.7	2.97	3.24	3.51	3.78	4.05	4.32	4.59	4.86
0.95	0.57	0.68	0.8	0.91	1.03	1.14	1.43	1.71	2	2.28	2.57	2.85	3.14	3.42	3.71	3.99	4.28	4.56	4.85	5.13
1	0.6	0.72	0.84	0.96	1.08	1.2	1.5	1.8	2.1	2.4	2.7	3	3.3	3.6	3.9	4.2	4.5	4.8	5.1	5.4

Values have been rounded off

Date created: Nov 2004
Revised: Aug 2019

Neonatal
epoprostenol infusion

Concentration: 2 mcg/mL = 2,000 ng/mL

Admixture:
Reconstitute vial (0.5 mg) with 5 mL of SWFI or NS with a gentle swirl
Then, dilute 1 mL of reconstituted solution (0.1 mg/mL) with 49 mL SWFI or NS for a total volume of 50 mL
Protect from light

	PATIENT WEIGHT (kg)																		
DOSE	**0.6**	**0.7**	**0.8**	**0.9**	**1**	**1.25**	**1.5**	**1.75**	**2**	**2.25**	**2.5**	**2.75**	**3**	**3.25**	**3.5**	**3.75**	**4**	**4.25**	**4.5**
(ng/kg/min)	INFUSION RATE (mL/hr)																		
2	0.04	0.04	0.05	0.05	0.06	0.08	0.09	0.11	0.12	0.14	0.15	0.17	0.18	0.2	0.21	0.23	0.24	0.26	0.27
4	0.07	0.08	0.1	0.11	0.12	0.15	0.18	0.21	0.24	0.27	0.3	0.33	0.36	0.39	0.42	0.45	0.48	0.51	0.54
6	0.11	0.13	0.14	0.16	0.18	0.23	0.27	0.32	0.36	0.41	0.45	0.5	0.54	0.59	0.63	0.68	0.72	0.77	0.81
8	0.14	0.17	0.19	0.22	0.24	0.3	0.36	0.42	0.48	0.54	0.6	0.66	0.72	0.78	0.84	0.9	0.96	1.02	1.08
10	0.18	0.21	0.24	0.27	0.3	0.38	0.45	0.53	0.6	0.68	0.75	0.83	0.9	0.98	1.05	1.13	1.2	1.28	1.35
12	0.22	0.25	0.29	0.32	0.36	0.45	0.54	0.63	0.72	0.81	0.9	0.99	1.08	1.17	1.26	1.35	1.44	1.53	1.62
14	0.25	0.29	0.34	0.38	0.42	0.53	0.63	0.74	0.84	0.95	1.05	1.16	1.26	1.37	1.47	1.58	1.68	1.79	1.89
16	0.29	0.34	0.38	0.43	0.48	0.6	0.72	0.84	0.96	1.08	1.2	1.32	1.44	1.56	1.68	1.8	1.92	2.04	2.16
18	0.32	0.38	0.43	0.49	0.54	0.68	0.81	0.95	1.08	1.22	1.35	1.49	1.62	1.76	1.89	2.03	2.16	2.3	2.43
20	0.36	0.42	0.48	0.54	0.6	0.75	0.90	1.05	1.2	1.35	1.5	1.65	1.8	1.95	2.1	2.25	2.4	2.55	2.7
22	0.4	0.46	0.53	0.59	0.66	0.83	0.99	1.16	1.32	1.49	1.65	1.82	1.98	2.15	2.31	2.48	2.64	2.81	2.97
24	0.43	0.5	0.58	0.65	0.72	0.9	1.08	1.26	1.44	1.62	1.8	1.98	2.16	2.34	2.52	2.7	2.88	3.06	3.24
26	0.47	0.55	0.62	0.7	0.78	0.98	1.17	1.37	1.56	1.76	1.95	2.15	2.34	2.54	2.73	2.93	3.12	3.32	3.51
28	0.50	0.59	0.67	0.76	0.84	1.05	1.26	1.47	1.68	1.89	2.1	2.31	2.52	2.73	2.94	3.15	3.36	3.57	3.78
30	0.54	0.63	0.72	0.81	0.9	1.13	1.35	1.58	1.8	2.03	2.25	2.48	2.7	2.93	3.15	3.38	3.6	3.83	4.05
32	0.58	0.67	0.77	0.86	0.96	1.2	1.44	1.68	1.92	2.16	2.4	2.64	2.88	3.12	3.36	3.6	3.84	4.08	4.32
34	0.61	0.71	0.82	0.92	1.02	1.28	1.53	1.79	2.04	2.3	2.55	2.81	3.06	3.32	3.57	3.83	4.08	4.34	4.59
36	0.65	0.76	0.86	0.97	1.08	1.35	1.62	1.89	2.16	2.43	2.7	2.97	3.24	3.51	3.78	4.05	4.32	4.59	4.86
38	0.68	0.8	0.91	1.03	1.14	1.43	1.71	2	2.28	2.57	2.85	3.14	3.42	3.71	3.99	4.28	4.56	4.85	5.13
40	0.72	0.84	0.96	1.08	1.2	1.5	1.8	2.1	2.4	2.7	3	3.3	3.6	3.9	4.2	4.5	4.8	5.1	5.4

Values have been rounded off

Created: May 2015
Revised: Apr 2020

Neonatal
esmolol infusion

Concentration: 10,000 mcg/mL

Admixture:
Using pre-mixed solution; 2500 mg/250 mL = 10,000 mcg/mL

	PATIENT WEIGHT (kg)																			
DOSE (mcg/kg/min)	**0.5**	**0.6**	**0.7**	**0.8**	**0.9**	**1**	**1.25**	**1.5**	**1.75**	**2**	**2.25**	**2.5**	**2.75**	**3**	**3.25**	**3.5**	**3.75**	**4**	**4.25**	**4.5**
	INFUSION RATE (mL/hr)																			
25	0.08	0.09	0.11	0.12	0.14	0.15	0.19	0.23	0.26	0.3	0.34	0.38	0.41	0.45	0.49	0.53	0.56	0.6	0.64	0.68
50	0.15	0.18	0.21	0.24	0.27	0.3	0.38	0.45	0.53	0.6	0.68	0.75	0.83	0.9	0.98	1.05	1.13	1.2	1.28	1.35
100	0.3	0.36	0.42	0.48	0.54	0.6	0.75	0.9	1.05	1.2	1.35	1.5	1.65	1.8	1.95	2.1	2.25	2.4	2.55	2.7
150	0.45	0.54	0.63	0.72	0.81	0.9	1.13	1.35	1.58	1.8	2.03	2.25	2.48	2.7	2.93	3.15	3.38	3.6	3.83	4.05
200	0.6	0.72	0.84	0.96	1.08	1.2	1.5	1.8	2.1	2.4	2.7	3	3.3	3.6	3.9	4.2	4.5	4.8	5.1	5.4
250	0.75	0.9	1.05	1.2	1.35	1.5	1.88	2.25	2.63	3	3.38	3.75	4.13	4.5	4.88	5.25	5.63	6	6.38	6.75
300	0.9	1.08	1.26	1.44	1.62	1.8	2.25	2.7	3.15	3.6	4.05	4.5	4.95	5.4	5.85	6.3	6.75	7.2	7.65	8.1
350	1.05	1.26	1.47	1.68	1.89	2.1	2.63	3.15	3.68	4.2	4.73	5.25	5.78	6.3	6.83	7.35	7.88	8.4	8.93	9.45
400	1.2	1.44	1.68	1.92	2.16	2.4	3	3.6	4.2	4.8	5.4	6	6.6	7.2	7.8	8.4	9	9.6	10.2	10.8
500	1.5	1.8	2.1	2.4	2.7	3	3.75	4.5	5.25	6	6.75	7.5	8.25	9	9.75	10.5	11.25	12	12.75	13.5
600	1.8	2.16	2.52	2.88	3.24	3.6	4.5	5.4	6.3	7.2	8.1	9	9.9	10.8	11.7	12.6	13.5	14.4	15.3	16.2
700	2.1	2.52	2.94	3.36	3.78	4.2	5.25	6.3	7.35	8.4	9.45	10.5	11.55	12.6	13.65	14.7	15.75	16.8	17.85	18.9
800	2.4	2.88	3.36	3.84	4.32	4.8	6	7.2	8.4	9.6	10.8	12	13.2	14.4	15.6	16.8	18	19.2	20.4	21.6
900	2.7	3.24	3.78	4.32	4.86	5.4	6.75	8.1	9.45	10.8	12.15	13.5	14.85	16.2	17.55	18.9	20.3	21.6	23	24.3
1000	3	3.6	4.2	4.8	5.4	6	7.5	9	10.5	12	13.5	15	16.5	18	19.5	21	22.5	24	25.5	27

Values have been rounded off

Neonatal
fentaNYL infusion

Concentration: 10 mcg/mL

Admixture:
Dilute 2 mL of 50 mcg/mL solution with 8 mL of D5W or NS for a total volume of 10 mL

	PATIENT WEIGHT (kg)																			
DOSE (mcg/kg/hr)	**0.5**	**0.6**	**0.7**	**0.8**	**0.9**	**1**	**1.25**	**1.5**	**1.75**	**2**	**2.25**	**2.5**	**2.75**	**3**	**3.25**	**3.5**	**3.75**	**4**	**4.25**	**4.5**
	INFUSION RATE (mL/hr)																			
0.5	0.03	0.03	0.04	0.04	0.05	0.05	0.06	0.08	0.09	0.1	0.11	0.13	0.14	0.15	0.16	0.18	0.19	0.2	0.21	0.23
1	0.05	0.06	0.07	0.08	0.09	0.1	0.13	0.15	0.18	0.2	0.23	0.25	0.28	0.3	0.33	0.35	0.38	0.4	0.43	0.45
1.5	0.08	0.09	0.11	0.12	0.14	0.15	0.19	0.23	0.26	0.3	0.34	0.38	0.41	0.45	0.49	0.53	0.56	0.6	0.64	0.68
2	0.1	0.12	0.14	0.16	0.18	0.2	0.25	0.3	0.35	0.4	0.45	0.5	0.55	0.6	0.65	0.7	0.75	0.8	0.85	0.9
2.5	0.13	0.15	0.18	0.2	0.23	0.25	0.31	0.38	0.44	0.5	0.56	0.63	0.69	0.75	0.81	0.88	0.94	1	1.06	1.13
3	0.15	0.18	0.21	0.24	0.27	0.3	0.38	0.45	0.53	0.6	0.68	0.75	0.83	0.9	0.98	1.05	1.13	1.2	1.28	1.35
3.5	0.18	0.21	0.25	0.28	0.32	0.35	0.44	0.53	0.61	0.7	0.79	0.88	0.96	1.05	1.14	1.23	1.31	1.4	1.49	1.58
4	0.2	0.24	0.28	0.32	0.36	0.4	0.5	0.6	0.7	0.8	0.9	1	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8
4.5	0.23	0.27	0.32	0.36	0.41	0.45	0.56	0.68	0.79	0.9	1.01	1.13	1.24	1.35	1.46	1.58	1.69	1.8	1.91	2.03
5	0.25	0.3	0.35	0.4	0.45	0.5	0.63	0.75	0.88	1	1.13	1.25	1.38	1.5	1.63	1.75	1.88	2	2.13	2.25

Values have been rounded off

Date created: Nov 2004
Revised: Aug 2019

Neonatal
furosemide infusion

Concentration: 2 mg/mL

Admixture:

Dilute 1 mL of 10 mg/mL solution with 4 mL of NS or D5W for a total volume of 5 mL

	PATIENT WEIGHT (kg)																			
DOSE (mg/kg/hr)	**0.5**	**0.6**	**0.7**	**0.8**	**0.9**	**1**	**1.25**	**1.5**	**1.75**	**2**	**2.25**	**2.5**	**2.75**	**3**	**3.25**	**3.5**	**3.75**	**4**	**4.25**	**4.5**
	INFUSION RATE (mL/hr)																			
0.1	0.03	0.03	0.04	0.04	0.05	0.05	0.06	0.08	0.09	0.1	0.11	0.13	0.14	0.15	0.16	0.18	0.19	0.2	0.21	0.23
0.15	0.04	0.05	0.05	0.06	0.07	0.08	0.09	0.11	0.13	0.15	0.17	0.19	0.21	0.23	0.24	0.26	0.28	0.3	0.32	0.34
0.2	0.05	0.06	0.07	0.08	0.09	0.1	0.13	0.15	0.18	0.2	0.23	0.25	0.28	0.3	0.33	0.35	0.38	0.4	0.43	0.45
0.25	0.06	0.08	0.09	0.1	0.11	0.13	0.16	0.19	0.22	0.25	0.28	0.31	0.34	0.38	0.41	0.44	0.47	0.5	0.53	0.56
0.3	0.08	0.09	0.11	0.12	0.14	0.15	0.19	0.23	0.26	0.3	0.34	0.38	0.41	0.45	0.49	0.53	0.56	0.6	0.64	0.68
0.35	0.09	0.11	0.12	0.14	0.16	0.18	0.22	0.26	0.31	0.35	0.39	0.44	0.48	0.53	0.57	0.61	0.66	0.7	0.74	0.79
0.4	0.1	0.12	0.14	0.16	0.18	0.2	0.25	0.3	0.35	0.4	0.45	0.5	0.55	0.6	0.65	0.7	0.75	0.8	0.85	0.9
0.45	0.11	0.14	0.16	0.18	0.2	0.23	0.28	0.34	0.39	0.45	0.51	0.56	0.62	0.68	0.73	0.79	0.84	0.9	0.96	1.01
0.5	0.13	0.15	0.18	0.2	0.23	0.25	0.31	0.38	0.44	0.5	0.56	0.63	0.69	0.75	0.81	0.88	0.94	1	1.06	1.13
0.55	0.14	0.17	0.19	0.22	0.25	0.28	0.34	0.41	0.48	0.55	0.62	0.69	0.76	0.83	0.89	0.96	1.03	1.1	1.17	1.24
0.6	0.15	0.18	0.21	0.24	0.27	0.3	0.38	0.45	0.53	0.6	0.68	0.75	0.83	0.9	0.98	1.05	1.13	1.2	1.28	1.35
0.65	0.16	0.2	0.23	0.26	0.29	0.33	0.41	0.49	0.57	0.65	0.73	0.81	0.89	0.98	1.06	1.14	1.22	1.3	1.38	1.46
0.7	0.18	0.21	0.25	0.28	0.32	0.35	0.44	0.53	0.61	0.7	0.79	0.88	0.96	1.05	1.14	1.23	1.31	1.4	1.49	1.58
0.75	0.19	0.23	0.26	0.3	0.34	0.38	0.47	0.56	0.66	0.75	0.84	0.94	1.03	1.13	1.22	1.31	1.41	1.5	1.59	1.69
0.8	0.2	0.24	0.28	0.32	0.36	0.4	0.5	0.6	0.7	0.8	0.9	1	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8
0.85	0.21	0.26	0.3	0.34	0.38	0.43	0.53	0.64	0.74	0.85	0.96	1.06	1.17	1.28	1.38	1.49	1.59	1.7	1.81	1.91
0.9	0.23	0.27	0.32	0.36	0.41	0.45	0.56	0.68	0.79	0.9	1.01	1.13	1.24	1.35	1.46	1.58	1.69	1.8	1.91	2.03
0.95	0.24	0.29	0.33	0.38	0.43	0.48	0.59	0.71	0.83	0.95	1.07	1.19	1.31	1.43	1.54	1.66	1.78	1.9	2.02	2.14
1	0.25	0.3	0.35	0.4	0.45	0.5	0.63	0.75	0.88	1	1.13	1.25	1.38	1.5	1.63	1.75	1.88	2	2.13	2.25

Values have been rounded off

Neonatal
glucagon infusion

Concentration: 40 mcg/mL

Admixture:

Reconstitute vial (1 mg) with 1 mL of the provided diluent

Then, dilute 1 mL of 1 mg/mL reconstituted solution with 24 mL of D5W or D10W for a total volume of 25 mL

	PATIENT WEIGHT (kg)																			
DOSE (mcg/kg/hr)	**0.5**	**0.6**	**0.7**	**0.8**	**0.9**	**1**	**1.25**	**1.5**	**1.75**	**2**	**2.25**	**2.5**	**2.75**	**3**	**3.25**	**3.5**	**3.75**	**4**	**4.25**	**4.5**
	INFUSION RATE (mL/hr)																			
2.5	0.03	0.04	0.04	0.05	0.06	0.06	0.08	0.09	0.11	0.13	0.14	0.16	0.17	0.19	0.2	0.22	0.23	0.25	0.27	0.28
5	0.06	0.08	0.09	0.1	0.11	0.13	0.16	0.19	0.22	0.25	0.28	0.31	0.34	0.38	0.41	0.44	0.47	0.5	0.53	0.56
7.5	0.09	0.11	0.13	0.15	0.17	0.19	0.23	0.28	0.33	0.38	0.42	0.47	0.52	0.56	0.61	0.66	0.7	0.75	0.8	0.84
10	0.13	0.15	0.18	0.2	0.23	0.25	0.31	0.38	0.44	0.5	0.56	0.63	0.69	0.75	0.81	0.88	0.94	1	1.06	1.13
12.5	0.16	0.19	0.22	0.25	0.28	0.31	0.39	0.47	0.55	0.63	0.7	0.78	0.86	0.94	1.02	1.09	1.17	1.25	1.33	1.41
15	0.19	0.23	0.26	0.3	0.34	0.38	0.47	0.56	0.66	0.75	0.84	0.94	1.03	1.13	1.22	1.31	1.41	1.5	1.59	1.69
17.5	0.22	0.26	0.31	0.35	0.39	0.44	0.55	0.66	0.77	0.88	0.98	1.09	1.2	1.31	1.42	1.53	1.64	1.75	1.86	1.97
20	0.25	0.3	0.35	0.4	0.45	0.5	0.63	0.75	0.88	1	1.13	1.25	1.38	1.5	1.63	1.75	1.88	2	2.13	2.25
22.5	0.28	0.34	0.39	0.45	0.51	0.56	0.7	0.84	0.98	1.13	1.27	1.41	1.55	1.69	1.83	1.97	2.11	2.25	2.39	2.53
25	0.31	0.38	0.44	0.5	0.56	0.63	0.78	0.94	1.09	1.25	1.41	1.56	1.72	1.88	2.03	2.19	2.34	2.5	2.66	2.81
27.5	0.34	0.41	0.48	0.55	0.62	0.69	0.86	1.03	1.2	1.38	1.55	1.72	1.89	2.06	2.23	2.41	2.58	2.75	2.92	3.09
30	0.38	0.45	0.53	0.6	0.68	0.75	0.94	1.13	1.31	1.5	1.69	1.88	2.06	2.25	2.44	2.63	2.81	3	3.19	3.38
32.5	0.41	0.49	0.57	0.65	0.73	0.81	1.02	1.22	1.42	1.63	1.83	2.03	2.23	2.44	2.64	2.84	3.05	3.25	3.45	3.66
35	0.44	0.53	0.61	0.7	0.79	0.88	1.09	1.31	1.53	1.75	1.97	2.19	2.41	2.63	2.84	3.06	3.28	3.5	3.72	3.94
37.5	0.47	0.56	0.66	0.75	0.84	0.94	1.17	1.41	1.64	1.88	2.11	2.34	2.58	2.81	3.05	3.28	3.52	3.75	3.98	4.22
40	0.5	0.6	0.7	0.8	0.9	1	1.25	1.5	1.75	2	2.25	2.5	2.75	3	3.25	3.5	3.75	4	4.25	4.5
45	0.56	0.68	0.79	0.9	1.01	1.13	1.41	1.69	1.97	2.25	2.53	2.81	3.09	3.38	3.66	3.94	4.22	4.5	4.78	5.06

Values have been rounded off

Date created: Aug 2010
Revised: Apr 2020

50	0.63	0.75	0.88	1	1.13	1.25	1.56	1.88	2.19	2.5	2.81	3.13	3.44	3.75	4.06	4.38	4.69	5	5.31	5.63

Neonatal
heparin infusion

Concentration: 50 units/mL

Admixture:
Using pre-mixed solution; 25,000 units/500 mL = 50 units/mL

	PATIENT WEIGHT (kg)																			
DOSE (units/kg/hr)	**0.5**	**0.6**	**0.7**	**0.8**	**0.9**	**1**	**1.25**	**1.5**	**1.75**	**2**	**2.25**	**2.5**	**2.75**	**3**	**3.25**	**3.5**	**3.75**	**4**	**4.25**	**4.5**
	INFUSION RATE (mL/hr)																			
10	0.1	0.12	0.14	0.16	0.18	0.2	0.25	0.3	0.35	0.4	0.45	0.5	0.55	0.6	0.65	0.7	0.75	0.8	0.85	0.9
15	0.15	0.18	0.21	0.24	0.27	0.3	0.38	0.45	0.53	0.6	0.68	0.75	0.83	0.9	0.98	1.05	1.13	1.2	1.28	1.35
18	0.18	0.22	0.25	0.29	0.32	0.36	0.45	0.54	0.63	0.72	0.81	0.9	0.99	1.08	1.17	1.26	1.35	1.44	1.53	1.62
19	0.19	0.23	0.27	0.30	0.34	0.38	0.48	0.57	0.67	0.76	0.86	0.95	1.05	1.14	1.24	1.33	1.43	1.52	1.62	1.71
20	0.2	0.24	0.28	0.32	0.36	0.4	0.5	0.6	0.7	0.8	0.9	1	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8
21	0.21	0.25	0.29	0.34	0.38	0.42	0.53	0.63	0.74	0.84	0.95	1.05	1.16	1.26	1.37	1.47	1.58	1.68	1.79	1.89
22	0.22	0.26	0.31	0.35	0.4	0.44	0.55	0.66	0.77	0.88	0.99	1.1	1.21	1.32	1.43	1.54	1.65	1.76	1.87	1.98
23	0.23	0.28	0.32	0.37	0.41	0.46	0.58	0.69	0.81	0.92	1.04	1.15	1.27	1.38	1.5	1.61	1.73	1.84	1.96	2.07
24	0.24	0.29	0.34	0.38	0.43	0.48	0.6	0.72	0.84	0.96	1.08	1.2	1.32	1.44	1.56	1.68	1.8	1.92	2.04	2.16
25	0.25	0.3	0.35	0.4	0.45	0.5	0.63	0.75	0.88	1	1.13	1.25	1.38	1.5	1.63	1.75	1.88	2	2.13	2.25
26	0.26	0.31	0.36	0.42	0.47	0.52	0.65	0.78	0.91	1.04	1.17	1.3	1.43	1.56	1.69	1.82	1.95	2.08	2.21	2.34
27	0.27	0.32	0.38	0.43	0.49	0.54	0.68	0.81	0.95	1.08	1.22	1.35	1.49	1.62	1.76	1.89	2.03	2.16	2.3	2.43
28	0.28	0.34	0.39	0.45	0.5	0.56	0.7	0.84	0.98	1.12	1.26	1.4	1.54	1.68	1.82	1.96	2.1	2.24	2.38	2.52
29	0.29	0.35	0.41	0.46	0.52	0.58	0.73	0.87	1.02	1.16	1.31	1.45	1.6	1.74	1.89	2.03	2.18	2.32	2.47	2.61
30	0.30	0.36	0.42	0.48	0.54	0.6	0.75	0.9	1.05	1.2	1.35	1.5	1.65	1.8	1.95	2.1	2.25	2.4	2.55	2.7
31	0.31	0.37	0.43	0.5	0.56	0.62	0.78	0.93	1.09	1.24	1.4	1.55	1.71	1.86	2.02	2.17	2.33	2.48	2.64	2.79
32	0.32	0.4	0.45	0.51	0.58	0.64	0.8	0.96	1.12	1.28	1.44	1.6	1.76	1.92	2.08	2.24	2.4	2.56	2.72	2.88

Values have been rounded off

Neonatal
insulin regular infusion

Concentration: 0.1 unit/mL

Admixture:

Dilute 1 mL of 100 unit/mL solution with 9 mL of NS for a total volume of 10 mL - 10 unit/mL

Then, dilute 0.5 mL of 10 unit/mL solution with 49.5 mL of NS for a total volume of 50 mL

	PATIENT WEIGHT (kg)																			
DOSE (unit/kg/hr)	**0.5**	**0.6**	**0.7**	**0.8**	**0.9**	**1**	**1.25**	**1.5**	**1.75**	**2**	**2.25**	**2.5**	**2.75**	**3**	**3.25**	**3.5**	**3.75**	**4**	**4.25**	**4.5**
	INFUSION RATE (mL/hr)																			
0.01	0.05	0.06	0.07	0.08	0.09	0.1	0.13	0.15	0.18	0.2	0.23	0.25	0.28	0.3	0.33	0.35	0.38	0.4	0.43	0.45
0.02	0.1	0.12	0.14	0.16	0.18	0.2	0.25	0.3	0.35	0.4	0.45	0.5	0.55	0.6	0.65	0.7	0.75	0.8	0.85	0.9
0.03	0.15	0.18	0.21	0.24	0.27	0.3	0.38	0.45	0.53	0.6	0.68	0.75	0.83	0.9	0.98	1.05	1.13	1.2	1.28	1.35
0.04	0.2	0.24	0.28	0.32	0.36	0.4	0.5	0.6	0.7	0.8	0.9	1	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8
0.05	0.25	0.3	0.35	0.4	0.45	0.5	0.63	0.75	0.88	1	1.13	1.25	1.38	1.5	1.63	1.75	1.88	2	2.13	2.25
0.06	0.3	0.36	0.42	0.48	0.54	0.6	0.75	0.9	1.05	1.2	1.35	1.5	1.65	1.8	1.95	2.1	2.25	2.4	2.55	2.7
0.07	0.35	0.42	0.49	0.56	0.63	0.7	0.88	1.05	1.23	1.4	1.58	1.75	1.93	2.1	2.28	2.45	2.63	2.8	2.98	3.15
0.08	0.4	0.48	0.56	0.64	0.72	0.8	1	1.2	1.4	1.6	1.8	2	2.2	2.4	2.6	2.8	3	3.2	3.4	3.6
0.09	0.45	0.54	0.63	0.72	0.81	0.9	1.13	1.35	1.58	1.8	2.03	2.25	2.48	2.7	2.93	3.15	3.38	3.6	3.83	4.05
0.1	0.5	0.6	0.7	0.8	0.9	1	1.25	1.5	1.75	2	2.25	2.5	2.75	3	3.25	3.5	3.75	4	4.25	4.5
0.15	0.75	0.9	1.05	1.2	1.35	1.5	1.88	2.25	2.63	3	3.38	3.75	4.13	4.5	4.88	5.25	5.63	6	6.38	6.75
0.2	1	1.2	1.4	1.6	1.8	2	2.5	3	3.5	4	4.5	5	5.5	6	6.5	7	7.5	8	8.5	9

Values have been rounded off

Date created: Nov 2004
Revised: Apr 2020

Neonatal
isoproterenol infusion

Concentration: 20 mcg/mL

Admixture:

Dilute 1 mL of 200 mcg/mL solution with 9 mL of NS or D5W for a total volume of 10 mL

	PATIENT WEIGHT (kg)																			
DOSE	**0.5**	**0.6**	**0.7**	**0.8**	**0.9**	**1**	**1.25**	**1.5**	**1.75**	**2**	**2.25**	**2.5**	**2.75**	**3**	**3.25**	**3.5**	**3.75**	**4**	**4.25**	**4.5**
(mcg/kg/min)	INFUSION RATE (mL/hr)																			
0.025	0.04	0.05	0.05	0.06	0.07	0.08	0.09	0.11	0.13	0.15	0.17	0.19	0.21	0.23	0.24	0.26	0.28	0.3	0.32	0.34
0.05	0.08	0.09	0.11	0.12	0.14	0.15	0.19	0.23	0.26	0.3	0.34	0.38	0.41	0.45	0.49	0.53	0.56	0.6	0.64	0.68
0.1	0.15	0.18	0.21	0.24	0.27	0.3	0.38	0.45	0.53	0.6	0.68	0.75	0.83	0.9	0.98	1.05	1.13	1.2	1.28	1.35
0.2	0.3	0.36	0.42	0.48	0.54	0.6	0.75	0.9	1.05	1.2	1.35	1.5	1.65	1.8	1.95	2.1	2.25	2.4	2.55	2.7
0.3	0.45	0.54	0.63	0.72	0.81	0.9	1.13	1.35	1.58	1.8	2.03	2.25	2.48	2.7	2.93	3.15	3.38	3.6	3.83	4.05
0.4	0.6	0.72	0.84	0.96	1.08	1.2	1.5	1.8	2.1	2.4	2.7	3	3.3	3.6	3.9	4.2	4.5	4.8	5.1	5.4
0.5	0.75	0.9	1.05	1.2	1.35	1.5	1.88	2.25	2.63	3	3.38	3.75	4.13	4.5	4.88	5.25	5.63	6	6.38	6.75
0.6	0.9	1.08	1.26	1.44	1.62	1.8	2.25	2.7	3.15	3.6	4.05	4.5	4.95	5.4	5.85	6.3	6.75	7.2	7.65	8.1
0.7	1.05	1.26	1.47	1.68	1.89	2.1	2.63	3.15	3.68	4.2	4.73	5.25	5.78	6.3	6.83	7.35	7.88	8.4	8.93	9.45
0.8	1.2	1.44	1.68	1.92	2.16	2.4	3	3.6	4.2	4.8	5.4	6	6.6	7.2	7.8	8.4	9	9.6	10.2	10.8
0.9	1.35	1.62	1.89	2.16	2.43	2.7	3.38	4.05	4.73	5.4	6.08	6.75	7.43	8.1	8.78	9.45	10.13	10.8	11.48	12.15
1	1.5	1.8	2.1	2.4	2.7	3	3.75	4.5	5.25	6	6.75	7.5	8.25	9	9.75	10.5	11.25	12	12.75	13.5
1.5	2.25	2.7	3.15	3.6	4.05	4.5	5.63	6.75	7.88	9	10.13	11.25	12.38	13.5	14.63	15.75	16.88	18	19.13	20.25
2	3	3.6	4.2	4.8	5.4	6	7.5	9	10.5	12	13.5	15	16.5	18	19.5	21	22.5	24	25.5	27

Values have been rounded off

Date created: April 2015
Revised: Aug 2019

Neonatal
lidocaine infusion [CARDIAC]

Concentration: 4,000 mcg/mL

Admixture:

Using pre-mixed solution; 0.4% = 4,000 mcg/mL

	PATIENT WEIGHT (kg)																			
DOSE	**0.5**	**0.6**	**0.7**	**0.8**	**0.9**	**1**	**1.25**	**1.5**	**1.75**	**2**	**2.25**	**2.5**	**2.75**	**3**	**3.25**	**3.5**	**3.75**	**4**	**4.25**	**4.5**
(mcg/kg/min)	**INFUSION RATE (mL/hr)**																			
10	0.08	0.09	0.11	0.12	0.14	0.15	0.19	0.23	0.26	0.3	0.34	0.38	0.41	0.45	0.49	0.53	0.56	0.6	0.64	0.68
15	0.11	0.14	0.16	0.18	0.2	0.23	0.28	0.34	0.39	0.45	0.51	0.56	0.62	0.68	0.73	0.79	0.84	0.9	0.96	1.01
20	0.15	0.18	0.21	0.24	0.27	0.3	0.38	0.45	0.53	0.6	0.68	0.75	0.83	0.9	0.98	1.05	1.13	1.2	1.28	1.35
25	0.19	0.23	0.26	0.3	0.34	0.38	0.47	0.56	0.66	0.75	0.84	0.94	1.03	1.13	1.22	1.31	1.41	1.5	1.59	1.69
30	0.23	0.27	0.32	0.36	0.41	0.45	0.56	0.68	0.79	0.9	1.01	1.13	1.24	1.35	1.46	1.58	1.69	1.8	1.91	2.03
35	0.26	0.32	0.37	0.42	0.47	0.53	0.66	0.79	0.92	1.05	1.18	1.31	1.44	1.58	1.71	1.84	1.97	2.1	2.23	2.36
40	0.3	0.36	0.42	0.48	0.54	0.6	0.75	0.9	1.05	1.2	1.35	1.5	1.65	1.8	1.95	2.1	2.25	2.4	2.55	2.7
45	0.34	0.41	0.47	0.54	0.61	0.68	0.84	1.01	1.18	1.35	1.52	1.69	1.86	2.03	2.19	2.36	2.53	2.7	2.87	3.04
50	0.38	0.45	0.53	0.6	0.68	0.75	0.94	1.13	1.31	1.5	1.69	1.88	2.06	2.25	2.44	2.63	2.81	3	3.19	3.38

Neonatal
lidocaine infusion [SEIZURE]

Concentration: 4 mg/mL

Admixture:

Using pre-mixed solution; 0.4% = 4 mg/mL

	PATIENT WEIGHT (kg)																			
DOSE	**0.5**	**0.6**	**0.7**	**0.8**	**0.9**	**1**	**1.25**	**1.5**	**1.75**	**2**	**2.25**	**2.5**	**2.75**	**3**	**3.25**	**3.5**	**3.75**	**4**	**4.25**	**4.5**
(mg/kg/hr)	INFUSION RATE (mL/hr)																			
1	0.13	0.15	0.18	0.2	0.23	0.25	0.31	0.38	0.44	0.5	0.56	0.63	0.69	0.75	0.81	0.88	0.94	1	1.06	1.13
2	0.25	0.3	0.35	0.4	0.45	0.5	0.63	0.75	0.88	1	1.13	1.25	1.38	1.5	1.63	1.75	1.88	2	2.13	2.25
3	0.38	0.45	0.53	0.6	0.68	0.75	0.94	1.13	1.31	1.5	1.69	1.88	2.06	2.25	2.44	2.63	2.81	3	3.19	3.38
4	0.5	0.6	0.7	0.8	0.9	1	1.25	1.5	1.75	2	2.25	2.5	2.75	3	3.25	3.5	3.75	4	4.25	4.5
5	0.63	0.75	0.88	1	1.13	1.25	1.56	1.88	2.19	2.5	2.81	3.13	3.44	3.75	4.06	4.38	4.69	5	5.31	5.63
6	0.75	0.9	1.05	1.2	1.35	1.5	1.88	2.25	2.63	3	3.38	3.75	4.13	4.5	4.88	5.25	5.63	6	6.38	6.75
7	0.88	1.05	1.23	1.4	1.58	1.75	2.19	2.63	3.06	3.5	3.94	4.38	4.81	5.25	5.69	6.13	6.56	7	7.44	7.88

Neonatal
midazolam infusion

Concentration: 0.5 mg/mL

Admixture:

Dilute 1 mL of 5 mg/mL solution with 9 mL of NS or D5W for a total volume of 10 mL

or

Dilute 2.5 mL of 5 mg/mL solution with 22.5 mL of NS or D5W for a total volume of 25 mL

	PATIENT WEIGHT (kg)																			
DOSE	**0.5**	**0.6**	**0.7**	**0.8**	**0.9**	**1**	**1.25**	**1.5**	**1.75**	**2**	**2.25**	**2.5**	**2.75**	**3**	**3.25**	**3.5**	**3.75**	**4**	**4.25**	**4.5**
(mg/kg/hr)	INFUSION RATE (mL/hr)																			
0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.03	0.03	0.04	0.04	0.05	0.05	0.06	0.06	0.07	0.07	0.08	0.08	0.09	0.09
0.02	0.02	0.02	0.03	0.03	0.04	0.04	0.05	0.06	0.07	0.08	0.09	0.1	0.11	0.12	0.13	0.14	0.15	0.16	0.17	0.18
0.03	0.03	0.04	0.04	0.05	0.05	0.06	0.08	0.09	0.11	0.12	0.14	0.15	0.17	0.18	0.2	0.21	0.23	0.24	0.26	0.27
0.04	0.04	0.05	0.06	0.06	0.07	0.08	0.1	0.12	0.14	0.16	0.18	0.2	0.22	0.24	0.26	0.28	0.3	0.32	0.34	0.36
0.05	0.05	0.06	0.07	0.08	0.09	0.1	0.13	0.15	0.18	0.2	0.23	0.25	0.28	0.3	0.33	0.35	0.38	0.4	0.43	0.45
0.06	0.06	0.07	0.08	0.1	0.11	0.12	0.15	0.18	0.21	0.24	0.27	0.3	0.33	0.36	0.39	0.42	0.45	0.48	0.51	0.54
0.07	0.07	0.08	0.1	0.11	0.13	0.14	0.18	0.21	0.25	0.28	0.32	0.35	0.39	0.42	0.46	0.49	0.53	0.56	0.6	0.63
0.08	0.08	0.1	0.11	0.13	0.14	0.16	0.2	0.24	0.28	0.32	0.36	0.4	0.44	0.48	0.52	0.56	0.6	0.64	0.68	0.72
0.09	0.09	0.11	0.13	0.14	0.16	0.18	0.23	0.27	0.32	0.36	0.41	0.45	0.5	0.54	0.59	0.63	0.68	0.72	0.77	0.81
0.1	0.1	0.12	0.14	0.16	0.18	0.2	0.25	0.3	0.35	0.4	0.45	0.5	0.55	0.6	0.65	0.7	0.75	0.8	0.85	0.9
0.15	0.15	0.18	0.21	0.24	0.27	0.3	0.38	0.45	0.53	0.6	0.68	0.75	0.83	0.9	0.98	1.05	1.13	1.2	1.28	1.35
0.2	0.2	0.24	0.28	0.32	0.36	0.4	0.5	0.6	0.7	0.8	0.9	1	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8
0.25	0.25	0.3	0.35	0.4	0.45	0.5	0.63	0.75	0.88	1	1.13	1.25	1.38	1.5	1.63	1.75	1.88	2	2.13	2.25
0.3	0.3	0.36	0.42	0.48	0.54	0.6	0.75	0.9	1.05	1.2	1.35	1.5	1.65	1.8	1.95	2.1	2.25	2.4	2.55	2.7
0.35	0.35	0.42	0.49	0.56	0.63	0.7	0.88	1.05	1.23	1.4	1.58	1.75	1.93	2.1	2.28	2.45	2.63	2.8	2.98	3.15
0.4	0.4	0.48	0.56	0.64	0.72	0.8	1	1.2	1.4	1.6	1.8	2	2.2	2.4	2.6	2.8	3	3.2	3.4	3.6

Values have been rounded off

Date created: Nov 2007
Revised: Apr 2020

Values have been rounded off

Date created: Nov 2007
Revised: Apr 2020

Neonatal
milrinone infusion

Concentration: 100 mcg/mL

Admixture:

Dilute 3 mL of 1,000 mcg/mL solution with 27 mL of NS or D5W for a total volume of 30 mL

	PATIENT WEIGHT (kg)																			
DOSE	**0.5**	**0.6**	**0.7**	**0.8**	**0.9**	**1**	**1.25**	**1.5**	**1.75**	**2**	**2.25**	**2.5**	**2.75**	**3**	**3.25**	**3.5**	**3.75**	**4**	**4.25**	**4.5**
(mcg/kg/min)	INFUSION RATE (mL/hr)																			
0.25	0.08	0.09	0.11	0.12	0.14	0.15	0.19	0.23	0.26	0.3	0.34	0.38	0.41	0.45	0.49	0.53	0.56	0.6	0.64	0.68
0.3	0.09	0.11	0.13	0.14	0.16	0.18	0.23	0.27	0.32	0.36	0.41	0.45	0.50	0.54	0.59	0.63	0.68	0.72	0.77	0.81
0.35	0.11	0.13	0.15	0.17	0.19	0.21	0.26	0.32	0.37	0.42	0.47	0.53	0.58	0.63	0.68	0.74	0.79	0.84	0.89	0.95
0.4	0.12	0.14	0.17	0.19	0.22	0.24	0.3	0.36	0.42	0.48	0.54	0.6	0.66	0.72	0.78	0.84	0.9	0.96	1.02	1.08
0.45	0.14	0.16	0.19	0.22	0.24	0.27	0.34	0.41	0.47	0.54	0.61	0.68	0.74	0.81	0.88	0.95	1.01	1.08	1.15	1.22
0.5	0.15	0.18	0.21	0.24	0.27	0.3	0.38	0.45	0.53	0.6	0.68	0.75	0.83	0.9	0.98	1.05	1.13	1.2	1.28	1.35
0.55	0.17	0.2	0.23	0.26	0.3	0.33	0.41	0.5	0.58	0.66	0.74	0.83	0.91	0.99	1.07	1.16	1.24	1.32	1.4	1.49
0.6	0.18	0.22	0.25	0.29	0.32	0.36	0.45	0.54	0.63	0.72	0.81	0.9	0.99	1.08	1.17	1.26	1.35	1.44	1.53	1.62
0.65	0.2	0.23	0.27	0.31	0.35	0.39	0.49	0.59	0.68	0.78	0.88	0.98	1.07	1.17	1.27	1.37	1.46	1.56	1.66	1.76
0.7	0.21	0.25	0.29	0.34	0.38	0.42	0.53	0.63	0.74	0.84	0.95	1.05	1.16	1.26	1.37	1.47	1.58	1.68	1.79	1.89
0.75	0.23	0.27	0.32	0.36	0.41	0.45	0.56	0.68	0.79	0.9	1.01	1.13	1.24	1.35	1.46	1.58	1.69	1.8	1.91	2.03
0.8	0.24	0.29	0.34	0.38	0.43	0.48	0.6	0.72	0.84	0.96	1.08	1.2	1.32	1.44	1.56	1.68	1.8	1.92	2.04	2.16
0.85	0.26	0.31	0.36	0.41	0.46	0.51	0.64	0.77	0.89	1.02	1.15	1.28	1.4	1.53	1.66	1.79	1.91	2.04	2.17	2.3
0.9	0.27	0.32	0.38	0.43	0.49	0.54	0.68	0.81	0.95	1.08	1.22	1.35	1.49	1.62	1.76	1.89	2.03	2.16	2.3	2.43
0.95	0.29	0.34	0.4	0.46	0.51	0.57	0.71	0.86	1	1.14	1.28	1.43	1.57	1.71	1.85	2	2.14	2.28	2.42	2.57
1	0.3	0.36	0.42	0.48	0.54	0.6	0.75	0.9	1.05	1.2	1.35	1.5	1.65	1.8	1.95	2.1	2.25	2.4	2.55	2.7

Neonatal
morphine infusion

Concentration: 0.05 mg/mL (50 mcg/mL)

Admixture:
Dilute 0.5 mL of 2 mg/mL solution with 19.5 mL of NS or D5W for a total volume of 20 mL

	PATIENT WEIGHT (kg)																			
DOSE	**0.5**	**0.6**	**0.7**	**0.8**	**0.9**	**1**	**1.25**	**1.5**	**1.75**	**2**	**2.25**	**2.5**	**2.75**	**3**	**3.25**	**3.5**	**3.75**	**4**	**4.25**	**4.5**
(mcg/kg/hr)	**INFUSION RATE (mL/hr)**																			
2.5	0.03	0.03	0.04	0.04	0.05	0.05	0.06	0.08	0.09	0.1	0.11	0.13	0.14	0.15	0.16	0.18	0.19	0.2	0.21	0.23
5	0.05	0.06	0.07	0.08	0.09	0.1	0.13	0.15	0.18	0.2	0.23	0.25	0.28	0.3	0.33	0.35	0.38	0.4	0.43	0.45
7.5	0.08	0.09	0.11	0.12	0.14	0.15	0.19	0.23	0.26	0.3	0.34	0.38	0.41	0.45	0.49	0.53	0.56	0.6	0.64	0.68
10	0.1	0.12	0.14	0.16	0.18	0.2	0.25	0.3	0.35	0.4	0.45	0.5	0.55	0.6	0.65	0.7	0.75	0.8	0.85	0.9
12.5	0.13	0.15	0.18	0.2	0.23	0.25	0.31	0.38	0.44	0.5	0.56	0.63	0.69	0.75	0.81	0.88	0.94	1	1.06	1.13
15	0.15	0.18	0.21	0.24	0.27	0.3	0.38	0.45	0.53	0.6	0.68	0.75	0.83	0.9	0.98	1.05	1.13	1.2	1.28	1.35
17.5	0.18	0.21	0.25	0.28	0.32	0.35	0.44	0.53	0.61	0.7	0.79	0.88	0.96	1.05	1.14	1.23	1.31	1.4	1.49	1.58
20	0.2	0.24	0.28	0.32	0.36	0.4	0.5	0.6	0.7	0.8	0.9	1	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8
22.5	0.23	0.27	0.32	0.36	0.41	0.45	0.56	0.68	0.79	0.9	1.01	1.13	1.24	1.35	1.46	1.58	1.69	1.8	1.91	2.03
25	0.25	0.3	0.35	0.4	0.45	0.5	0.63	0.75	0.88	1	1.13	1.25	1.38	1.5	1.63	1.75	1.88	2	2.13	2.25
27.5	0.28	0.33	0.39	0.44	0.5	0.55	0.69	0.83	0.96	1.1	1.24	1.38	1.51	1.65	1.79	1.93	2.06	2.2	2.34	2.48
30	0.3	0.36	0.42	0.48	0.54	0.6	0.75	0.9	1.05	1.2	1.35	1.5	1.65	1.8	1.95	2.1	2.25	2.4	2.55	2.7
32.5	0.33	0.39	0.46	0.52	0.59	0.65	0.81	0.98	1.14	1.3	1.46	1.63	1.79	1.95	2.11	2.28	2.44	2.6	2.76	2.93
35	0.35	0.42	0.49	0.56	0.63	0.7	0.88	1.05	1.23	1.4	1.58	1.75	1.93	2.1	2.28	2.45	2.63	2.8	2.98	3.15
37.5	0.38	0.45	0.53	0.6	0.68	0.75	0.94	1.13	1.31	1.5	1.69	1.88	2.06	2.25	2.44	2.63	2.81	3	3.19	3.38
40	0.4	0.48	0.56	0.64	0.72	0.8	1	1.2	1.4	1.6	1.8	2	2.2	2.4	2.6	2.8	3	3.2	3.4	3.6
42.5	0.43	0.51	0.6	0.68	0.77	0.85	1.06	1.28	1.49	1.7	1.91	2.13	2.34	2.55	2.76	2.98	3.19	3.4	3.61	3.83
45	0.45	0.54	0.63	0.72	0.81	0.9	1.13	1.35	1.58	1.8	2.03	2.25	2.48	2.7	2.93	3.15	3.38	3.6	3.83	4.05
47.5	0.48	0.57	0.67	0.76	0.86	0.95	1.19	1.43	1.66	1.9	2.14	2.38	2.61	2.85	3.09	3.33	3.56	3.8	4.04	4.28
50	0.5	0.6	0.7	0.8	0.9	1	1.25	1.5	1.75	2	2.25	2.5	2.75	3	3.25	3.5	3.75	4	4.25	4.5

Values have been rounded off

Date created: June 2004
Revised: Aug 2019

Neonatal
norepinephrine infusion

Concentration: 50 mcg/mL

Admixture:

Dilute 1 mL of 1,000 mcg/mL solution with 19 mL of D5W for a total volume of 20 mL

PATIENT WEIGHT (kg)

DOSE (mcg/kg/min)	0.5	0.6	0.7	0.8	0.9	1	1.25	1.5	1.75	2	2.25	2.5	2.75	3	3.25	3.5	3.75	4	4.25	4.5
	INFUSION RATE (mL/hr)																			
0.2	0.12	0.14	0.17	0.19	0.22	0.24	0.3	0.36	0.42	0.48	0.54	0.6	0.66	0.72	0.78	0.84	0.9	0.96	1.02	1.08
0.3	0.18	0.22	0.25	0.29	0.32	0.36	0.45	0.54	0.63	0.72	0.81	0.9	0.99	1.08	1.17	1.26	1.35	1.44	1.53	1.62
0.4	0.24	0.29	0.34	0.38	0.43	0.48	0.6	0.72	0.84	0.96	1.08	1.2	1.32	1.44	1.56	1.68	1.8	1.92	2.04	2.16
0.5	0.3	0.36	0.42	0.48	0.54	0.6	0.75	0.9	1.05	1.2	1.35	1.5	1.65	1.8	1.95	2.1	2.25	2.4	2.55	2.7
0.6	0.36	0.43	0.5	0.58	0.65	0.72	0.9	1.08	1.26	1.44	1.62	1.8	1.98	2.16	2.34	2.52	2.7	2.88	3.06	3.24
0.7	0.42	0.5	0.59	0.67	0.76	0.84	1.05	1.26	1.47	1.68	1.89	2.1	2.31	2.52	2.73	2.94	3.15	3.36	3.57	3.78
0.8	0.48	0.58	0.67	0.77	0.86	0.96	1.2	1.44	1.68	1.92	2.16	2.4	2.64	2.88	3.12	3.36	3.6	3.84	4.08	4.32
0.9	0.54	0.65	0.76	0.86	0.97	1.08	1.35	1.62	1.89	2.16	2.43	2.7	2.97	3.24	3.51	3.78	4.05	4.32	4.59	4.86
1	0.6	0.72	0.84	0.96	1.08	1.2	1.5	1.8	2.1	2.4	2.7	3	3.3	3.6	3.9	4.2	4.5	4.8	5.1	5.4
1.5	0.9	1.08	1.26	1.44	1.62	1.8	2.25	2.7	3.15	3.6	4.05	4.5	4.95	5.4	5.85	6.3	6.75	7.2	7.65	8.1
2	1.2	1.44	1.68	1.92	2.2	2.4	3	3.6	4.2	4.8	5.4	6	6.6	7.2	7.8	8.4	9	9.6	10.2	10.8

Values have been rounded off

Date created: Nov 04
Revised: Aug 2019

Neonatal
octreotide infusion

Concentration: 10 mcg/mL

Admixture:

Dilute 1 mL of 100 mcg/mL solution with 9 mL of NS or D5W for a total volume of 10 mL

	PATIENT WEIGHT (kg)																			
DOSE	**0.5**	**0.6**	**0.7**	**0.8**	**0.9**	**1**	**1.25**	**1.5**	**1.75**	**2**	**2.25**	**2.5**	**2.75**	**3**	**3.25**	**3.5**	**3.75**	**4**	**4.25**	**4.5**
(mcg/kg/hr)	INFUSION RATE (mL/hr)																			
0.5	0.03	0.03	0.04	0.04	0.05	0.05	0.06	0.08	0.09	0.1	0.11	0.13	0.14	0.15	0.16	0.18	0.19	0.2	0.21	0.23
1	0.05	0.06	0.07	0.08	0.09	0.1	0.13	0.15	0.18	0.2	0.23	0.25	0.28	0.3	0.33	0.35	0.38	0.4	0.43	0.45
2	0.1	0.12	0.14	0.16	0.18	0.2	0.25	0.3	0.35	0.4	0.45	0.5	0.55	0.6	0.65	0.7	0.75	0.8	0.85	0.9
3	0.15	0.18	0.21	0.24	0.27	0.3	0.38	0.45	0.53	0.6	0.68	0.75	0.83	0.9	0.98	1.05	1.13	1.2	1.28	1.35
4	0.2	0.24	0.28	0.32	0.36	0.4	0.5	0.6	0.7	0.8	0.9	1	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8
5	0.25	0.3	0.35	0.4	0.45	0.5	0.63	0.75	0.88	1	1.13	1.25	1.38	1.5	1.63	1.75	1.88	2	2.13	2.25
6	0.3	0.36	0.42	0.48	0.54	0.6	0.75	0.9	1.05	1.2	1.35	1.5	1.65	1.8	1.95	2.1	2.25	2.4	2.55	2.7
7	0.35	0.42	0.49	0.56	0.63	0.7	0.88	1.05	1.23	1.4	1.58	1.75	1.93	2.1	2.28	2.45	2.63	2.8	2.98	3.15
8	0.4	0.48	0.56	0.64	0.72	0.8	1	1.2	1.4	1.6	1.8	2	2.2	2.4	2.6	2.8	3	3.2	3.4	3.6
9	0.45	0.54	0.63	0.72	0.81	0.9	1.13	1.35	1.58	1.8	2.03	2.25	2.48	2.7	2.93	3.15	3.38	3.6	3.83	4.05
10	0.5	0.6	0.7	0.8	0.9	1	1.25	1.5	1.75	2	2.25	2.5	2.75	3	3.25	3.5	3.75	4	4.25	4.5

Values have been rounded off

Neonatal
pantoprazole infusion

Concentration: 0.8 mg/mL

Admixture:

Reconstitute vial (40 mg) with 10 mL of NS

Then, dilute 5 mL of 4 mg/mL reconstituted solution with 20 mL of NS or D5W for a total volume of 25 mL

	PATIENT WEIGHT (kg)																			
DOSE	**0.5**	**0.6**	**0.7**	**0.8**	**0.9**	**1**	**1.25**	**1.5**	**1.75**	**2**	**2.25**	**2.5**	**2.75**	**3**	**3.25**	**3.5**	**3.75**	**4**	**4.25**	**4.5**
(mg/kg/hr)	INFUSION RATE (mL/hr)																			
0.2	0.13	0.15	0.18	0.2	0.23	0.25	0.31	0.38	0.44	0.5	0.56	0.63	0.69	0.75	0.81	0.88	0.94	1	1.06	1.13

Neonatal procainamide infusion

Concentration: 2 mg/mL = 2,000 mcg/mL

Admixture:

Dilute 0.2 mL of 100 mg/mL solution with 9.8 mL of NS for a total volume of 10 mL

or

Dilute 1 mL of 100 mg/mL solution with 49 mL of NS for a total volume of 50 mL

	PATIENT WEIGHT (kg)																			
DOSE	**0.5**	**0.6**	**0.7**	**0.8**	**0.9**	**1**	**1.25**	**1.5**	**1.75**	**2**	**2.25**	**2.5**	**2.75**	**3**	**3.25**	**3.5**	**3.75**	**4**	**4.25**	**4.5**
(mcg/kg/min)	INFUSION RATE (mL/hr)																			
20	0.3	0.36	0.42	0.48	0.54	0.6	0.75	0.9	1.05	1.2	1.35	1.50	1.65	1.8	1.95	2.1	2.25	2.4	2.55	2.7
25	0.38	0.45	0.53	0.6	0.68	0.75	0.94	1.13	1.31	1.5	1.69	1.88	2.06	2.25	2.44	2.63	2.81	3	3.19	3.38
30	0.45	0.54	0.63	0.72	0.81	0.9	1.13	1.35	1.58	1.8	2.03	2.25	2.48	2.7	2.93	3.15	3.38	3.6	3.83	4.05
35	0.53	0.63	0.74	0.84	0.95	1.05	1.31	1.58	1.84	2.1	2.36	2.63	2.89	3.15	3.41	3.68	3.94	4.2	4.46	4.73
40	0.6	0.72	0.84	0.96	1.08	1.2	1.5	1.8	2.1	2.4	2.7	3	3.3	3.6	3.9	4.2	4.5	4.8	5.1	5.4
45	0.68	0.81	0.95	1.08	1.22	1.35	1.69	2.03	2.36	2.7	3.04	3.38	3.71	4.05	4.39	4.73	5.06	5.4	5.74	6.08
50	0.75	0.9	1.05	1.2	1.35	1.5	1.88	2.25	2.63	3	3.38	3.75	4.13	4.5	4.88	5.25	5.63	6	6.38	6.75
55	0.83	0.99	1.16	1.32	1.49	1.65	2.06	2.48	2.89	3.3	3.71	4.13	4.54	4.95	5.36	5.78	6.19	6.6	7.01	7.43
60	0.9	1.08	1.26	1.44	1.62	1.8	2.25	2.7	3.15	3.6	4.05	4.5	4.95	5.4	5.85	6.3	6.75	7.2	7.65	8.1
65	0.98	1.17	1.37	1.56	1.76	1.95	2.44	2.93	3.41	3.9	4.39	4.88	5.36	5.85	6.34	6.83	7.31	7.8	8.29	8.78
70	1.05	1.26	1.47	1.68	1.89	2.1	2.63	3.15	3.68	4.2	4.73	5.25	5.78	6.3	6.83	7.35	7.88	8.4	8.93	9.45
75	1.13	1.35	1.58	1.8	2.03	2.25	2.81	3.38	3.94	4.5	5.06	5.63	6.19	6.75	7.31	7.88	8.44	9	9.56	10.13
80	1.2	1.44	1.68	1.92	2.16	2.4	3	3.6	4.2	4.8	5.4	6	6.6	7.2	7.8	8.4	9	9.6	10.2	10.8

Values have been rounded off

Date created: Nov 2010
Revised: Apr 2020

Neonatal
rocuronium infusion

Concentration: 2 mg/mL = 2,000 mcg/mL

Admixture:

Dilute 2 mL of 10 mg/mL solution with 8 mL of NS or D5W for a total volume of 10 mL

OR

Dilute 10 mL of 10 mg/mL solution with 40 mL of NS or D5W for a total volume of 50 mL

	PATIENT WEIGHT (kg)																			
DOSE	**0.5**	**0.6**	**0.7**	**0.8**	**0.9**	**1**	**1.25**	**1.5**	**1.75**	**2**	**2.25**	**2.5**	**2.75**	**3**	**3.25**	**3.5**	**3.75**	**4**	**4.25**	**4.5**
(mcg/kg/min)	INFUSION RATE (mL/hr)																			
5	0.08	0.09	0.11	0.12	0.14	0.15	0.19	0.23	0.26	0.3	0.34	0.38	0.41	0.45	0.49	0.53	0.56	0.6	0.64	0.68
6	0.09	0.11	0.13	0.14	0.16	0.18	0.23	0.27	0.32	0.36	0.41	0.45	0.5	0.54	0.59	0.63	0.68	0.72	0.77	0.81
7	0.11	0.13	0.15	0.17	0.19	0.21	0.26	0.32	0.37	0.42	0.47	0.53	0.58	0.63	0.68	0.74	0.79	0.84	0.89	0.95
8	0.12	0.14	0.17	0.19	0.22	0.24	0.3	0.36	0.42	0.48	0.54	0.6	0.66	0.72	0.78	0.84	0.9	0.96	1.02	1.08
9	0.14	0.16	0.19	0.22	0.24	0.27	0.34	0.41	0.47	0.54	0.61	0.68	0.74	0.81	0.88	0.95	1.01	1.08	1.15	1.22
10	0.15	0.18	0.21	0.24	0.27	0.3	0.38	0.45	0.53	0.6	0.68	0.75	0.83	0.9	0.98	1.05	1.13	1.2	1.28	1.35
11	0.17	0.2	0.23	0.26	0.3	0.33	0.41	0.5	0.58	0.66	0.74	0.83	0.91	0.99	1.07	1.16	1.24	1.32	1.4	1.49
12	0.18	0.22	0.25	0.29	0.32	0.36	0.45	0.54	0.63	0.72	0.81	0.9	0.99	1.08	1.17	1.26	1.35	1.44	1.53	1.62
13	0.2	0.23	0.27	0.31	0.35	0.39	0.49	0.59	0.68	0.78	0.88	0.98	1.07	1.17	1.27	1.37	1.46	1.56	1.66	1.76
14	0.21	0.25	0.29	0.34	0.38	0.42	0.53	0.63	0.74	0.84	0.95	1.05	1.16	1.26	1.37	1.47	1.58	1.68	1.79	1.89
15	0.23	0.27	0.32	0.36	0.41	0.45	0.56	0.68	0.79	0.9	1.01	1.13	1.24	1.35	1.46	1.58	1.69	1.8	1.91	2.03
16	0.24	0.29	0.34	0.38	0.43	0.48	0.6	0.72	0.84	0.96	1.08	1.2	1.32	1.44	1.56	1.68	1.8	1.92	2.04	2.16
17	0.26	0.31	0.36	0.41	0.46	0.51	0.64	0.77	0.89	1.02	1.15	1.28	1.4	1.53	1.66	1.79	1.91	2.04	2.17	2.3
18	0.27	0.32	0.38	0.43	0.49	0.54	0.68	0.81	0.95	1.08	1.22	1.35	1.49	1.62	1.76	1.89	2.03	2.16	2.3	2.43
20	0.3	0.36	0.42	0.48	0.54	0.6	0.75	0.9	1.05	1.2	1.35	1.5	1.65	1.8	1.95	2.1	2.25	2.4	2.55	2.7
22.5	0.34	0.41	0.47	0.54	0.61	0.68	0.84	1.01	1.18	1.35	1.52	1.69	1.86	2.03	2.19	2.36	2.53	2.7	2.87	3.04
25	0.38	0.45	0.53	0.6	0.68	0.75	0.94	1.13	1.31	1.5	1.69	1.88	2.06	2.25	2.44	2.63	2.81	3	3.19	3.38
30	0.45	0.54	0.63	0.72	0.81	0.9	1.13	1.35	1.58	1.8	2.03	2.25	2.48	2.7	2.93	3.15	3.38	3.6	3.83	4.05

Neonatal
vasopressin infusion

Concentration: 200 mUnits/mL

Admixture:

Dilute 0.5 mL of 20 units/mL solution with 49.5 mL of NS or D5W for a total volume of 50 mL

	PATIENT WEIGHT (kg)																			
DOSE	**0.5**	**0.6**	**0.7**	**0.8**	**0.9**	**1**	**1.25**	**1.5**	**1.75**	**2**	**2.25**	**2.5**	**2.75**	**3**	**3.25**	**3.5**	**3.75**	**4**	**4.25**	**4.5**
(mUnits/kg/min)	INFUSION RATE (mL/hr)																			
0.1	0.02	0.02	0.02	0.02	0.03	0.03	0.04	0.05	0.05	0.06	0.07	0.08	0.08	0.09	0.1	0.11	0.11	0.12	0.13	0.14
0.2	0.03	0.04	0.04	0.05	0.05	0.06	0.08	0.09	0.11	0.12	0.14	0.15	0.17	0.18	0.2	0.21	0.23	0.24	0.26	0.27
0.3	0.05	0.05	0.06	0.07	0.08	0.09	0.11	0.14	0.16	0.18	0.2	0.23	0.25	0.27	0.29	0.32	0.34	0.36	0.38	0.41
0.4	0.06	0.07	0.08	0.10	0.11	0.12	0.15	0.18	0.21	0.24	0.27	0.3	0.33	0.36	0.39	0.42	0.45	0.48	0.51	0.54
0.5	0.08	0.09	0.11	0.12	0.14	0.15	0.19	0.23	0.26	0.3	0.34	0.38	0.41	0.45	0.49	0.53	0.56	0.6	0.64	0.68
0.6	0.09	0.11	0.13	0.14	0.16	0.18	0.23	0.27	0.32	0.36	0.41	0.45	0.5	0.54	0.59	0.63	0.68	0.72	0.77	0.81
0.7	0.11	0.13	0.15	0.17	0.19	0.21	0.26	0.32	0.37	0.42	0.47	0.53	0.58	0.63	0.68	0.74	0.79	0.84	0.89	0.95
0.8	0.12	0.14	0.17	0.19	0.22	0.24	0.3	0.36	0.42	0.48	0.54	0.6	0.66	0.72	0.78	0.84	0.9	0.96	1.02	1.08
0.9	0.14	0.16	0.19	0.22	0.24	0.27	0.34	0.41	0.47	0.54	0.61	0.68	0.74	0.81	0.88	0.95	1.01	1.08	1.15	1.22
1	0.15	0.18	0.21	0.24	0.27	0.3	0.38	0.45	0.53	0.6	0.68	0.75	0.83	0.9	0.98	1.05	1.13	1.2	1.28	1.35
1.1	0.17	0.2	0.23	0.26	0.3	0.33	0.41	0.5	0.58	0.66	0.74	0.83	0.91	0.99	1.07	1.16	1.24	1.32	1.4	1.49
1.2	0.18	0.22	0.25	0.29	0.32	0.36	0.45	0.54	0.63	0.72	0.81	0.9	0.99	1.08	1.17	1.26	1.35	1.44	1.53	1.62

VIHA IV MONOGRAPH bevacizumab

*BIOSIMILAR ALERT	CLASSIFICATION pH 5.5 to 6.2 Antineoplastic – non vesicant	*ELDER ALERT See Cautions	HAZARDOUS DRUG Low Reproductive Risk

- BCHA Provincial Formulary restrictions apply to the IV use of bevacizumab

INDICATIONS FOR IV USE

***Avastin, Mvasi and Zirabev are NOT interchangeable**

HEALTH CANADA APPROVED

- Treatment of colorectal cancer[1-3], non-small cell lung cancer[1-3], some gynecological cancers[1,3] or brain tumours [1-3]

NON HEALTH CANADA APPROVED INDICATION BUT SUBSTANTIATED IN THE LITERATURE

- Treatment of head and neck cancer, mesothelioma, prostrate and renal cell cancers[4]

CONTRAINDICATIONS

- ➢ *Hypersensitivity to bevacizumab or any other components of formulation[1-3]*
- ➢ *Hypersensitivity to other murine or Chinese hamster ovary cell proteins eg riTUXimab or other recombinant human or humanized antibodies[1-3]*
- Untreated central nervous system metastases; due to unknown risk of CNS hemorrhage[1-3]
- Major surgery within last 4 weeks, recent stroke or myocardial infarction (less than 1 year); recent intracranial hemorrhage; uncontrolled hypertension[5]

CAUTIONS

- * Patients greater than 65 years; greater risk for adverse events, including arterial thrombotic events and proteinuria [6]
- Renal disease including proteinuria, bleeding disorders (congenital bleeding diatheses or acquired coagulopathy), uncontrolled angina, cardiac arrhythmias, heart failure, prior anthracycline exposure or chest wall radiation[4,5]
- In patients with risk factors for thromboembolic events: eg recent arterial thromboembolic events (less than 6 months)[5], history of DVT [5], diabetes[1-3]

DRUG INTERACTIONS:

- Warfarin: weekly INR until stable warfarin dose is established then INR at the beginning of each cycle[5]

PREGNANCY/BREAST FEEDING: Consult pharmacy or specialised on-line references for most recent information

ADMINISTRATION

BCCA administration guideline in ***bold, italics***

MODE	DIRECT IV	INTERMITTENT INFUSION	CONTINUOUS INFUSION
	NO	YES	NO
WHO MAY GIVE		All registered nurses	
ADULT		Dilute doses ***1650 mg or less in 100 mL NS*** Doses greater than ***1650 mg in 250 mL NS*** Infuse over ***10 to 60 minutes*** See individual protocol for specific infusion details	
PEDIATRIC		Limited information – see DOSE	
REQUIREMENTS	Health Care Professionals who are pregnant, breast feeding or attempting to conceive; personal protective equipment (gloves, mask and goggles) if preparing the drug and one pair of chemotherapy approved gloves when risk of direct contact Flush with at least 10 mL NS pre and post dose Electronic infusion device		

MONITORING

REQUIRED

- Observe continuously for signs of hypersensitivity reactions (ie, fever, chills, urticaria, angioedema) for 10 minutes after the start of each dose
- Baseline BP, HR, RR and temperature and BP post dose for first 3 cycles

RECOMMENDED

- Baseline: CBC with differential, creatinine, bilirubin, AST, alkaline phosphatase, albumin, electrolytes, dipstick or laboratory urinalysis for protein [5]
- For subsequent monitoring; refer to individual protocol

RECONSTITUTION

- None required

COMPATIBILITY/STABILITY

- Stable in NS for at least 24 hours at room temperature and in the refrigerator [1-3]
- Incompatible with dextrose solutions[1-3]
- For drug-drug compatibility consult pharmacy or specialised on-line references for most recent information

ADVERSE EFFECTS

INFUSION RELATED REACTIONS

- Hypersensitivity reactions (eg hypertension, hypertensive crisis, wheezing, oxygen desaturation, anaphylactic/anaphylactoid reactions, chest pain, rigors, headache, diaphoresis) may occur with first infusion (uncommon).[6] Stop infusion and contact physician. Infusion reactions are treated according to severity. If therapy is restarted it should be given at an initial rate of 60 minutes or longer[4]
- Pre medication is not typically recommended [5]

CARDIOVASCULAR

- Hypertension: see individual protocol for specific recommendations. Permanent discontinuation recommended if hypertensive crisis or hypertensive encephalopathy occurs. Temporarily discontinue in those who develop uncontrolled hypertension[6]
- Heart failure[4,6]
- Arterial or venous thromboembolic events, including cerebral infarction, stroke, MI, TIA, angina[6]

RENAL

- Proteinuria: may range from clinically asymptomatic to nephritic syndrome; may be dose related. Increased risk in those with history of hypertension [1-3]

HEMORRHAGE

- Severe or fatal hemorrhage, including hemoptysis, gastrointestinal bleeding, central nervous system hemorrhage, epistaxis, vaginal bleeding[6]
- Serious or fatal pulmonary hemorrhage (primarily in patients with non small cell lung cancer with squamous cell histology) [6]

GASTROINTESTINAL

- Gastrointestinal fistula (including enterocutaneous, esophageal, duodenal, and rectal fistulas), and intra-abdominal abscess have been reported (not related to treatment duration) [6]
- Gastrointestinal perforation, (sometimes fatal). Most cases occur within 50 days of treatment initiation; monitor patients for signs/symptoms (eg, fever, abdominal pain with constipation and/or nausea/vomiting) [6]
- Emetogenic potential; minimal [6]

MISCELLANEOUS

- Wound dehiscence. Impaired wound healing. Avoid use 28 days before or after surgery [4,6]
- Posterior reversible encephalopathy syndrome: Symptoms (which include headache, seizure, confusion, lethargy, blindness and/or other vision, or neurologic disturbances) may occur from 16 hours to 1 year after treatment initiation. Resolution of symptoms usually occurs within days after discontinuation; however, neurologic sequelae may remain[4,6]
- Non-gastrointestinal fistula formation (including tracheoesophageal, bronchopleural, biliary, vaginal, vesical, renal, bladder, and female tract fistulas) has been observed (rarely fatal), most commonly within the first 6 months of treatment[6]

DOSE

Numerous dosing schedules exist and the dose depends on disease, response and concomitant therapy. Guidelines for dosing also include consideration of proteinuria and hypertension when dosages may be delayed or discontinued. Refer to individual protocol

ADULT [4] **Brand must be specified as biosimilar agents exist**

- 5 to 15 mg/kg x 1 dose. Repeat every 2 to 3 weeks depending on protocol
- Dose reduction for adverse events is not recommended. Bevacizumab is either temporarily suspended or discontinued – refer to individual protocol

ELDERLY[6]

- Refer to adult dosing above

PEDIATRIC

- Not used within Island Health for any BCHA approved indications – for non-approved indications contact pharmacy

RENAL IMPAIRMENT ADJUSTMENTS No information available at this time

HEPATIC IMPAIRMENT ADJUSTMENTS No information available at this time

HEMO/PERITONEAL DIALYSIS No information available at this time

MISCELLANEOUS

- Environmental concerns: none. Safe handling precautions for reproductive risk employees only – see Med Policy D 23, Appendix 1 for more information
- IM and subcutaneous use – no information available at this time

bevacizumab- references

1. Avastin [Product Monograph], Mississauga, ON: Hoffmann-La Roche, Ltd.; Jun 2018.

2. Mvasi [Product Monograph], Mississauga, ON: Amgen Canada, Inc.; Jun 2019.

3. Zirabev [Product Monograph], Kirkland, QC: Pfizer Canada, ULC.; Jun 2019.

4. Bevacizumab. In: Badry N, editor. B.C. Cancer Drug Manual. Vancouver, BC: B.C. Cancer; Rev Nov 2019 [cited 2019 Nov]. Available from http://www.bccancer.bc.ca.

5. BC Cancer Protocol summary for palliative therapy for recurrent malignant gliomas using bevacizumab with or without concurrent etoposide or lomustine. (CNBEV) Vancouver, British Columbia: BC Cancer Agency; Rev 1 Nov 2019. [cited 2019 Nov].

6. Bevacizumab In: Lexi-Comp Online™, Lexi-Drugs Online™, Hudson, Ohio: Lexi-Comp, Inc.; [cited 2019 Oct].

VIHA IV MONOGRAPH

ciprofloxacin

OTHER NAMES	CLASSIFICATION	*ELDER ALERT
Cipro	Antibiotic - quinolone pH 3.5 to 4.6	See Cautions

INDICATIONS FOR IV USE

HEALTH CANADA APPROVED[1]

- Treatment of infections of the respiratory tract, urinary tract, skin or skin structure, blood or bone caused by susceptible organisms

CONTRAINDICATIONS[1]

- *Hypersensitivity to ciprofloxacin, any component of formulation or other quinolone antibacterial agents*
- History of tendinitis or tendon rupture associated with the use of a quinolone antibacterial agent

CAUTIONS [1,2]

- Elderly: may be at risk of increased toxicity (eg QT_c prolongation, disturbance in glucose homeostasis, tendon rupture)
- Patients with known prolongation of QT_c interval, ventricular arrhythmias including torsades de pointes, proarrhythmic conditions (eg, clinically significant bradycardia, acute myocardial ischemia), uncorrected hypokalemia, hypomagnesemia: may have potential to further prolong QT_c interval
- Hepatic impairment or liver cirrhosis; may increase risk of QT prolongation
- Myasthenia gravis: may exacerbate muscle weakness related to myasthenia gravis
- Known or suspected CNS disorders, such as severe cerebral atherosclerosis, epilepsy, or other factors that may predispose to seizures: convulsion, increased intracranial pressure, psychosis and CNS stimulation have been reported with quinolones
- Diabetics; disturbances of blood glucose including symptomatic hyper- and hypoglycemia have been reported
- Renal impairment, rheumatoid arthritis, solid organ transplant recipients; may increase risk of tendon rupture

DRUG INTERACTIONS:[1,2]

- Class IA (eg quiNIDine, procainamide), and Class III (eg amiodarone, sotalol) antiarrhythmic agents: may have additive effect on QT_c interval
- Other drugs that prolong QT_c interval (erythromycin, antipsychotics and tricyclic antidepressants)
- Concurrent corticosteroid; may increase risk of tendon rupture
- May interact with warfarin mechanism unknown – monitor INR

PREGNANCY/BREAST FEEDING: Consult pharmacy or specialised on-line references for most recent information

ADMINISTRATION

MODE	DIRECT IV	INTERMITTENT INFUSION	CONTINUOUS INFUSION
	NO	YES	NO
WHO MAY GIVE		All registered nurses	
ADULT		Premixed bags: 200 in 100 mL or 400 mg in 200 mL Peripheral line: infuse over 60 minutes Central line: infuse over 30 to 60 minutes	
PEDIATRIC		See Syringe pump infusion table and/or large volume pump infusion table	
NEONATE		See Pediatric Syringe Pump Infusion Table or Neonatal ICU IV Recon and Dilution Table	
REQUIREMENTS	None		

MONITORING

REQUIRED

- None

RECOMMENDED

- Baseline and periodic complete blood count with differential and serum creatinine
- Diabetics and the elderly: monitor blood glucose at least once a day. Can use a bedside blood glucose monitor

RECONSTITUTION

- Available as premixed bags: 200 mg in 100 mL D5W and 400 mg in 200 mL D5W

COMPATIBILITY/STABILITY

- Compatible with NS, D5W, D5-1/2S, D10W, Ringer's, and lactated Ringer's solutions [3]
- Manufacturer indicates that product should be protected from light for long-term storage [1]
- For drug-drug compatibility, consult pharmacy or specialised on-line references for most recent information

ADVERSE EFFECTS [1,2]

LOCAL REACTIONS

- Thrombophlebitis, burning, pain, erythema. Generally resolve rapidly after completion of infusion, associated with infusion rates of 30 minutes or less

HYPERSENSITIVITY

- Severe hypersensitivity reactions, including anaphylaxis
- Spectrum of reactions can vary widely; may present as typical allergic symptoms (eg, itching, urticaria, rash, edema) after a single dose, or may manifest as severe idiosyncratic dermatologic (eg, Stevens-Johnson, toxic epidermal necrolysis), vascular (eg, vasculitis), pulmonary (eg, pneumonitis), renal (eg, nephritis), hepatic (eg, hepatic failure or necrosis), and/or hematologic (eg, anemia, cytopenias) events, usually after multiple doses

CARDIOVASCULAR

- Prolongation of QT_c interval

CNS

- Dizziness, headache
- CNS stimulation eg agitation, anxiety, convulsions, depression, insomnia, light headedness, nervousness

GASTROINTESTINAL

- Diarrhea, nausea (most common)
- Pseudomembranous colitis

MISCELLANEOUS

- Symptomatic hyper- and hypoglycemia
- Rupture of shoulder, hand and Achilles tendons, appears to be a class-related effect and a relationship to dosage is not clear. Patients should not generally be re-exposed [4]
- Peripheral neuropathy; may occur soon after initiation of therapy and may be irreversible

DOSE

ADULT

- Dose range: 200 to 400 mg. Standard dose 400 mg [1]
- Frequency: every 12 hours, every 8 hour dosing reserved for severe or complicated infections [1]
- IV to oral step-down:[5]
  - 200 mg IV every 12 hours to 250 mg PO every 12 hours
  - 400 mg IV every 12 hours to 500 mg PO every 12 hours
  - 400 mg IV every 8 hours to 750 mg PO every 12 hours

ELDERLY[1]

- Consider age-related decreases in renal function when selecting dosage

PEDIATRIC[6]

- 15 to 30 mg/kg/day divided every 8 to 12 hours. Max dose: 800 mg /24 hours
- Cystic fibrosis: 15 to 30 mg/kg/day divided every 8 to 12 hours. Max dose: 1.2 g /24 hours

NEONATE [7]

- Limited information available. 10 to 20 mg/kg/day divided every 12 hours

RENAL IMPAIRMENT ADJUSTMENTS

Manufacturer's recommendation:[1]

Creatinine clearance (mL/minute)	Maximum daily dose
31 to 60	800 mg
30 or less	400 mg

HEPATIC IMPAIRMENT ADJUSTMENTS[1]

- None required

HEMO/PERITONEAL DIALYSIS

- Hemodialysis: 200 to 400 mg q24h; administer post hemodialysis [8]
- CAPD: Not dialysed. 200 mg q12h [9]

MISCELLANEOUS

- Subcutaneous and IM administration: No information available at this time

ciprofloxacin - references

1. Ciprofloxacin Injection USP [Product Monograph], Krikland, QC: Pfizer Canada, Inc.; Apr 2018.

2. Ciprofloxacin (Systemic) In: Lexi-Comp Online™ , Lexi-Drugs Online™, Hudson, Ohio: Lexi-Comp, Inc.; [cited 2018 Jun].

3. Ciprofloxacin In: Lexi-Comp Online™ , Trissel's™ 2 Clinical Pharmaceutics database (created by Lawrence A. Trissel), Hudson, Ohio: Lexi-Comp, Inc.; [cited 2018 Jun].

4. Ciprofloxacin In: AHFS Drug Information® (2018) online version. American Society of Health-System Pharmacists, Inc. Available from http://online.statref.com/ [cited 2018 Jun].

5. Fluoroquinolone Allergy In: Lexi-Comp Online™ , Drug Allergy and Idiosyncratic Reactions Online™, Hudson, Ohio: Lexi-Comp, Inc.; [cited 2018 Jun].

6. Ciprofloxacin In: BC Children's and Women's Hospital (C&W) Online Formulary. Pediatric Drugs, Vancouver, BC: BC Children's and Women's Hospital; [cited 2018 Jun].

7. Ciprofloxacin In: IBM Micromedex® Neofax® and Pediatrics (electronic version). IBM Watson Health, Greenwood Village, Colorado, USA. Available at: https://www.micromedexsolutions.com/ [cited 2019 Jul].

8. Kwok P, Leung M. Dialyze-IHD. Dialyzability of medications in patients undergoing intermittent hemodialysis. Vancouver, BC. [cited 2018 Jun] Available at : http://www.dialyzeihd.com/

9. Ashley C and Dunleavy A. editors. UK Renal Pharmacy Group. The Renal Drug handbook. 4th ed. London; Radcliffe Publishing; 2014. p 199-200.

Pediatric dexmedetomidine infusion

Concentration: 4 mcg/mL

Admixture:
200 mcg diluted to a total volume of 50 mL with NS for 4 mcg/mL
or
Use pre-mixed solution; 4 mcg/mL (100 mL bottle)

	PATIENT WEIGHT (kg)																			
DOSE (mcg/kg/h)	**2**	**4**	**6**	**8**	**10**	**12**	**14**	**16**	**18**	**20**	**25**	**30**	**35**	**40**	**45**	**50**	**55**	**60**	**65**	**70**
	INFUSION RATE (mL/h)																			
0.1	0.05	0.1	0.15	0.2	0.25	0.3	0.35	0.4	0.45	0.5	0.63	0.75	0.88	1	1.1	1.3	1.4	1.5	1.6	1.8
0.2	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1	1.3	1.5	1.8	2	2.3	2.5	2.8	3	3.3	3.5
0.3	0.15	0.3	0.45	0.6	0.75	0.9	1.1	1.2	1.4	1.5	1.9	2.3	2.6	3	3.4	3.8	4.1	4.5	4.9	5.3
0.4	0.2	0.4	0.6	0.8	1	1.2	1.4	1.6	1.8	2	2.5	3	3.5	4	4.5	5	5.5	6	6.5	7
0.5	0.25	0.5	0.75	1	1.3	1.5	1.8	2	2.3	2.5	3.1	3.8	4.4	5	5.6	6.3	6.9	7.5	8.1	8.8
0.6	0.3	0.6	0.9	1.2	1.5	1.8	2.1	2.4	2.7	3	3.8	4.5	5.3	6	6.8	7.5	8.3	9	9.8	10.5
0.7	0.35	0.7	1.1	1.4	1.8	2.1	2.5	2.8	3.2	3.5	4.4	5.3	6.1	7	7.9	8.8	9.6	10.5	11.4	12.3
0.8	0.4	0.8	1.2	1.6	2	2.4	2.8	3.2	3.6	4	5	6	7	8	9	10	11	12	13	14
0.9	0.45	0.9	1.4	1.8	2.3	2.7	3.2	3.6	4.1	4.5	5.6	6.8	7.9	9	10.1	11.3	12.4	13.5	14.6	15.8
1	0.5	1	1.5	2	2.5	3	3.5	4	4.5	5	6.3	7.5	8.8	10	11.3	12.5	13.8	15	16.3	17.5

Date created: Dec 2012
Date revised: Apr 2020

VIHA IV MONOGRAPH **fentaNYL**

OTHER NAMES	CLASSIFICATION pH 4 to 7.5 Opiate agonist - Narcotic Analgesic	*ELDER ALERT - See Cautions *HIGH ALERT DRUG – Narcotic

INDICATIONS FOR IV USE

HEALTH CANADA APPROVED[1]

- In anesthesia as an analgesic, an adjunct to general and regional anesthesia, and as an anesthetic for induction and maintenance

NON HEALTH CANADA APPROVED INDICATIONS BUT SUBSTANTIATED IN THE LITERATURE

- Temporary relief of severe pain and patient controlled analgesia [2]

CONTRAINDICATIONS

- *Hypersensitivity to fentaNYL or any component of formulation.*[1] *Cross reaction may occur with meperidine and SUFentanil*

For CAUTIONS see page 2

ADMINISTRATION

MODE	DIRECT IV	INTERMITTENT INFUSION	CONTINUOUS INFUSION
	YES	YES	YES
WHO MAY GIVE	**Adults:** All registered nurses **Peds/Neonates:** Registered nurses with specialized skills - see **Requirements + Required monitoring**	**Neonates only:** Registered nurses with specialized skills - see Required Monitoring	**Adults:** All registered nurses **Peds/Neonates:** Registered nurses with specialized skills - see Required Monitoring
ADULT	Give dose slowly over 1 to 3 minutes **Obstetrics:** dilute 100 mcg (2 mL) with 8 mL NS for 10 mcg/mL – 10 mL[3]		Refer to Adult IV Dose-Rate/Mix chart for standard concentration
	Patient Controlled Analgesia: Provided by Pharmacy in a standard concentration		
PEDIATRIC	**Doses less than 5 mcg/kg:** over 3 to 5 minutes[4] **Doses 5 mcg/kg or greater:** over 5 to 10 minutes[4] Intubation: over 1 to 3 min [5,6]		Refer to Pediatric IV Dose-Rate/Mix charts
NEONATE	See Neonatal ICU IV Recon and Dilution Table		Refer to Neonatal IV Dose-Rate/Mix charts
REQUIREMENTS	Infusion: Electronic infusion device. PCA: PCA programmed electronic infusion device Direct IV for neonatal intubation: Healthcare professional certified in neonatal intubation must be physically present		

MONITORING

REQUIRED

Baseline:

- RR, HR, BP, sedation scale before dose or start of infusion

Direct IV (all patients) or intermittent infusion (neonates):

- RR, HR, BP, sedation scale, at 5 and 15 minutes post dose/post infusion

Direct IV (pediatric/neonate): In addition to above,

- Continuous electronic respiratory monitoring and pulse oximetry during and for 15 minutes post dose
- Observe patient continually for 15 minutes post dose for signs/symptoms of apnea and/or muscle rigidity

All patients - continuous infusion:

- RR and sedation scale at 5 and 15 minutes then every 2 hours

Plus in pediatric and neonates - continuous infusion:

- Continuous electronic respiratory monitoring and continuous pulse oximetry

Patient controlled analgesia (PCA):

- As per Acute Pain Management Webpage – PCA monitoring requirements

RECOMMENDED

- Neonatal intubation: monitor urine output post dose
- All patients: Monitor fluid intake and urine output; check for bladder distension
- Check for abdominal distension, gas or constipation

RECONSTITUTION

- None required

COMPATIBILITY/STABILITY

- Stable in D5W and NS for at least 24 hours at room temperature and in refrigerator when mixed on patient care unit [9]
- Compatible with Ringer's and lactated Ringer's solutions[9]
- Products premixed by pharmacy are individually labelled with an expiry date and storage instructions
- For drug-drug compatibility consult pharmacy or specialised on-line references for most recent information

CAUTIONS [2]

* Elderly: May be more sensitive to adverse effects, including life-threatening respiratory depression. Decrease initial dose. Clearance may also be reduced in older adults (with or without renal impairment) resulting in a narrow therapeutic window and increasing risk for respiratory depression or overdose
- Cachectic or debilitated patients: Is a greater potential for critical respiratory depression, even at therapeutic dosages
- Respiratory disease: Monitor for respiratory depression in patients with significant chronic obstructive pulmonary disease or cor pulmonale and patients having a substantially decreased respiratory reserve, hypoxia, hypercarbia, or preexisting respiratory depression, particularly when initiating therapy and titrating therapy; critical respiratory depression may occur, even at therapeutic dosages
- Sleep-disordered breathing: Use with caution for chronic pain and titrate dosage cautiously in patients with risk factors for sleep-disordered breathing, including HF and obesity
- Hypovolemia, cardiovascular disease (including acute MI), circulatory shock: Potential vasodilation + hypotension
- Head trauma, intracranial lesions, or elevated intracranial pressure: Respiratory depressant effects (with CO_2 retention and secondary elevation of CSF pressure) may be markedly exaggerated
- CNS depression/coma: Are susceptible to intracranial effects of CO_2 retention
- Abdominal conditions: May obscure diagnosis or clinical course
- Adrenocortical insufficiency: including Addison disease. Long-term opioid use may cause secondary hypogonadism
- Biliary tract dysfunction or acute pancreatitis: May cause constriction of sphincter of Oddi
- Delirium tremens, hepatic or renal impairment, obesity, prostatic hyperplasia/urinary stricture, psychosis, thyroid dysfunction. Seizure disorders: May cause or exacerbate preexisting seizures
- Patients on opioids for chronic pain, pt with opioid use disorder , pt on opioid agonist therapy – may require consultation to specialist (eg anesthesiology, addictions medicine)

DRUG INTERACTIONS:

- Benzodiazepines or other CNS depressants: May result in profound sedation, respiratory depression, coma, and death
- Is metabolized by cytochrome P450 3A4; concomitant use with any 3A4 inhibitors may result in an increase in fentaNYL plasma concentrations, which could increase or prolong adverse reactions and may cause potentially fatal respiratory depression. Discontinuation of a concomitantly used 3A4 inducer may result in an increase in fentaNYL plasma concentration. Review drug profile at time of initiation and with any change in medication regimen
- Other potentially significant interactions may exist, requiring dose or frequency adjustment, additional monitoring, and/or selection of alternative therapy. Consult drug interactions database for more detailed information

PREGNANCY/BREASTFEEDING:

- Safe use other than in labour not established. Consult pharmacy or specialised on-line references for most recent information

ADVERSE EFFECTS [1,2]

RESPIRATORY

- Respiratory depression and apnea; may be severe, requiring maintenance of an adequate airway, use of resuscitative equipment, and administration of oxygen, naloxone, and/or other resuscitative drugs
- Muscular rigidity. Treatment: naloxone IV and respiratory support as required. Associated with speed of administration, reduced by use of slow intravenous injection
- Neonatal Intubation: Possible chest wall rigidity. Muscle relaxation (succinylcholine) overcomes this[8]

CARDIOVASCULAR

- Bradycardia; which may be treated with atropine
- Hypotension.[1] Orthostatic hypotension in ambulatory patients

CNS

- Sedation (common)
- Confusion, dizziness, fatigue

continued

ADVERSE EFFECTS [1,2] continued

GASTROINTESTINAL common

- Nausea, vomiting
- Constipation. Diminished propulsive peristaltic waves in GI tract

MISCELLANEOUS

- Neonatal withdrawal syndrome: may be life-threatening. Signs and symptoms include irritability, hyperactivity, abnormal sleep pattern, high-pitched cry, tremor, vomiting, diarrhea, and failure to gain weight. Onset, duration, and severity depend on the drug used, duration of use, maternal dose, and rate of drug elimination by the newborn [1]

DOSE

- *Optimal analgesic dose varies widely among patients; while doses should be titrated to pain management, consideration of sedation level and respiratory status will also guide dosing [10]*
- ***The following should only be considered as guidelines***

ADULT

- **Intrapartum use:** refer to site specific procedures
- **Intermittent dosing critically ill patients**:[2] 25 to 35 mcg (based on ~70 kg patient) **or** 0.35 to 0.5 mcg/kg every 30 to 60 minutes as needed.[11] **Note:** More frequent dosing may be needed (eg, mechanically-ventilated patients)
- **Continuous infusion for critically ill patients**: 50 to 700 mcg/hour (based on ~70 kg patient) **or** 0.7 to 10 mcg/kg/**hour** [2,11]
- **Patient-controlled analgesia (PCA)** [2] *Opioid-naive:* Demand dose: Usual: 10 to 20 mcg. Lockout interval: 4 to 10 minutes. Usual basal rate: 50 mcg/hour or less. **Note:** Continuous basal infusions are not recommended for initial programming and should rarely be used; consider limiting infusion rate to 10 mcg/hour if used [12]

ELDERLY

- Elderly have been found to be twice as sensitive as younger patients to effects of fentaNYL. A wide range of doses may be required. Start with a low dose and titrate as tolerated [2]

PEDIATRIC [5]

- **Intermittent dosing:**
  Infants: 1 to 2 mcg/kg/dose every 2 to 4 hour PRN (usual max 4 mcg/kg/dose)
  Children: 1 to 2 mcg/kg/dose every 30 to 60 minutes PRN
- **Continuous infusion**: Usual dose: 0.25 to 4 mcg/kg/hour (titrate to effect). Higher doses may be required in palliative care or end of life symptom management with monitored titration
- **Intubation dose**: 2 to 10 mcg/kg/dose over 1 to 2 minutes

NEONATE

Analgesia [13]

- **Single or intermittent dose:** 0.5 to 3 mcg/kg/dose. Repeat as required (usually every 2 to 4 hours)
- **Continuous infusion:** 0.5 to 2 mcg/kg/hour. Tolerance may develop rapidly following constant infusion

Sedation [13]

- **Single or intermittent dose:** 0.5 to 4 mcg/kg/dose. Repeat as required (usually every 2 to 4 hours)
- **Continuous infusion:** 1 to 5 mcg/kg/hour. Tolerance may develop rapidly following constant infusion
- **Endotracheal Intubation:**[4,14] 1 to 5 mcg/kg. Succinylcholine to be at bedside in event of chest wall rigidity/laryngeal spasm

RENAL IMPAIRMENT ADJUSTMENTS [15]

- For short surgical procedures, degree of renal impairment is irrelevant
- For other indications, renal impairment may have a moderate effect on elimination, however as fentaNYL is titrated to response usual dose remains valid. Start with a low dose and titrate as tolerated

HEPATIC IMPAIRMENT ADJUSTMENTS

- Caution is advised. No guidelines available at this time

HEMO/PERITONEAL DIALYSIS [15,16]

- Is not removed by dialysis

MISCELLANEOUS

- May be given IM [1] or subcutaneously [6]
- 100 mcg fentaNYL is approximately equianalgesic to 10 mg morphine[1]

fentaNYL IV - references

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2. Fentanyl In: Lexi-Comp Online™ , Lexi-Drugs Online™, Hudson, Ohio: Lexi-Comp, Inc.; [cited 2018 Oct].

3. Fentanyl: protocol for labour. In: Fetal Maternal Newborn & Family Health Policy & Procedure Manual. Vancouver, BC: BC Women's Hospital; Sept 2017. [cited 2019 Mar].

4. Fentanyl In: Lexi-Comp Online™ , Pediatric and Neonatal Lexi-Drugs Online™ , Hudson, Ohio: Lexi-Comp, Inc.; [cited 2018 Oct].

5. Fentanyl In: BC Children's and Women's Hospital (C&W) Online Formulary. Pediatric Drugs, Vancouver, BC: BC Children's and Women's Hospital; [cited 2018 Oct].

6. Phelps SJ, Hagemann TM, Lee KR, Thompson AJ, editors. Pediatric injectable drugs. Teddy Bear Book. 10th ed. Bethesda: American Society of Hospital Pharmacists; 2013. p. 288-290.

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13. Fentanyl In: IBM Micromedex® Neofax® and Pediatrics (electronic version). IBM Watson Health, Greenwood Village, Colorado, USA. Available at: https://www.micromedexsolutions.com/ [cited 2019 Jun 5]

14. Barrington K. Premedication for endotracheal intubation in the newborn infant. Paediatr Child Health. 2011 Mar;16(3):159-71.

15. Ashley C and Dunleavy A. editors. UK Renal Pharmacy Group. The Renal Drug handbook. 5th ed. London; Radcliffe Publishing; 2018. p.419-450.

16. Kwok P, Leung M. Dialyze-IHD. Dialyzability of medications in patients undergoing intermittent hemodialysis. Vancouver, BC. [cited 2018 Oct] Available at : http://www.dialyzeihd.com/

OTHER NAMES	CLASSIFICATION Anticoagulant	pH 5 to 7.5	*ELDER ALERT - See Cautions *HIGH ALERT DRUG

INDICATIONS FOR IV USE

HEALTH CANADA APPROVED [1]

- **Anticoagulation:** Prophylaxis and treatment of thromboembolic disorders (eg, venous thromboembolism, pulmonary embolism) and thromboembolic complications associated with atrial fibrillation; prevention of clotting in arterial and cardiac surgery; as an anticoagulant for extracorporeal circulation and dialysis procedures

NON HEALTH CANADA APPROVED INDICATION BUT SUBSTANTIATED IN THE LITERATURE:

- Anticoagulant in several conditions in addition to those above, such as: Superficial vein thrombosis, patients with atrial fibrillation undergoing cardioversion, nonbacterial thrombotic endocarditis and systemic or pulmonary emboli, cerebral venous sinus thrombosis, acute arterial emboli or thrombosis, non-ST-elevation acute coronary syndrome, adjunct to fibrinolysis with ST-elevation myocardial infarction, bridge during oral anticoagulation interruption in those with valvular heart disease [2]

CONTRAINDICATIONS

- *Hypersensitivity to heparin[1] or pork protein or any component of the formulation (except in life threatening situations).* Commercially available heparin is derived from porcine intestinal mucosa. Heparin derived from beef lung (Special Access Program) may be used in patients hypersensitive to heparin derived from pigs
- Severe thrombocytopenia; uncontrolled active bleeding except when due to disseminated intravascular coagulation [2]
- History of heparin-induced thrombocytopenia (HIT) especially within 100 days of previous episode [2]

CAUTIONS [1]

- Elderly: increased risk of bleeding, especially in women over 60 years of age
- Any condition in which bleeding constitutes a substantial hazard or would be difficult to control because of its location, eg ulcer, renal calculus, or malignant neoplasm
- Disease states where risk of bleeding may be increased, ie subacute bacterial endocarditis, arterial sclerosis, aneurysm, severe hypertension, alcohol abuse
- Febrile illness, infections associated with thrombosing tendencies, pulmonary embolism, myocardial infarction, extensive thrombotic disorders especially those associated with neoplastic disease and following surgery: possible increased resistance to heparin
- Avoid IM injections; avoid invasive procedures
- Hepatic, biliary or renal impairment

DRUG INTERACTIONS:

- Protamine sulphate neutralises heparin activity. (See protamine sulphate IV monograph)
- *Interacts with many drugs* - contact pharmacy for more information

PREGNANCY/BREAST FEEDING: Consult pharmacy or specialised on-line references for most recent information

ADMINISTRATION

MODE	DIRECT IV	INTERMITTENT INFUSION	CONTINUOUS INFUSION
	YES	NO	YES
WHO MAY GIVE	All registered nurses		All registered nurses
ADULT	Over at least 1 minute	While cited in the literature is not given this way within Island Health	See Adult IV Dose-Rate/Mix Chart
PEDIATRIC	Over 10 minutes [2,3]		See Pediatric IV Dose-Rate/Mix Chart
NEONATE	Over 10 minutes [2]		See Neonatal IV Dose-Rate/Mix charts
REQUIREMENTS	**Continuous infusion**: Electronic infusion device		

MONITORING

REQUIRED

- Observe patient for signs of bleeding, eg bleeding gums, bruises, petechiae, nosebleeds, tarry stools

RECOMMENDED

- Baseline PTT, then every 4 to 6 hours after initial bolus and each dose adjustment until stabilization, then once daily at the same time of day [2]
- Baseline CBC and platelet count, then every 2 to 4 days, frequency depending on risk factor for HIT

RECONSTITUTION

- None required

COMPATIBILITY/STABILITY [5]

- Compatible with dextrose, saline, dextrose-saline combinations, Ringer's and lactated Ringer's solutions
- Commercially prepared premixed solutions are stable in outer wrap until labelled expiry date
- For drug-drug compatibility, consult pharmacy or specialised on-line references for most recent information

ADVERSE EFFECTS

HEMATOLOGICAL

- Hemorrhage - minor at invaded or disturbed sites, or severe involving gastrointestinal, genitourinary, retroperitoneal or intracerebral sites may occur. For severe bleeding, discontinue infusion. Protamine sulphate neutralises heparin activity.[2] See protamine IV monograph
- Thrombocytopenia. Early, benign, reversible non-immune thrombocytopenia – platelets recover despite continued heparin. Late, more serious, IgG-mediated immune thrombocytopenia, associated with thrombotic complications. In heparin naïve patients most common onset is between 5 to 10 days, in those previously exposed to heparin onset may occur within 24 hours [2,6]

HYPERSENSITIVITY Rare[1]

- Fever, chills and urticaria
- Asthma, conjunctivitis, rhinitis, angioedema and anaphylactoid reactions have occurred

MISCELLANEOUS[1]

- Asymptomatic elevation of liver enzymes. Itching or burning of the plantar surfaces of the feet
- Alopecia, affecting the entire scalp or confined to the temple. Rare

DOSE

Individual doses may vary greatly. Institutional heparin protocols should be used whenever possible

ADULT

- **Treatment venous thromboembolism (DVT/PE):** *Initial anticoagulation:* 80 units/kg (or alternatively 5,000 units) bolus followed by an initial continuous infusion of 18 units/kg/hour (or alternatively 1,000 units/hour) Adjust to target PTT of 1.5 to 2.5 times control [2]
- **Acute coronary syndromes:** *STEMI:* Adjunct to fibrinolysis and *NSTE-ACS:* Initial bolus of 60 units/kg (maximum: 4,000 units), then 12 units/kg/hour (maximum: 1,000 units/hour) as continuous infusion. Adjust to target PTT of 1.5 to 2 times control [2]
- **Cardiopulmonary bypass**: Initial dose: 150 to 400 unit/kg depending on length of procedure.[1] Subsequent doses titrated to maintain activated clotting time between 400 to 500 seconds

ELDERLY

- Patients greater than 60 years of age may have higher serum levels and clinical response (longer PTTs) as compared to younger patients receiving similar dosages. Lower dosages may be required [2]

PEDIATRIC [7]

- **Systemic heparinization:** 75 unit/kg bolus (max: 5000 units) followed by an initial continuous infusion of:
  1 year or less; 28 unit/kg/hour. Older than 1 year; 20 unit/kg/hour. Adolescent: 18 unit/kg/hour
  Adjust rate in response to PTT values

NEONATE[8]

- **Treatment of thrombosis:** 75 units/kg bolus, followed by an initial continuous infusion of 28 units/kg/hour. Adjust rate in response to PTT values

RENAL IMPAIRMENT ADJUSTMENTS [2]

- None required

HEPATIC IMPAIRMENT ADJUSTMENT [2]

- None required

HEMO/PERITONEAL DIALYSIS [2]

- Is not removed by dialysis. No dosage adjustment is required during hemodialysis or peritoneal dialysis

MISCELLANEOUS

- IM injection (especially in the arm or thigh) and *shallow* subcutaneous injection is not recommended. Duration of effect is shortened and is more likely to produce pain and hematoma [1]
- Deep subcutaneous injection; use of a 1 mL tuberculin syringe with a No. 25 or No. 26 - ½ inch needle is recommended

heparin - references

1. Heparin Sodium in 5% dextrose [Product Monograph], Kirkland, QC: Hospira Healthcare Corporation; May 2017.

2. Heparin In: Lexi-Comp Online™, Lexi-Drugs Online™, Hudson, Ohio: Lexi-Comp, Inc.; [cited 2018 Feb].

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VIHA IV MONOGRAPH **inFLIXimab**

*BIOSIMILAR ALERT	**CLASSIFICATION** pH ~7.2 Biological response modifier	

- BCHA Provincial Formulary restrictions apply to the IV use of inFLIXimab

INDICATION FOR IV USE

***Remicade, Inflectra and Renflexis are NOT interchangeable**

HEALTH CANADA APPROVED [1-3]

- In combination with methotrexate for treatment of rheumatoid arthritis in adults
- Severe active; Crohn's disease, ankylosing spondylitis, ulcerative colitis, arthritis and psoriatic arthritis refractory to standard therapy
- Patients with fistulas as a complication of Crohn's disease

CONTRAINDICATIONS [1-3]

- *Hypersensitivity to inFLIXimab, murine (mouse) proteins (*suffix *-omab) or any other component of the formulation*
- Severe infections such as sepsis, abscesses, tuberculosis, and opportunistic infections
- Moderate or severe (NYHA Class III/IV) heart failure

CAUTIONS

- Patients with mild heart failure (NYHA Class I, II) or decreased left ventricular function; worsening and new-onset heart failure has been reported [1-3]

DRUG INTERACTIONS: Vaccines: Avoid use of live vaccines. Other vaccinations may be less effective. Inactivated influenza vaccine may be of value [4]

PREGNANCY/BREAST FEEDING: Consult pharmacy or specialised on-line references for most recent information

ADMINISTRATION

MODE	DIRECT IV	INTERMITTENT INFUSION	CONTINUOUS INFUSION
	NO	YES	NO
WHO MAY GIVE		All registered nurses	
ADULT [5,6]		Add dose to 250 to 500 mL NS - final conc 0.4 to 4 mg/mL [1,2] and titrate infusion as follows (total infusion time ~ 2 to 3 hours): 10 mL/h x 15 min; then, increase to 20 mL/h x 15 min; then, increase to 40 mL/h x 15 min; then, increase to 80 mL/h x 15 min; then, increase to 150 mL/h x 30 min; then, increase to 250 mL/h until infusion completed **Shortened infusion time**: see DOSE	
PEDIATRIC [7,8]		See large volume pump infusion table titrate infusion as follows (total infusion time ~ 2 hours): **Children less than 35 kg**: 5 mL/h x 15 min then, Increase to 10 mL/h x 15 min; then, increase to 20 mL/h x 15 min; then, increase to 40 mL/h x 15 min; then, increase to 75 mL/h x 30 min; then, increase to 125 mL/h until infusion completed **Children greater than 35 kg**: rate as for adults above	
NEONATE		No information	
REQUIREMENTS	Electronic infusion device: In-line filter (1.2 micron or less) Patients with a history of acute infusion reactions should receive prophylaxis pre medication		

MONITORING

REQUIRED

- **Adults**: Baseline HR, BP, RR, temp; then q 30 min during infusion and q 30 min x 2 after completion of infusion [6]
  Adult patients with a history of infusion reactions; HR, BP, RR, temp q 10 minutes x 3 initially, then as above if stable [6]
- **Pediatrics:** Baseline HR, BP, RR, temp; then 5 min after each time rate is increased, then q 30 min during remainder of infusion and q 30 min x 2 after completion of infusion [8]
  Pediatric patients with a history of infusion reactions; HR, BP, RR, temp q 10 minutes until max rate is reached, then as above if stable [8]

RECOMMENDED

- Monitor for signs and symptoms of infection, including screening for tuberculosis
- Patients with heart failure, monitor cardiac status (eg shortness of breath, swelling feet)

RECONSTITUTION

- Reconstitute 100 mg vial with 10 mL sterile water for injection - resulting concentration 10 mg/mL. *Do not shake vial*. Allow reconstituted solution to stand for 5 minutes, prior to adding to infusion solution [1-3]

COMPATIBILITY/STABILITY

- Stable in NS in a concentration between 0.4 to 4 mg/mL for 24 hours at room temperature or in the refrigerator, manufacturer recommends infusion begin within 3 hours of reconstitution and dilution [1-3]
- For drug-drug compatibility consult pharmacy or specialised on-line references

ADVERSE EFFECTS [1-3]

INFUSION RELATED HYPERSENSITIVITY REACTIONS

- Treat symptoms symptomatically. Usually occur during infusion or within 2 hours of infusion
- *Severe*: Hypotension and clinical manifestations of anaphylaxis including bronchospasm. Infusion should be discontinued and physician notified
- *Mild*: Headache, nausea, mild dizziness. Respond to decreasing rate of infusion
- Delayed reactions occurring 3 to 12 days post infusion; myalgia, arthralgia plus fever, rash

GASTROINTESTINAL Abdominal pain, nausea, vomiting

CARDIOVASCULAR Worsening of heart failure; do not exceed a dose of 5 mg/kg in patients with mild heart failure

MISCELLANEOUS

- Coughing, fatigue
- Respiratory tract infections, including sinusitis, pharyngitis, bronchitis; and urinary tract infections
- Lupus-like syndrome (fever, pleuritic pain, pleural effusion), associated with autoantibody formation
- Blood dyscrasias (leucopenia, neutropenia, thrombocytopenia, pancytopenia)
- Severe hepatic reactions, including autoimmune hepatitis, increased liver function tests, jaundice, liver failure, have been reported (rare). Possible reactivation of hepatitis B in patients who are chronic carriers of this virus
- Hepatosplenic T-cell lymphoma; rare. Majority in adolescent or young adult males with Crohn's disease or ulcerative colitis
- Lymphoma and other malignancies, some fatal have been reported in children and adolescent patients

DOSE

Premedication (acetaminophen, antihistamines) may prevent or ameliorate acute infusion reactions

ADULT / ELDERLY Brand must be specified as biosimilar agents exist

- **Fistulising Crohn's disease:** 5 mg/kg at 0, 2, and 6 weeks and then every 8 weeks thereafter; if no response by week 14, consider discontinuing therapy [1-3]
- **Crohn's disease, ulcerative colitis:** 5 mg/kg at 0, 2, and 6 weeks, and then every 8 weeks thereafter. Dose may be increased to 10 mg/kg to sustain clinical response and remission [1-3]
- **Rheumatoid arthritis:** (in combination with methotrexate therapy): 3 mg/kg at 0, 2, and 6 weeks, and then every 8 weeks thereafter. Doses up to 10 mg/kg and/or treating as often as every 4 weeks may be required in those with an incomplete response [1-3]
- **Ankylosing spondylitis:** 5 mg/kg at 0, 2, and 6 weeks, and then every 6 to 8 weeks thereafter [1-3]
- **Psoriatic arthritis, plaque psoriasis:** 5 mg/kg at 0, 2, and 6 weeks, and then every 8 weeks thereafter [1-3]
- **Shortened infusion time**: Remicade; On receipt of a physician's order, patients who have tolerated 3 to 4 infusions over 2 hours may be transitioned to a 60 minute infusion. Start at 40 mL/h x 15 min then increase to 125 to 300 mL/h or as tolerated [9-11]

  Inflectra and Renflexis: less information available [2,3], requires a specific physician's order, administer as above [12]

PEDIATRIC[13] **Brand must be specified as biosimilar agents exist**

Rheumatic diseases: eg juvenile idiopathic arthritis, uveitis, vasculitis (in combination with methotrexate):

- 6 mg/kg at 0, 2, 4 and 6 weeks, and then every 6 to 8 weeks thereafter. Doses up to 10 mg/kg have been used in incomplete responders

Crohn's disease, ulcerative colitis:

- 5 mg/kg at 0, 2 and 6 weeks, and then every 8 weeks thereafter. Frequency may be reduced to every 4 weeks and dose increased to 10 mg/kg for incomplete responders

NEONATE No information available at this time

RENAL IMPAIRMENT ADJUSTMENTS: Dose as in normal renal function. Use with caution [14]

HEPATIC IMPAIRMENT ADJUSTMENTS: No information available at this time

HEMO/PERITONEAL DIALYSIS: Not removed by dialysis [14]

MISCELLANEOUS

IM and subcutaneous use – no information available at this time

inFLIXimab - references

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VIHA
Department of Pharmacy

Pediatric ketamine infusion

Concentration: 2 mg/mL

Admixture:
20 mg diluted to a total volume of 10 mL with NS or D5W for 2 mg/mL
or
100 mg diluted to a total volume of 50 mL with NS or D5W for 2 mg/mL

	PATIENT WEIGHT (kg)																			
DOSE (mcg/kg/min)	**2**	**4**	**6**	**8**	**10**	**12**	**14**	**16**	**18**	**20**	**25**	**30**	**35**	**40**	**45**	**50**	**55**	**60**	**65**	**70**
	INFUSION RATE (mL/h)																			
1	0.06	0.12	0.18	0.24	0.3	0.36	0.42	0.48	0.54	0.6	0.75	0.9	1.1	1.2	1.4	1.5	1.7	1.8	2	2.1
2	0.12	0.24	0.36	0.48	0.6	0.72	0.84	0.96	1.1	1.2	1.5	1.8	2.1	2.4	2.7	3	3.3	3.6	3.9	4.2
3	0.18	0.36	0.54	0.72	0.9	1.1	1.3	1.4	1.6	1.8	2.3	2.7	3.2	3.6	4.1	4.5	5	5.4	5.9	6.3
4	0.24	0.48	0.72	0.96	1.2	1.4	1.7	1.9	2.2	2.4	3	3.6	4.2	4.8	5.4	6	6.6	7.2	7.8	8.4
5	0.3	0.6	0.9	1.2	1.5	1.8	2.1	2.4	2.7	3	3.8	4.5	5.3	6	6.8	7.5	8.3	9	9.8	10.5
6	0.36	0.72	1.1	1.4	1.8	2.2	2.5	2.9	3.2	3.6	4.5	5.4	6.3	7.2	8.1	9	9.9	10.8	11.7	12.6
7	0.42	0.84	1.3	1.7	2.1	2.5	2.9	3.4	3.8	4.2	5.3	6.3	7.4	8.4	9.5	10.5	11.6	12.6	13.7	14.7
8	0.48	0.96	1.4	1.9	2.4	2.9	3.4	3.8	4.3	4.8	6	7.2	8.4	9.6	10.8	12	13.2	14.4	15.6	16.8
9	0.54	1.1	1.6	2.2	2.7	3.2	3.8	4.3	4.9	5.4	6.8	8.1	9.5	10.8	12.2	13.5	14.9	16.2	17.6	18.9
10	0.6	1.2	1.8	2.4	3	3.6	4.2	4.8	5.4	6	7.5	9	10.5	12	13.5	15	16.5	18	19.5	21
12	0.72	1.4	2.2	2.9	3.6	4.3	5	5.8	6.5	7.2	9	10.8	12.6	14.4	16.2	18	20	22	23	25
14	0.84	1.7	2.5	3.4	4.2	5	5.9	6.7	7.6	8.4	10.5	12.6	14.7	16.8	18.9	21	23	25	27	29
16	1	1.9	2.9	3.8	4.8	5.8	6.7	7.7	8.6	9.6	12	14.4	16.8	19.2	22	24	26	29	31	34
18	1.1	2.2	3.2	4.3	5	6.5	7.6	8.6	9.7	10.8	13.5	16.2	18.9	22	24	27	30	32	35	38
20	1.2	2.4	3.6	4.8	6	7.2	8.4	9.6	10.8	12	15	18	21	24	27	30	33	36	39	42
25	1.5	3	4.5	6	7.5	9	10.5	12	13.5	15	18.8	23	26	30	34	38	41	45	49	53
30	1.8	3.6	5.4	7.2	9	10.8	12.6	14.4	16.2	18	23	27	32	36	41	45	50	54	59	63
35	2.1	4.2	6.3	8.4	10.5	12.6	14.7	16.8	18.9	21	26	32	37	42	47	53	58	63	68	74
40	2.4	4.8	7.2	9.6	12	14.4	16.8	19.2	22	24	30	36	42	48	54	60	66	72	78	84

Values have been rounded off

Date created: Mar 2020

NAME OF DRUG levETIRAcetam **IV information Sheet** pH 5.5 **TRADE NAME** Keppra

levETIRAcetam is formulary but no IV monograph is available. Medication Administration Approval for use for status epilepticus is on page 3 – for further details see Medication P&P B 18

INDICATIONS FOR IV USE

HEALTH CANADA INDICATIONS FOR USE [1]

- Treatment of seizures

NON HEALTH CANADA APPROVED INDICATION BUT SUBSTANTIATED IN THE LITERATURE:

- Treatment of status epilepticus [2]

RECONSTITUTION

- None required. Available as levETIRAcetam 100 mg/mL – 5 mL

COMPATIBILITY/STABILITY

- No stability information on 1:1 dilution with D5W or NS used in clinical trials for status epilepticus, prepare immediately prior to use
- Compatible with D5W, NS and lactated Ringer's [1]
- For further compatibility information consult pharmacy or specialised on-line references

ADMINISTRATION

MODE	DIRECT IV	INTERMITTENT INFUSION	CONTINUOUS INFUSION
	NO	YES	NO
WHO MAY GIVE		All registered nurses	
ADULT		**Status epilepticus:** dilute dose 1:1 with D5W or NS in an empty sterile minibag [3,4] Administered over 5 to 10 minutes [3,4]	
PEDIATRIC		See Syringe pump infusion table and/or large volume pump infusion table	
NEONATE		See Pediatric Syringe Pump Infusion Table or Neonatal ICU IV Recon and Dilution Table	
REQUIREMENTS	None		

MONITORING

REQUIRED

- None

RECOMMENDED

- None

DOSE

ADULT/ELDERLY

- **Status epilepticus:** 40 to 60 mg/kg once.[5,6] Max: 4,500 mg [5,6]

PEDIATRIC

- **Refractory status epilepticus:** 40 to 60 mg/kg/dose once [4,7]. Max: 4500 mg/dose [4]. Consider lower dose if patient already on maintenance therapy [7]

NEONATES

- **Refractory status epilepticus:** Initial 10 to 20 mg/kg/dose q12h. Increase dose by 10 mg/kg/dose every 1 to 3 days. Usual dosage range: 10 to 40 mg/kg/dose q12h [8]

RENAL IMPAIRMENT ADJUSTMENTS

- Patients with severe renal failure were excluded from clinical trials when used for status epilepticus [5,6]

HEPATIC IMPAIRMENT ADJUSTMENTS

- No dosage adjustment required [2]

HEMO/PERITONEAL DIALYSIS

- Patients with severe renal failure were excluded from clinical trials when used for status epilepticus [5,6]

continued

NAME OF DRUG **IV information Sheet** pH 5.5 **TRADE NAME**

levETIRAcetam Keppra

ADVERSE EFFECTS [1,2]

CNS

- Behavioral disorders; incidence higher in children (37.6%) than adults (13.3%); dosage reductions may be required. Typically aggression, hostility (children 10% vs adults 2%) and nervousness
- Headache, somnolence, fatigue

MISCELLANEOUS

- Nasopharyngitis
- Vomiting (primarily in children)

island health

IV/EPIDURAL/INTRATHECAL DRUG ORDER
REQUIRING MEDICATION ADMINISTRATION
APPROVAL FORM

Medication Policy
B. 18 - APPENDIX 1
HA-P&T Committee
Revised: Mar 2020

DATE: **March 2020**

PATIENT LOCATION:

FROM: **Pharmacy Department**

Medication administration approval for intravenous/epidural/intrathecal order required due to (check applicable box below):

- ✓ Drug to be given by a registered nurse via the intravenous/epidural/intrathecal route and an Island Health approved drug monograph is not available
- ❑ Requirements or required monitoring as detailed in the Island Health approved drug monograph cannot be followed (e.g., administration of atropine to a palliative patient without ECG monitoring). Approval will stipulate exactly what is required (i.e. required monitoring: none)

This will grant approval for: _____
(Patient Name/Location)

to receive levETIRAcetam (Keppra) IV
(Drug Name/Route)

as directed by _____
(M.D. Name)

to be administered by:
- ✓ All registered nurses
- ❑ Registered nurses with specialized skills
- ❑ Physician/Resident

For the indication of: Status epilepticus; in patients who have relative or absolute contraindications to both IV phenytoin and IV valproic acid OR as a 2nd or 3rd agent in the management of status epilepticus (i.e. failure of IV phenytoin and/or valproic acid to abort status epilepticus).

Requirements: None

Required Monitoring: None

Approved By: David Forbes

- ✓ Pharmacy Manager, Clinical Programs

Original: Patient Chart

levETIRAcetam - references

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VIHA IV MONOGRAPH — lidocaine

OTHER NAMES	CLASSIFICATION		*ELDER ALERT
Xylocard, lignocaine	Antiarrhythmic	pH: 5 to 7 (injection) pH 3.5 to 6 (premixed in D5W)	See Cautions

INDICATIONS FOR IV USE

HEALTH CANADA APPROVED[1]

- Treatment of ventricular arrhythmias from myocardial infarction or cardiac manipulation (eg, cardiac surgery)

NON HEALTH *CANADA APPROVED INDICATION BUT SUBSTANTIATED IN THE LITERATURE:*

- Cardiac arrest, as per ACLS and PALS guidelines [2,3]
- Severe pain syndrome unresponsive, completely or incompletely to standard therapy including adjuvant therapies[4,5]
- Post-operative pain; especially abdominal surgeries [6]
- Refractory neonatal seizures [7]

CONTRAINDICATIONS

- *Hypersensitivity to lidocaine or any component of the formulation.* Cross reaction may occur with amide type local anaesthetics (eg bupivacaine, prilocaine, mepivacaine). Cross reaction has not been reported with procainamide or quiNIDine[1]
- Adams-Stokes syndrome, Wolff-Parkinson-White syndrome, severe degrees of sinoatrial, atrioventricular or intraventricular block (except in patients with functioning artificial pacemaker)[1,8]

CAUTIONS

- Elderly: may be a decreased clearance or increased half-life and increased risk for CNS and cardiac effects[8]
- Use **cardiac** lidocaine only, ie preservative free and lacking EPINEPHrine
- Bradycardia, severe digitalis intoxication, 1st or 2nd degree heart block in the absence of pacemaker, hypokalemia,[1] severe hypoxia or respiratory depression [8]
- Conditions which decrease hepatic blood flow may lead to accumulation with continuous infusion[9] eg heart failure, severe liver impairment, hypovolemia, shock

DRUG INTERACTIONS

- Is metabolised by cytochrome P450 1A2 and 3A4.[1] *Potential to interact with many drugs*. Contact pharmacy for more information. Review drug profile at time of initiation and with any change in medication regimen

PREGNANCY/BREAST FEEDING: Consult pharmacy or specialised on-line references for most recent information

ADMINISTRATION

MODE	DIRECT IV	INTERMITTENT INFUSION	CONTINUOUS INFUSION
	YES	YES	YES
WHO MAY GIVE	Registered nurse with specialized skills - see required monitoring	All registered nurses	Registered nurse with specialized skills - see required monitoring
ADULT	Cardiac arrest; IV push [2] Non cardiac arrest; max rate 50 mg/min[1]	Pain control: dilute dose in 100 to 250 mL D5W [or NS] Infuse over 30 to 120 min[4,5]	Refer to Adult IV Dose Rate/Mix Chart
PEDIATRIC	Loading dose over at least 2 min[10]	No information	Refer to Pediatric IV Dose Rate/Mix Chart
NEONATE	See Neonatal ICU IV Recon and Dilution Table	No information	Refer to Neonatal IV Dose Rate/Mix Chart
REQUIREMENTS	Electronic infusion device for intermittent and continuous infusion		

MONITORING

REQUIRED

- **Direct IV and continuous infusion**: Continuous ECG monitoring during administration and until stable. Notify physician if there is a prolongation of PR interval and QRS complex
- **Intermittent infusion**: Baseline BP, HR and CNS toxicity; then every 10 minutes during infusion, then every 15 minutes x 2.[4] Potential signs of CNS toxicity; ringing in ears, circumoral numbness, metallic taste, nausea, dizziness, sedation

RECOMMENDED

- When used for chronic pain, if patient is male over 65 years or female over 55 years and/or known or suspected of having cardiac problems, ECG within 14 days prior to first infusion[4]

RECONSTITUTION

- None required. Available in various forms and strengths

COMPATIBILITY/STABILITY[11]

For additional drug-drug compatibility consult on-line references or pharmacy

- Stable in D5W (preferred[1]) or NS in conc from 1 to 8 mg/mL for at least 24 hours at room temp and in refrigerator
- Compatible with dextrose, saline, dextrose-saline combinations, and lactated Ringer's solutions
- Lidocaine, DOBUTamine, DOPamine, nitroglycerin and nitroprusside prepared in D5W or NS, are compatible by Y-site in all possible combinations

ADVERSE EFFECTS [1,12]

CNS/RESPIRATORY Are mostly dose related

- CNS depressant effects may be preceded by excitatory CNS effects, restlessness, tremors and shivering
  Drowsiness and/or slurred speech may be an early sign of a toxic level
  Unrest, tremor and facial twitching are warning signs of impending generalised seizures[4]
- Perspiration, dyspnea and short intervals of apnea are warning signs of impending respiratory arrest[4]
- Nervousness, dizziness, blurred vision, tinnitus, vomiting, miosis, chills

CARDIOVASCULAR Rare at therapeutic doses

- Hypotension, myocardial depression (prolongation of PR interval and QRS complex), bradycardia
- Heart block, ventricular arrhythmias, cardiac arrest

HYPERSENSITIVITY

- Rare: dermatological reactions, urticaria, edema, anaphylactoid reactions

DOSE

ADULT

Antiarrhythmic loading dose:

- 1 to 1.5 mg/kg. Further doses of 0.5 to 0.75 mg/kg may be repeated every 5 to 10 minutes, to a total of 3 mg/kg[2]
- **Maximum recommended cumulative dose:** 300 mg in 1 hour[1]

Antiarrhythmic infusion:

- 1 to 4 mg/min or 30 to 50 mcg/kg/minute.[2] It is rarely necessary to continue this infusion for longer than 24 hours, but in the event that a longer infusion is required, the dose may need to be reduced to avoid potential toxicity resulting from an increase in half-life[8,13]
- Reduce maintenance infusion in patients with heart failure or shock; initiate infusion at 10 **mcg**/kg/minute (max dose: 1.5 mg/minute or 20 mcg/kg/minute)[8]

Neuropathic pain: Optimum dosing regimen still to be determined

- **Intermittent infusion:** 5 to 10 mg/kg (1st dose max 900 mg). Dose adjustments based on response and side effects [4,5]

Post-operative pain: Optimum dose and timing (including duration of administration) is still to be determined [6]

- **Most common regimen:** loading dose 1.5 mg/kg, followed by infusion 1.5 to 2 mg/kg/h. Typically started perioperatively and continued until end of surgery or up to 24 hours post op [6, 14]
- In the event that a longer infusion is required, dose may need to be reduced to avoid potential toxicity resulting from an increase in half-life[8,13]

ELDERLY Refer to adult dosing[8]

PEDIATRIC[10]

- **Antiarrhythmic loading dose**: 1 mg/kg/dose then begin continuous infusion. If greater than 15 min delay in starting infusion, give a second dose of 0.5 to 1 mg/kg/dose. Maximum 100 mg/dose or 5 mg/kg total dose
  Infusion: 20 to 50 **mcg**/kg/minute

NEONATE

Antiarrhythmic [15]

- **Initial bolus** dose: 0.5 to 1 mg/kg. Repeat every 10 minutes as necessary to control arrhythmia. Maximum total bolus dose should not exceed 5 mg/kg
- **Maintenance infusion:** 10 to 50 mcg/kg/minute. Premature neonates should receive lowest dosage

Refractory neonatal seizures in term, normothermic newborns [16]

- 2 mg/kg, followed immediately by maintenance infusion, 6 mg/kg/ hour for 6 hours, then 4 mg/kg/ hour for 12 hours, then 2 mg/kg/ hour for 12 hours
- **Caution:** Preterm newborns and term newborns undergoing hypothermia treatment are at risk for drug accumulation due to slower drug clearance. Precise dosing in these infants is uncertain

RENAL IMPAIRMENT ADJUSTMENTS [17]

- None required. However, accumulation of metabolites during long term infusions may be increased in renal dysfunction

HEPATIC IMPAIRMENT ADJUSTMENTS[8]

- Reduce maintenance infusion**. Initial:** 0.75 mg/minute or 10 mcg/kg/minute; **maximum dose:** 1.5 mg/minute or 20 mcg/kg/minute

HEMO/PERITONEAL DIALYSIS [17]

- **Hemodialysis and CAPD:** no supplement required

MISCELLANEOUS

- **Endotracheal use for cardiac arrest:** 2 to 4 mg/kg (2 to 2.5 times the IV dose) Dilute in NS or sterile water, absorption greater with sterile water and results in less impairment of PaO_2 [8]
- **Intraosseous use for cardiac arrest:** dose as for IV above [8]
- **IM or subcutaneous administration:** no information available on current formulations
- Lidocaine serum levels are sent to Provincial Toxicology lab in Vancouver, with a turnaround time of ~ 2 weeks[18]

lidocaine - references

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OTHER NAMES	CLASSIFICATION pH 7.5 to 9 Antineoplastic - non-vesicant	*HIGH ALERT DRUG *ELDER ALERT – Cytotoxic Agent See Cautions

INDICATIONS FOR IV USE

HEALTH CANADA APPROVED[1]

- Alone or in combination with other antineoplastic agents in the treatment of various neoplastic conditions, including acute lymphocytic leukemia and non-Hodgkin's lymphoma
- As a disease modifying antirheumatic agent when standard therapy has failed

CONTRAINDICATIONS[1]

➢ *Hypersensitivity to methotrexate or any component of formulation*
- Myelosuppression or severe hepatic or renal failure
- May be additional contraindications depending on indication for use and risk benefit ratio

CAUTIONS[1,2]

* Elderly; hepatic and renal function and folate stores may be decreased; select dosage with caution. Monitor for early signs of toxicity
- Hepatic or renal impairment, peptic ulcer disease, ulcerative colitis or general debilitation
- Pleural effusion or ascites; due to prolonged half-life and unexpected toxicity

DRUG INTERACTIONS:

- Leucovorin - decrease toxicity by 'rescuing' normal cells from the toxic effects of methotrexate
- ***Interacts with many other drugs*** – refer to specialised references for most recent information

PREGNANCY/BREAST FEEDING: Contact pharmacy or specialised on-line references for most recent information

ADMINISTRATION

BC Cancer administration guidelines in ***bold, italics***

MODE	DIRECT IV	INTERMITTENT INFUSION	CONTINUOUS INFUSION
	YES	YES	NO
WHO MAY GIVE	RN's who have received training in administration of non-vesicant cytotoxic medications	RN's who have received training in administration of non-vesicant cytotoxic medications	
ADULT	Give undiluted, as a slow push (10 mg/minute) [3]	Pharmacy to prepare and dilute in ***NS*** or D5W Infuse over ***20 minutes to 4 hours*** [2] May be extended to 24 hours [4]	Not given via continuous infusion in Island Health
PEDIATRIC [5]	Doses less than 500 mg/m^2/dose; undiluted over 2 to 5 minutes	Pharmacy to prepare and dilute in NS or D5W Doses less than 500 mg/m^2/dose: over 10 to 15 minutes (See DOSE) Doses 500 mg/m^2/dose and greater: not currently given within Island Health	
REQUIREMENTS	Electronic infusion device		

MONITORING

REQUIRED

- Methotrexate serum levels with high dose protocols

RECOMMENDED

- Baseline CBC with differential, serum creatinine, bilirubin and AST and then with each treatment/cycle or as per protocol
- Urine pH with high dose protocols [4]

RECONSTITUTION

- All products are prepared by pharmacy

COMPATIBILITY/STABILITY

- Compatible with NS, D5W, D5NS, and Ringer's solutions [1,3]
- All products are individually labelled with an expiry date and storage instructions
- For additional drug-drug compatibility, consult pharmacy or specialised on-line references for most recent information

ADVERSE EFFECTS[1,2]

HEMATOLOGICAL Dose-limiting toxicity
- Neutropenia: nadir 4 to 7 days, recovery 7 to 13 days. Second nadir at 12 to 21 days, recovery 15 to 20 days
- Thrombocytopenia: nadir 5 to 12 days, recovery 15 to 27 days
- Anemia

GASTROINTESTINAL
- Diarrhea, stomatitis, vomiting; dose-limiting toxicities [3]
- Emetogenic potential: dose-related: high-moderate for greater than 1000 mg/m^2; low-moderate for 250 to 1000 mg/m^2; low for less than 250 mg/m^2 to greater than 50 mg/m^2; rare for less than 50 mg/m^2
- Anorexia, gingivitis, glossitis, intestinal perforation, nausea

HEPATIC
- Transient elevation of liver function tests, usually return to normal within 1 month. More common in high-dose therapy
- Fibrosis, cirrhosis, with long-term (two years or more) low-dose use

RENAL
- Renal failure, especially with high doses. Minimised by alkalinisation of urine and intensive hydration

MISCELLANEOUS
- Anaphylactic reactions (rare)
- Chills, dizziness, fatigue, fever, malaise
- Erythematous rash with high dose, pruritus, urticaria, photosensitivity
- Alopecia may occur, with several months required for regrowth
- Non specific pneumonitis, can occur at any dosage
- Infertility (usually reversible), fetal defects, abortifacient

DOSE

Numerous dosing schedules exist and depend on disease, response and concomitant therapy. Guidelines for dosing also include consideration of white blood cell count and/or dose-limiting side effects, when dosages may be reduced and/or delayed. Refer to individual protocol

ADULT

Antineoplastic agent:[2]
- 25 to 3000 mg/m^2/dose cycle length 1 to 4 weeks
- Osteosarcoma: 8 to 12 g/m^2 over 4 hours with leucovorin rescue. Cycle length 1 to 4 weeks [6]
- Leucovorin rescue: required with high dose protocols, that is doses greater than 500 mg/m^2. May be required for doses 100 to 500 mg/m^2

Psoriasis:[1] Use particular care to verify dosage, administration schedule, and monitoring when no protocol exists
- 10 to 25 mg/week until adequate/optimal response is achieved. 30 mg/week should not ordinarily be exceeded

ELDERLY
- Caution since hepatic and renal function and folate stores may be decreased; closely monitor for early signs of toxicity[1]

PEDIATRIC

Antineoplastic agent:
- Doses may range from 40 mg/m^2/dose to 12,000 mg/m^{2}dose [3] refer to individual treatment protocol. Typically doses greater than 400 mg/m^2 are not given within Island Health [7]
- Dose may be a fixed dose or escalating dose eg 100 mg/m^2 (escalate dose by 50 mg/m^2 each dose) on days 0, 10, 20, 30, and 40 until toxicity is apparent; known as 'Capizzi methotrexate' [8]
- Doses less than 500 mg/m^2/dose without leucovorin rescue can be given undiluted direct IV or further diluted and infused over 10 to 15 minutes [5]
- Leucovorin rescue:[3] required with high dose protocols, that is doses greater than 500 mg/m^2. May be required for doses 100 to 500 mg/m^2

Rheumatic disease: given subcutaneously [9]

RENAL IMPAIRMENT ADJUSTMENTS[2] A variety of dose modification regimens exists; refer to individual protocol

Creatinine clearance (mL/min)	% usual dose
61 to 80	75%
51 to 60	70%
10 to 50	30 to 50%
less than 10	avoid

HEPATIC IMPAIRMENT ADJUSTMENTS[2]

Bilirubin (micromol/L)	or	AST (units/L)	% usual dose
50 to 85		180	75%
greater than 85		-	avoid

HEMO/PERITONEAL DIALYSIS
- Hemodialysis: 50% dose[2]
- CAPD: not dialysed; use is contraindicated [10]

MISCELLANEOUS
- Extravasation - non-vesicant - use cold packs
- Environmental concerns - use cytotoxic precautions
- May be given IM, intrarterially[1], intrathecally and subcutaneously (depending on indication and product) [2]

methotrexate - references

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VIHA IV MONOGRAPH

morphine

OTHER NAMES	CLASSIFICATION pH 2.5 to 6 Opiate Agonist/Narcotic Analgesic	*ELDER ALERT - See Cautions *HIGH ALERT DRUG - Narcotic

INDICATIONS FOR IV USE

- Severe acute or chronic pain[1]

CONTRAINDICATIONS

- *Hypersensitivity to morphine (rare), or any component of formulation (may contain sulfite preservatives) Cross reaction may occur with codeine, oxyCODONE, HYDROmorphone, oxymorphone*

For CAUTIONS see page 2

ADMINISTRATION

* Maximum rate of infusion is hospital policy as per Regional Medical Advisory Committee 2002 [2]

MODE	DIRECT IV	INTERMITTENT INFUSION	CONTINUOUS INFUSION
	YES	YES	YES
WHO MAY GIVE	**Adults/Pediatrics:** All registered nurses **Neonates:** Registered nurses with specialized skills – see Requirements + Required Monitoring	All registered nurses	All registered nurses **Children less than 6 months old:** Registered nurses with specialized skills - see required monitoring
ADULT	Dilute in 5 to 10 mL with NS Maximum rate 2 mg/min*	Dilute in 50 to 100 mL minibag Infuse over 15 to 30 minutes Maximum rate 2 mg/min*	Refer to Adult IV Dose-Rate/Mix chart for standard concentration
	Patient Controlled Analgesia: Provided by Pharmacy in standard concentration		
PEDIATRIC	Undiluted or dilute with NS Final conc 0.5 to 5 mg/mL [3] (~ 1 mg/mL preferred) Over 4 to 5 minutes[3]	See Syringe pump infusion table	Refer to Pediatric IV Dose-Rate/Mix charts for standard concentrations and mixing instructions
	Patient Controlled Analgesia: Provided by Pharmacy in standard concentration		
NEONATE	See Neonatal ICU IV Recon and Dilution Table	N/A	Refer to Neonatal IV Dose-Rate/Mix charts for standard concentrations and mixing instructions
REQUIREMENTS	Infusion: Electronic infusion device. PCA: PCA programmed electronic infusion device Direct IV for Neonates (eg neonatal intubation): Healthcare professional certified in neonatal intubation must be physically present		

MONITORING

REQUIRED

Baseline: RR, HR, BP, sedation scale before dose or start of infusion

Pediatric/neonate doses given Direct IV or via intermittent infusion + Adult doses greater than 5 mg given direct IV:

- RR, HR, BP, sedation scale at 5 and 15 minutes post dose/post infusion

Direct IV in pediatrics: In addition to above,

- Observe patient continually for 5 minutes post dose for signs/symptoms of respiratory depression

Direct IV in neonates: In addition to above,

- Observe patient continually for 5 minutes post dose for signs/symptoms of respiratory depression
- Continuous electronic respiratory monitoring during and for 15 minutes post dose

Adults: Intermittent infusions or Direct IV doses 5 mg or less:

- No monitoring required. Maximum rate of administration 2 mg/minute [2]

All patients - continuous infusion: RR and sedation scale at 5 and 15 minutes then every 2 hours

Plus in pediatrics - continuous infusion (including basal infusions via PCA): Continuous pulse oximetry

Plus in patients 6 months or less - continuous infusion: Continuous electronic respiratory monitoring

Patient controlled analgesia (PCA): As per Acute Pain Management Webpage – PCA monitoring requirements

RECOMMENDED

- Neonatal intubation: monitor urine output post dose
- All patients: Monitor fluid intake and urine output; check for bladder distension
- Check for abdominal distension, gas or constipation

RECONSTITUTION

- None required. Available in a variety of concentrations and volumes. Contact pharmacy for information

COMPATIBILITY/STABILITY

- Stable in D5W and NS for at least 24 hours at room temperature and in refrigerator when mixed on ward [4]
- Compatible with dextrose, saline, dextrose-saline combinations and lactated Ringer's solutions [4]
- Products premixed by pharmacy are individually labelled with an expiry date and storage instructions
- For drug-drug compatibility consult pharmacy or specialised on-line references for most recent information

CAUTIONS [5]

* Elderly: May be more sensitive to adverse effects, including life-threatening respiratory depression. Decrease initial dose. In setting of chronic pain, monitor closely due to an increased potential for risks, including certain risks such as falls/fracture, cognitive impairment, and constipation. Clearance may also be reduced in older adults (with or without renal impairment) resulting in a narrow therapeutic window and increasing risk for respiratory depression or overdose
- Cachectic or debilitated patients: Is a greater potential for critical respiratory depression, even at therapeutic dosages
- Infants less than 3 months of age, especially if premature: More susceptible to respiratory depression and/or apnea; use with caution and generally in reduced doses in this age group
- Respiratory disease: Monitor for respiratory depression in patients with significant chronic obstructive pulmonary disease or cor pulmonale and patients having a substantially decreased respiratory reserve, hypoxia, hypercarbia, or preexisting respiratory depression, particularly when initiating therapy and titrating therapy; critical respiratory depression may occur, even at therapeutic dosages
- Sleep-disordered breathing: Use with caution for chronic pain and titrate dosage cautiously in patients with risk factors for sleep-disordered breathing, including HF and obesity
- Hypovolemia, cardiovascular disease (including acute MI), circulatory shock: Potential vasodilation + hypotension
- Head trauma, intracranial lesions, or elevated intracranial pressure: Respiratory depressant effects (with CO_2 retention and secondary elevation of CSF pressure) may be markedly exaggerated
- CNS depression/coma: Are susceptible to intracranial effects of CO_2 retention
- Abdominal conditions: May obscure diagnosis or clinical course
- Adrenocortical insufficiency: including Addison disease. Long-term opioid use may cause secondary hypogonadism
- Biliary tract dysfunction or acute pancreatitis: May cause constriction of sphincter of Oddi
- Delirium tremens, hepatic or renal impairment, obesity, prostatic hyperplasia/urinary stricture, psychosis, thyroid dysfunction. Seizure disorders: May cause or exacerbate preexisting seizures
- Patients on opioids for chronic pain, pt with opioid use disorder, pt on opioid agonist therapy – may require consultation to specialist (eg anesthesiology, addictions medicine)

DRUG INTERACTIONS:

- Benzodiazepines or other CNS depressants: May result in profound sedation, respiratory depression, coma, and death
- Other potentially significant interactions may exist, requiring dose or frequency adjustment, additional monitoring, and/or selection of alternative therapy. Consult drug interactions database for more detailed information

PREGNANCY/BREASTFEEDING:

- Safe use other than in labour not established. Consult pharmacy or specialised on-line references for most recent information

ADVERSE EFFECTS [6]

RESPIRATORY

- Respiratory depression and apnea; may be severe, requiring maintenance of an adequate airway, use of resuscitative equipment, and administration of oxygen, naloxone, and/or other resuscitative drugs

CARDIOVASCULAR

- Hypotension. Orthostatic hypotension in ambulatory patients
- Increased ventricular response rate through a vagolytic action

CNS

- Sedation (common)
- Dizziness, visual disturbances, mental clouding or depression, coma, euphoria, dysphoria, weakness, faintness, agitation, restlessness, nervousness, seizures, delirium, insomnia

GASTROINTESTINAL common

- Nausea, vomiting
- Constipation. Diminished propulsive peristaltic waves in GI tract

MISCELLANEOUS

- Neonatal withdrawal syndrome: may be life-threatening. Signs and symptoms include irritability, hyperactivity, abnormal sleep pattern, high-pitched cry, tremor, vomiting, diarrhea, and failure to gain weight. Onset, duration, and severity depend on the drug used, duration of use, maternal dose, and rate of drug elimination by the newborn

DOSE

- *Optimal analgesic dose varies widely among patients; while doses should be titrated to pain management consideration of sedation level and respiratory status will also guide dosing* [7]
- ***The following doses should only be considered as guidelines***

ADULT [5]

- **Initial: Opioid naive:** 2.5 to 5 mg every 3 to 4 hours; patients with prior opioid exposure may require higher initial doses. Note: Administration of 2 to 3 mg every 5 minutes until pain relief or if associated sedation, oxygen saturation less than 95%, or serious adverse event occurs may be appropriate in treating acute moderate to severe pain in settings such as immediate postoperative period or emergency department [8,9]
  A max cumulative dose (eg, 10 mg) prompting reevaluation of continued morphine use and/or dose should be included as part of any medication order intended for short-term use (eg, PACU orders)
- **Critically ill patients, analgesia**: 2 to 4 mg every 1 to 2 hours or 4 to 8 mg every 3 to 4 hours as needed [10]
- **Continuous infusion: Opioid tolerant:** 0.8 to 10 mg/hour; usual range: 20 to 50 mg/hour (higher doses have been reported [11])
  Note: May administer a loading dose (amount administered should depend on severity of pain) prior to initiating infusion. A continuous (basal) infusion is not recommended in an opioid-naive patient [12]
- **Continuous infusion for critically ill patients:** Usual dosage range: 2 to 30 mg/hour [10]
- **Patient-controlled analgesia (PCA):** [13] Note: In opioid-naive patients, consider lower end of dosing range
  Demand dose: Usual: 1 mg; range: 0.5 to 2.5 mg. Lockout interval: 5 to 10 minutes

ELDERLY [5]

- As above; consider decrease in initial dose
- Dose reduction in immediate postoperative period (post-anesthesia care unit) is usually not necessary when administered as above [8]

PEDIATRIC [14]

- **Intermittent dosing:** 0.05 to 0.1 **mg**/kg/dose every 4 hours. Maximum 10 **mg**/dose
- **Continuous infusion:**
  Infants less than 3 months old: 5 to 20 mcg/kg/hour
  Children greater than 3 months old: 5 to 40 mcg/kg/hour average dose. Higher doses may be required especially in opioid-tolerant patients
- **Patient-controlled analgesia (PCA):** Demand dose: 10 to 20 mcg/kg. Lockout interval: 5 to 10 minutes
  Basal infusion: 0 to 20 mcg/kg/hour. 1-hour limit: 150 mcg/kg [15, 16]

NEONATE

- **Intermittent dosing:** [17] 0.05 to 0.2 mg/kg/dose. Repeat as required (usually every 4 hours)
- **Opioid dependence:** [17] Begin at most recent IV morphine dose equivalent. Taper 10% to 20% per day as tolerated
- **Pain continuous infusion:** [17] Loading dose 100 mcg/kg followed by 10 mcg/kg/hour; postoperatively may be increased further to 20 mcg/kg/hour

RENAL IMPAIRMENT ADJUSTMENTS [5]

- Manufacturers recommend starting cautiously with lower doses; titrating slowly while carefully monitoring for side effects. Choice of an alternate opioid may be prudent in patients with baseline renal impairment or rapidly changing renal function especially since other analgesics may be safer and reduced initial morphine dosing may result in suboptimal analgesia

HEPATIC IMPAIRMENT ADJUSTMENTS [5]

- Pharmacokinetics unchanged in mild liver disease; substantial extrahepatic metabolism may occur. In cirrhosis, increases in half-life and AUC suggest dosage adjustment required

HEMO/PERITONEAL DIALYSIS

- Avoid use due to potential for accumulation of neurotoxic metabolites. HYDROmorphone or fentaNYL preferred [18]

MISCELLANEOUS

- May be given IM or subcutaneously[1]

morphine IV - references

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VIHA
Department of Pharmacy

Pediatric naloxone infusion

Concentration: 200 mcg/mL

Admixture:
10 mg (10 mL - 1 mg/mL) diluted to a total volume of 50 mL with NS or D5W for 200 mcg/mL
or
Remove 20 mL from 100 mL minibag. Add 20 mg (20 mL - 1 mg/mL) for a total volume of 100 mL NS or D5W for 200 mcg/mL
or
Remove 50 mL from 250 mL bag. Add 50 mg (50 mL - 1 mg/mL) for a total volume of 250 mL NS or D5W for 200 mcg/mL

Call Pharmacy or pharmacist-on-call as soon as infusion is started to ensure on-going supplies

	PATIENT WEIGHT (kg)																			
DOSE (mcg/kg/h)	**2**	**4**	**6**	**8**	**10**	**12**	**14**	**16**	**18**	**20**	**25**	**30**	**35**	**40**	**45**	**50**	**55**	**60**	**65**	**70**
	INFUSION RATE (mL/h)																			
50	0.5	1	1.5	2	2.5	3	3.5	4	4.5	5	6.3	7.5	8.8	10	11.3	12.5	13.8	15	16.3	17.5
60	0.6	1.2	1.8	2.4	3	3.6	4.2	4.8	5.4	6	7.5	9	10.5	12	13.5	15	16.5	18	19.5	21
70	0.7	1.4	2.1	2.8	3.5	4.2	4.9	5.6	6.3	7	8.8	10.5	12.3	14	15.8	17.5	19.3	21	23	25
80	0.8	1.6	2.4	3.2	4	4.8	5.6	6.4	7.2	8	10	12	14	16	18	20	22	24	26	28
90	0.9	1.8	2.7	3.6	4.5	5.4	6.3	7.2	8.1	9	11.3	13.5	15.8	18	20	23	25	27	29	32
100	1	2	3	4	5	6	7	8	9	10	12.5	15	17.5	20	23	25	28	30	33	35
120	1.2	2.4	3.6	4.8	6	7.2	8.4	9.6	10.8	12	15	18	21	24	27	30	33	36	39	42
140	1.4	2.8	4.2	5.6	7	8.4	9.8	11.2	12.6	14	18	21	25	28	32	35	39	42	46	49
160	1.6	3.2	4.8	6.4	8	9.6	11.2	12.8	14.4	16	20	24	28	32	36	40	44	48	52	56
180	1.8	3.6	5.4	7.2	9	10.8	12.6	14.4	16.2	18	22.5	27	32	36	41	45	50	54	59	63
200	2	4	6	8	10	12	14	16	18	20	25	30	35	40	45	50	55	60	65	70
250	2.5	5	7.5	10	12.5	15	17.5	20	23	25	31	38	44	50	56	63	69	75	81	88
300	3	6	9	12	15	18	21	24	27	30	38	45	53	60	68	75	83	90	98	105
350	3.5	7	10.5	14	17.5	21	25	28	32	35	44	53	61	70	79	88	96	105	114	123
400	4	8	12	16	20	24	28	32	36	40	50	60	70	80	90	100	110	120	130	140

Values have been rounded off

Date created: Mar 2020

VIHA IV MONOGRAPH

naloxone

OTHER NAMES	CLASSIFICATION	
Narcan	Opioid antagonist	pH 3 to 4

INDICATIONS FOR IV USE

HEALTH CANADA APPROVED:[1]

- Complete or partial reversal of narcotic depression, including respiratory depression, induced by opioids
- Diagnosis of suspected acute opioid overdose

NON HEALTH CANADA APPROVED INDICATIONS BUT SUBSTANTIATED IN THE LITERATURE:

- Opioid-induced pruritus[2]

CONTRAINDICATIONS

- *Hypersensitivity to naloxone or any component of the formulation*[1]

CAUTIONS[1]

- Cardiovascular disease
- Patients, including newborns of mothers, physically dependant to opioids, as naloxone may precipitate severe withdrawal symptoms, including seizures

PREGNANCY/BREAST FEEDING: Contact pharmacy or specialised on-line references for most recent information

ADMINISTRATION

MODE	DIRECT IV	INTERMITTENT INFUSION	CONTINUOUS INFUSION
	YES	NO	YES
WHO MAY GIVE	All registered nurses		All registered nurses
ADULT	Undiluted If dilution required: dilute 1 mL (0.4 mg/mL) with 9 mL NS for 0.04 mg/mL Give over 30 seconds [2]		See Adult Dose-Rate/Mix Chart
PEDIATRIC	Undiluted over 30 seconds [3]		See Pediatric Dose-Rate/Mix Chart
NEONATE	Undiluted over 30 seconds [3]		-
REQUIREMENTS	Electronic infusion device for continuous infusion		

MONITORING

REQUIRED

- None

RECOMMENDED

- Reversal of CNS and/or respiratory depression: Monitor patient frequently until effects of opioid wear off. Continued observation after improvement of respiratory rate for 4 to 6 hours has been recommended [4]
  Opioid toxicity may be delayed in onset and protracted as compared with expected therapeutic actions[4] especially in presence of long acting opioids (eg methadone – half life 8 to 59 hours [5]) or sustained release product. Apparent duration of action of naloxone is 45 to 70 minutes [6]
- Assess level of pain following administration
- Assess for signs and symptoms of too rapid reversal of opioid effect (eg, nausea, vomiting, sweating, tachycardia), especially when used postoperatively

RECONSTITUTION

- None required

COMPATIBILITY/STABILITY

- Stable in D5W and NS for 24 hours at room temperature.[1] Compatibility in dextrose-saline combinations is assumed
- For drug-drug compatibility, contact pharmacy or specialised on-line references for most recent information

ADVERSE EFFECTS[1]

CARDIOVASCULAR

- Tachycardia, hypertension, cardiac arrest – associated with abrupt reversal of opioid depression
- Hypo-, hypertension, ventricular tachycardia and fibrillation – associated with postoperative use in patients with pre-existing cardiovascular disease

GASTROINTESTINAL

- Nausea, vomiting

MISCELLANEOUS

- Sweating, tremulousness
- Excitement and significant reversal of analgesia – associated with high doses in postoperative patients
- Irritability and increased crying in the newborn[3;]
- Seizures in neonates of opioid-dependant mothers, responds to morphine [7]

DOSE

NOTE: requirement for repeat doses is dependent on amount, type, and route of opioid administration

ADULT

Reversal of post-operative opioid analgesic respiratory depression:

- 0.1 to 0.2 mg/dose, repeat at 2 to 3 minutes intervals until desired response obtained.[1] Titrate to avoid excessive reversal of opioid analgesic action

Known/suspected opioid overdose:

- 0.4 to 2 mg/dose, (some experts recommend starting at 0.04 to 0.12 mg/dose to avoid precipitating acute withdrawal in both acute post-operative setting and in chronic users [8]) repeat at 2 to 3 minutes to a maximum 10 mg.[1] Higher single and cumulative doses may be required
- Continuous infusion:[2] for maintenance of opioid reversal in patients at risk of prolonged opioid toxicity (eg severe overdoses and exposures to long-acting opioids such as sustained release products and methadone). In severe opioid toxicity, use of a controlled airway with assisted ventilation without ongoing naloxone therapy should be considered
  - calculate dosage/hour based on effective intermittent dose used and duration of adequate response seen **or**
  - use two-thirds ($^2/_3$) of initial effective bolus on an hourly basis (typically 0.25 to 6.25 mg/hour);
  - one-half ($^1/_2$) of initial bolus dose should be readministered 15 minutes after initiation of infusion to prevent a drop in naloxone levels; adjust infusion rate as needed to assure adequate ventilation and prevent withdrawal symptoms

Opioid-induced pruritus:

- 0.004 to 0.2 mg/dose or low dose continuous infusion 0.25 to 2 mcg/kg/hour have been used [9-12] Anecdotally a dose of 0.04 mg (40 mcg) is used [13]

ELDERLY

- Refer to adult dosing[2]

PEDIATRIC

Post-operative opioid depression:

- 0.001 to 0.01 mg/kg/dose.[14] Titrate to avoid excessive reduction of opioid analgesic action

Known/suspected opioid overdose:

- 0.1 mg/kg/dose, up to 2 mg/dose. Repeat at 2 to 3 minutes to a maximum 10 mg. If no response, reassess diagnosis. In a non arrest situation use the lowest dose effective may start at 0.001 mg/kg/dose [15]
- Continuous infusion: [16]
  - Administer as a loading dose the amount to which the patient has had a previous positive response
  - Immediately begin infusion, with the same amount to be given over the next and each subsequent hour
  - Adjust rate as required

Opioid-induced pruritus:

- 1 to 10 **mcg**/kg/dose (***micro***gram); observe and repeat every 10 minutes as required to a max total of 100 **mcg**/kg [14]

When used as antidote for clonidine: Contact DPIC, 10 mg bolus dose and continuous infusion mean 5 mg/h (range 2 to 30 mg/h, ordered as mcg/kg/hr) have been observed [17]

NEONATE

Opiate depression: 0.1 mg/kg, repeat at 2 to 3 minutes intervals until desired response obtained.[15] Repeat doses may be required at 1 to 2 hour intervals[1]

RENAL IMPAIRMENT ADJUSTMENTS None required [18]

HEPATIC IMPAIRMENT ADJUSTMENTS None required [19]

HEMO/PERITONEAL DIALYSIS Not applicable [18,20]

MISCELLANEOUS

- Can be administered IM and subcutaneously[1] but onset of action may be delayed especially if patient has poor perfusion[2]
- Intranasal or inhalation via nebulisation are effective alternatives when needleless administration is desired [2]
- Can be administered via intraosseous and endotracheal route [2]

naloxone - references

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VIHA
Pharmacy Department

norepinephrine infusion

068

Concentration: 8 mg in 250 mL = 32 mcg/mL

Admixture:
Add 8 mL (8 mg) to 250 mL D5W or NS

DOSE (mcg/kg/min)	PATIENT WEIGHT (kg) INFUSION RATE (mL/h)																				
	50	**55**	**60**	**65**	**70**	**75**	**80**	**85**	**90**	**95**	**100**	**105**	**110**	**115**	**120**	**125**	**130**	**135**	**140**	**145**	**150**
0.01	0.9	1	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	2	2.1	2.2	2.3	2.3	2.4	2.5	2.6	2.7	2.8
0.02	1.9	2.1	2.3	2.4	2.6	2.8	3	3.2	3.4	3.6	3.8	3.9	4.1	4.3	4.5	4.7	4.9	5.1	5.3	5.4	5.6
0.03	2.8	3.1	3.4	3.7	3.9	4.2	4.5	4.8	5.1	5.3	5.6	5.9	6.2	6.5	6.8	7	7.3	7.6	7.9	8.2	8.4
0.04	3.8	4.1	4.5	4.9	5.3	5.6	6	6.4	6.8	7.1	7.5	7.9	8.3	8.6	9	9.4	9.8	10.1	10.5	10.9	11.3
0.05	4.7	5.2	5.6	6.1	6.6	7	7.5	8	8.4	8.9	9.4	9.8	10.3	10.8	11.3	11.7	12.2	12.7	13.1	13.6	14.1
0.06	5.6	6.2	6.8	7.3	7.9	8.4	9	9.6	10.1	10.7	11.3	11.8	12.4	12.9	13.5	14.1	14.6	15.2	15.8	16.3	16.9
0.07	6.6	7.2	7.9	8.5	9.2	9.8	10.5	11.2	11.8	12.5	13.1	13.8	14.4	15.1	15.8	16.4	17.1	17.7	18.4	19	19.7
0.08	7.5	8.3	9	9.8	10.5	11.3	12	12.8	13.5	14.3	15	15.8	16.5	17.3	18	18.8	19.5	20	21	22	23
0.09	8.4	9.3	10.1	11	11.8	12.7	13.5	14.3	15.2	16	16.9	17.7	18.6	19.4	20	21	22	23	24	24	25
0.1	9.4	10.3	11.3	12.2	13.1	14.1	15	15.9	16.9	17.8	18.8	19.7	21	22	23	23	24	25	26	27	28
0.11	10.3	11.3	12.4	13.4	14.4	15.5	16.5	17.5	18.6	19.6	21	22	23	24	25	26	27	28	29	30	31
0.12	11.3	12.4	13.5	14.6	15.8	16.9	18	19.1	20	21	23	24	25	26	27	28	29	30	32	33	34
0.13	12.2	13.4	14.6	15.8	17.1	18.3	19.5	21	22	23	24	26	27	28	29	30	32	33	34	35	37
0.14	13.1	14.4	15.8	17.1	18.4	19.7	21	22	24	25	26	28	29	30	32	33	34	35	37	38	39
0.15	14.1	15.5	16.9	18.3	19.7	21	23	24	25	27	28	30	31	32	34	35	37	38	39	41	42
0.16	15	16.5	18	19.5	21	23	24	26	27	29	30	32	33	35	36	38	39	41	42	44	45
0.17	15.9	17.5	19.1	21	22	24	26	27	29	30	32	33	35	37	38	40	41	43	45	46	48
0.18	16.9	18.6	20	22	24	25	27	29	30	32	34	35	37	39	41	42	44	46	47	49	51
0.19	17.8	19.6	21	23	25	27	29	30	32	34	36	37	39	41	43	45	46	48	50	52	53
0.2	18.8	21	23	24	26	28	30	32	34	36	38	39	41	43	45	47	49	51	53	54	56
0.21	19.7	22	24	26	28	30	32	33	35	37	39	41	43	45	47	49	51	53	55	57	59
0.22	21	23	25	27	29	31	33	35	37	39	41	43	45	47	50	52	54	56	58	60	62
0.23	22	24	26	28	30	32	35	37	39	41	43	45	47	50	52	54	56	58	60	63	65
0.24	23	25	27	29	32	34	36	38	41	43	45	47	50	52	54	56	59	61	63	65	68
0.25	23	26	28	30	33	35	38	40	42	45	47	49	52	54	56	59	61	63	66	68	70
0.26	24	27	29	32	34	37	39	41	44	46	49	51	54	56	59	61	63	66	68	71	73
0.27	25	28	30	33	35	38	41	43	46	48	51	53	56	58	61	63	66	68	71	73	76
0.28	26	29	32	34	37	39	42	45	47	50	53	55	58	60	63	66	68	71	74	76	79
0.29	27	30	33	35	38	41	44	46	49	52	54	57	60	63	65	68	71	73	76	79	82
0.3	28	31	34	37	39	42	45	48	51	53	56	59	62	65	68	70	73	76	79	82	84
0.31	*For higher rates use 64 mcg/mL concentration to avoid fluid overload*																				

Values 20 mL/h and greater have been rounded off

Date created: Mar 00
Revised: Jun 2020

norepinephrine infusion

Concentration: 8 mg in 250 mL = 32 mcg/mL

Admixture:

Add 8 mL (8 mg) to 250 mL D5W or NS

DOSE	RATE
mcg/min	mL/h
1	1.9
5	9.4
10	18.8
15	28
20	38
25	47
30	56
35	66
40	75
45	84

For higher rates use 64 mcg/mL concentration to avoid fluid overload

Values 20 mL/h and greater have been rounded off

Date created: Mar 00
Revised: Jun 2020

norepinephrine infusion

Concentration: 16 mg in 250 mL = 64 mcg/mL

Admixture:
Use premix or
Add 16 mL (16 mg) to 250 mL D5W or NS

DOSE (mcg/kg/min)	PATIENT WEIGHT (kg) INFUSION RATE (mL/h)																				
	50	**55**	**60**	**65**	**70**	**75**	**80**	**85**	**90**	**95**	**100**	**105**	**110**	**115**	**120**	**125**	**130**	**135**	**140**	**145**	**150**
0.01	0.5	0.5	0.6	0.6	0.7	0.7	0.8	0.8	0.8	0.9	0.9	1	1	1.1	1.1	1.2	1.2	1.3	1.3	1.4	1.4
0.03	1.4	1.5	1.7	1.8	2	2.1	2.3	2.4	2.5	2.7	2.8	3	3.1	3.2	3.4	3.5	3.7	3.8	3.9	4.1	4.2
0.05	2.3	2.6	2.8	3	3.3	3.5	3.8	4	4.2	4.5	4.7	4.9	5.2	5.4	5.6	5.9	6.1	6.3	6.6	6.8	7
0.07	3.3	3.6	3.9	4.3	4.6	4.9	5.3	5.6	5.9	6.2	6.6	6.9	7.2	7.5	7.9	8.2	8.5	8.9	9.2	9.5	9.8
0.1	4.7	5.2	5.6	6.1	6.6	7	7.5	8	8.4	8.9	9.4	9.8	10.3	10.8	11.3	11.7	12.2	12.7	13.1	13.6	14.1
0.11	5.2	5.7	6.2	6.7	7.2	7.7	8.3	8.8	9.3	9.8	10.3	10.8	11.3	11.9	12.4	12.9	13.4	13.9	14.4	15	15.5
0.12	5.6	6.2	6.8	7.3	7.9	8.4	9	9.6	10.1	10.7	11.3	11.8	12.4	12.9	13.5	14.1	14.6	15.2	15.8	16.3	16.9
0.13	6.1	6.7	7.3	7.9	8.5	9.1	9.8	10.4	11	11.6	12.2	12.8	13.4	14	14.6	15.2	15.8	16.5	17.1	17.7	18.3
0.14	6.6	7.2	7.9	8.5	9.2	9.8	10.5	11.2	11.8	12.5	13.1	13.8	14.4	15.1	15.8	16.4	17.1	17.7	18.4	19	19.7
0.15	7	7.7	8.4	9.1	9.8	10.5	11.3	12	12.7	13.4	14.1	14.8	15.5	16.2	16.9	17.6	18.3	19	19.7	20	21
0.16	7.5	8.3	9	9.8	10.5	11.3	12	12.8	13.5	14.3	15	15.8	16.5	17.3	18	18.8	19.5	20	21	22	23
0.17	8	8.8	9.6	10.4	11.2	12	12.8	13.5	14.3	15.1	15.9	16.7	17.5	18.3	19.1	19.9	21	22	22	23	24
0.18	8.4	9.3	10.1	11	11.8	12.7	13.5	14.3	15.2	16	16.9	17.7	18.6	19.4	20	21	22	23	24	24	25
0.19	8.9	9.8	10.7	11.6	12.5	13.4	14.3	15.1	16	16.9	17.8	18.7	19.6	20	21	22	23	24	25	26	27
0.2	9.4	10.3	11.3	12.2	13.1	14.1	15	15.9	16.9	17.8	18.8	19.7	21	22	23	23	24	25	26	27	28
0.21	9.8	10.8	11.8	12.8	13.8	14.8	15.8	16.7	17.7	18.7	19.7	21	22	23	24	25	26	27	28	29	30
0.22	10.3	11.3	12.4	13.4	14.4	15.5	16.5	17.5	18.6	19.6	21	22	23	24	25	26	27	28	29	30	31
0.23	10.8	11.9	12.9	14	15.1	16.2	17.3	18.3	19.4	20	22	23	24	25	26	27	28	29	30	31	32
0.24	11.3	12.4	13.5	14.6	15.8	16.9	18	19.1	20	21	23	24	25	26	27	28	29	30	32	33	34
0.25	11.7	12.9	14.1	15.2	16.4	17.6	18.8	19.9	21	22	23	25	26	27	28	29	30	32	33	34	35
0.26	12.2	13.4	14.6	15.8	17.1	18.3	19.5	21	22	23	24	26	27	28	29	30	32	33	34	35	37
0.27	12.7	13.9	15.2	16.5	17.7	19	20	22	23	24	25	27	28	29	30	32	33	34	35	37	38
0.28	13.1	14.4	15.8	17.1	18.4	19.7	21	22	24	25	26	28	29	30	32	33	34	35	37	38	39
0.29	13.6	15	16.3	17.7	19	20	22	23	24	26	27	29	30	31	33	34	35	37	38	39	41
0.3	14.1	15.5	16.9	18.3	19.7	21	23	24	25	27	28	30	31	32	34	35	37	38	39	41	42
0.35	16.4	18	19.7	21	23	25	26	28	30	31	33	34	36	38	39	41	43	44	46	48	49
0.39	18.3	20	22	24	26	27	29	31	33	35	37	38	40	42	44	46	48	49	51	53	55

Values 20 mL/h and greater have been rounded off

Date created: Mar 00
Revised: Jun 2020

norepinephrine infusion

Concentration: 16 mg in 250 mL = 64 mcg/mL

Admixture:

Add 16 mL (16 mg) to 250 mL D5W or NS

DOSE mcg/min	RATE mL/h
1	0.9
5	4.7
10	9.4
15	14.1
20	18.8
25	23
30	28
35	33
40	38
45	42
50	47
55	52
60	56

Values 20 mL/h and greater have been rounded off

Date created: Mar 00
Revised: Jun 2020

VIHA IV MONOGRAPH — norepinephrine

OTHER NAMES	CLASSIFICATION	*ELDER ALERT - See Cautions
Levarterenol, Levophed, Noradrenaline	Sympathomimetic pH 3 to 4.5	*HIGH ALERT DRUG

INDICATIONS FOR IV USE

HEALTH CANADA APPROVED:[1,2]

- Temporary restoration and maintenance of blood pressure in acute hypotension or shock states, such as surgery, trauma, sepsis
- As a temporary adjunct in the treatment of cardiac arrest and profound hypotension

CONTRAINDICATIONS [1-3]

- *Hypersensitivity to bisulfites or any other component of the formulation*
- Suspected mesenteric infarction or thrombosis, due to risk of increasing ischemia and extending area of infarction

CAUTIONS

- Elderly; due to potential for decreased organ function and concomitant disease or drug therapy [4]
- Correct hypovolemia prior to starting norepinephrine. In emergencies, may be given before and concurrently with volume replacement [1,2]
- Hypercapnia or hypoxia: cardiac arrhythmias may occur [4]
- Occlusive vascular disease – avoid using leg veins for administration [3]

DRUG INTERACTIONS:

- MAO inhibitors, tricyclic antidepressants, serotonin/norepinephrine reuptake inhibitors (eg venlafaxine): may potentiate pressor response [3]
- Linezolid: May enhance hypertensive effect. Monitor for enhanced pressor response [3] and adjust dose accordingly

PREGNANCY/BREAST FEEDING: Consult pharmacy or specialised on-line references for most recent information

ADMINISTRATION

MODE	DIRECT IV	INTERMITTENT INFUSION	CONTINUOUS INFUSION
	NO	NO	YES
WHO MAY GIVE			Registered nurses with specialized skills – see required monitoring
ADULT			Refer to Adult IV Dose Rate/Mix Charts
PEDIATRIC			Refer to Pediatric IV Dose Rate/Mix Charts
NEONATE			Refer to Neonatal IV Dose-Rate/Mix Chart
REQUIREMENTS	Electronic infusion device Central line required. Peripheral line may be used only as an interim measure until a central line can be inserted		

MONITORING

REQUIRED

- Continuous ECG monitoring
- Continuous BP monitoring or q3 to 5 minutes by cuff until continuous monitoring available
- If given peripherally, assess IV site for signs of extravasation (area will appear cold, hard and pale) every 30 minutes until a central line can be inserted

RECOMMENDED

- Advise patients to report burning/stinging/pain at IV site promptly
- Ensure adequate intravascular volume
- Assess extremities for changes in colour or temperature

RECONSTITUTION

- None required

COMPATIBILITY/STABILITY [5]

- Stable in D5W or NS solutions for at least 24 hours at room temperature when mixed on patient care unit by nursing. Dilution in NS is not recommended by manufacturer; however, stability in NS has been demonstrated
- Compatible with D5W, NS, D5S, Ringer's and lactated Ringer's solutions
- Do not use if solution is discoloured (pink, yellow or brown) or contains a precipitate
- For drug-drug compatibility, consult pharmacy or specialised on-line references for most recent information

ADVERSE EFFECTS[1-3]

CARDIOVASCULAR

- Severe peripheral and visceral vasoconstriction, associated with hypovolemia, decreased renal perfusion and decreased urine output, tissue hypoxia, and metabolic acidosis
- Plasma volume depletion, associated with prolonged use
- Decreased cardiac output due to increased peripheral vascular resistance, associated with prolonged use or large doses
- Hypertension (responds to IV phentolamine), reflex bradycardia
- Potentially fatal cardiac arrhythmias, including ventricular tachycardia and ventricular fibrillation[4]

CNS

- Anxiety, headache (may be a symptom of hypertension)

RESPIRATORY

- Dyspnea

EXTRAVASATION

- Results in sloughing and necrosis. Central line required. Blanching along vein pathway is preliminary sign of extravasation
- **Treatment:** Stop infusion. Restart norepinephrine at new IV site and notify physician immediately. Physician to infiltrate area of extravasation with phentolamine: 5 to 10 mg diluted in 10 mL NS.[1,2] Use a fine needle. To be effective, use within 12 hours of extravasation[1,2] Max total dose: adults 10 mg,[1,2] pediatrics 0.2 mg/kg or 5 mg [6]

DOSE

Dosage expressed in terms of norepinephrine base
Do not stop infusion abruptly; rate should be gradually tapered

ADULT

- **Initial dose:** 0.1 to 0.17 mcg/kg/minute (8 to 12 mcg/minute in a 70 kg patient).[1,2] Adjust in 0.02 to 0.05 mcg/kg/minute increments to desired blood pressure response based on monitoring requirements [7]
- **Usual maintenance range:** 0.03 to 0.06 mcg/kg/minute (2 to 4 mcg/minute in a 70 kg patient) [1,2] However, dosage range varies greatly depending on clinical situation.[3] Use minimum effective dose to achieve clinical targets
- Doses greater than 1.5 mcg/kg/min are not commonly required [7-10] in septic shock dose ranges from 0.01 to 3 mcg/kg/minute (0.7 to 210 mcg/minute in a 70 kg patient) have been used in clinical trials [8,9]

ELDERLY

- Initial dosage usually should be at low end of adult dosing range [3]

PEDIATRIC [11]

- 0.02 to 0.1 mcg/kg/minute. Titrate to establish and maintain desired blood pressure
- Max dose: 2 mcg/kg/minute

NEONATE [12]

- **Gestational age greater than 35 weeks:** Initial dose, 0.2 to 0.5 mcg/kg/minute; titrate every 30 minutes to target blood pressure. Usual Infusion rate 0.2 to 2 mcg/kg/minute; higher rates may be required

RENAL IMPAIRMENT ADJUSTMENTS

- None required; titrate to establish and maintain desired blood pressure

HEPATIC IMPAIRMENT ADJUSTMENTS

- None required; titrate to establish and maintain desired blood pressure

HEMO/PERITONEAL DIALYSIS

- No information available at this time

MISCELLANEOUS

- 1 mg norepinephrine base is approximately equal to 2 mg norepinephrine bitartrate
- IM or subcutaneous administration; no information available at this time

norepinephrine - references

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VIHA IV MONOGRAPH

pantoprazole

OTHER NAMES	CLASSIFICATION pH 9 to 10.5	
Panto IV	H^+, K^+-ATPase inhibitor	

INDICATIONS FOR IV USE

HEALTH CANADA APPROVED[1]

- To rapidly reduce gastric acid secretion in patients who cannot tolerate oral medication

NON HEALTH CANADA APPROVED INDICATION BUT SUBSTANTIATED IN THE LITERATURE

- Prophylaxis against recurrent GI bleed [2]

CONTRAINDICATIONS

- *Hypersensitivity to pantoprazole, other substituted benzimidazoles (eg esomeprazole, ompeprazole) or any component of formulation*[1]
- Coadministration with rilpivirine due to significant decrease in rilpivirine exposure and loss of therapeutic effect [1]

CAUTIONS

DRUG INTERACTIONS:

- Medications whose absorption is pH-dependent, eg ketoconazole[1]

PREGNANCY/BREAST FEEDING: Consult pharmacy or specialised on-line references for most recent information

ADMINISTRATION

MODE	DIRECT IV	INTERMITTENT INFUSION	CONTINUOUS INFUSION
	YES	YES	YES
WHO MAY GIVE	All registered nurses	All registered nurses	All registered nurses
ADULT	Undiluted, over at least 2 minutes[1,3]	Dilute in 100 mL NS or D5W Infuse over 15 minutes[1,3]	**0.8 mg/mL**: add 80 mg to 100 mL NS or 200 mg to 250 mL NS Infuse at 8 mg/h
PEDIATRIC	As above	See Syringe pump infusion table	Refer to Pediatric IV Dose-Rate/ Mix chart
NEONATE	No information	See Neonatal ICU IV Recon and Dilution Table	Refer to Neonatal IV Dose-Rate/ Mix chart
REQUIREMENTS	None		

MONITORING

REQUIRED

- None

RECOMMENDED

- None

RECONSTITUTION

- Reconstitute 40 mg vial with 10 mL preservative free NS. Resulting concentration 4 mg/mL [1]
- If drug is being added to a bag of NS a reconstitution device may be used
- If drug is being added to a bag of D5W a reconstitution device ***cannot*** be used. Drug should first be reconstituted with 10 mL preservative free NS

COMPATIBILITY/STABILITY

- **Is available in 2 formulations – with and without disodium edetate. Stability and compatibility information is different for the 2 formulations**. The information below applies to both formulations
- Stable in NS and D5W for at least 24 hours at room temperature [3,4]
- Compatible with NS, D5W and 2/3+1/3 [5,6]
- Pantoprazole when diluted in NS is compatible via Y-site with the following drugs, if they are mixed in D5W; ampicillin, ceFAZolin, cefTRIAXone, DOPamine, EPINEPHrine, regular insulin, morphine, nitroglycerin, potassium chloride, and vasopressin[5,6]
- When dimenhyDRINATE and furosemide are mixed in D5W minibags, they are compatible with pantoprazole in NS via Y-site; no information on compatibility if either dimenhyDRINATE or furosemide are given direct IV[, 5,6]
- Incompatibility with calcium chloride, ciprofloxacin, clindamycin, DOBUTamine, esmolol, HYDROmorphone, labetalol, magnesium sulfate, midazolam, moxifloxacin, norepinephrine, octreotide, potassium phosphate[5,6] or zinc[3]
- For additional drug-drug compatibility consult pharmacy or specialised on-line references for most recent information

ADVERSE EFFECTS[1]

- Headache
- Abdominal pain, cramps, bloating and discomfort, diarrhea, vomiting/retching
- Injection site reactions (inflammation, bruises)
- Hypersensitivity reactions, including anaphylaxis, erythema multiforme, Stevens-Johnson syndrome, and toxic epidermal necrolysis, have been reported [3]

DOSE

ADULT/ELDERLY

- When oral ingestion is not practical; 40 mg once daily.[1] Switch to oral therapy as soon as possible
- Pathological hypersecretion associated with Zollinger-Ellison syndrome: 80 mg every 12 hours. Doses up to 240 mg/day have been used [3]
- For upper GI bleeding to maintain gastric pH greater than 6; 80 mg initial bolus, followed by 8 mg/hour
  Max duration of infusion: 72 hours [2]

PEDIATRIC

- Stress ulcer prophylaxis:[7] 1 mg/kg IV every 24 hours. Maximum 40 mg/dose.[8-10] Higher doses (1 mg/kg every 12 hours) have been used [9,11]
- Acute upper GI bleeding; [12]

Weight	Dose	
5 to 40 kg	2 mg/kg/dose x 1 then 0.2 mg/kg/hour	Max infusion rate: 8 mg/hour Max duration of infusion: 72 hours
Greater than 40 kg	80 mg x 1 then 8 mg/hour	

NEONATE [13]

- Treatment of symptomatic GERD, duodenal and gastric ulcers, and erosive esophagitis: 1 to 2 mg/kg/dose once daily
- Acute upper GI bleeding: 2 mg/kg loading dose x 1, followed by 0.2 mg/kg/hour. Maximum duration: 72 hours

RENAL IMPAIRMENT ADJUSTMENTS

- None required[1]

HEPATIC IMPAIRMENT ADJUSTMENTS

- No dosage adjustment necessary; doses greater than 40 mg daily have not been studied [3]

HEMO/PERITONEAL DIALYSIS

- Is not removed by dialysis [14] Dose as in normal renal function

MISCELLANEOUS

- Do not give via IM or subcutaneous route[15]

pantoprazole - references

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VIHA IV MONOGRAPH pembrolizumab

OTHER NAMES	CLASSIFICATION	
Keytruda, lambrolizumab	Antineoplastic – non vesicant – non hazardous pH 5.2 to 5.8	

- BCHA Provincial Formulary restrictions apply to the IV use of pembrolizumab

INDICATIONS FOR IV USE

HEALTH CANADA APPROVED[1]

- For the treatment of a variety of cancers including; unresectable/ metastatic melanoma, metastatic non-small cell lung cancer, B-cell lymphoma, Hodgkin's lymphoma and urothelial carcinoma. *Not all are BCHA approved indications*

CONTRAINDICATIONS

- *Hypersensitivity to pembrolizumab or any other component of formulation* [1]
- Active autoimmune disease [2,3]

CAUTIONS

- Avoid systemic corticosteroids or immunosuppressants (more than 10 mg predniSONE/day or equivalent [2,3]) prior to starting pembrolizumab due to potential interference with efficacy of pembrolizumab; corticosteroids or immunosuppressants may be used during treatment for management of immune-mediated adverse reactions [4]

PREGNANCY/BREAST FEEDING: Consult pharmacy or specialised on-line references for most recent information

ADMINISTRATION BCCA administration guideline in ***bold, italics***

MODE	DIRECT IV	INTERMITTENT INFUSION	CONTINUOUS INFUSION
	NO	YES	NO
WHO MAY GIVE		All registered nurses	
ADULT		Dilute in 50 mL NS (conc range 1 to 10 mg/mL) [1] Infuse ***over 30 minutes*** [4]	
PEDIATRIC		Not applicable	
REQUIREMENTS	0.2 to 5 micron in-line filter Electronic infusion device		

MONITORING

REQUIRED

- None

RECOMMENDED

- Baseline: CBC, creatinine, alkaline phosphatase, AST, ALT, total bilirubin, LDH, electrolytes, TSH, chest x-ray [2,3]
- Before each treatment: CBC, creatinine, alkaline phosphatase, AST, ALT, total bilirubin, LDH, electrolytes, TSH, then as clinically indicated and as per protocol [2,3]

RECONSTITUTION

- If required, reconstitute with sterile water for injection [1] – volume may vary with brand see vial for specific details. Direct diluent against side of vial during reconstitution to avoid foaming. Allow up to 5 minutes for bubbles to clear. Do NOT shake [1]

COMPATIBILITY/STABILITY

- Stable in NS and D5W at concentrations of 1 to 10 mg/mL at room temperature for 6 hours. Stable for up to 24 hours in refrigerator, however total time from reconstitution to completion of infusion should not exceed 24 hours[1]
- For drug-drug compatibility, consult pharmacy or specialised on-line references for most recent information

ADVERSE EFFECTS [2-4]

IMMUNE-MEDIATED REACTIONS dose limiting toxicity

- Enterocolitis, intestinal perforation or hemorrhage, hepatitis, nephritis and renal dysfunction, dermatitis, neuropathy, endocrinopathy, pneumonitis
- Can be severe to fatal; usually occur during treatment course
- Early diagnosis and treatment essential; see protocol for detailed monitoring and adverse reaction management guide

HYPERSENSITIVITY REACTIONS

- Severe reactions are rarely reported
- Patients with mild to moderate reactions may receive medication with close monitoring and premedication

MISCELLANEOUS

- Emetogenic potential: low
- Extravasation hazard: none

DOSE

No specific dose modifications. Toxicity managed by treatment delay and other measures. Refer to individual chemotherapy protocol

ADULT

- 3 week cycle length: 2 mg/kg for one dose on day 1. Max 200 mg. Repeat every 3 weeks [4]
  Alternatively 200 mg as a fixed dose for one dose on day 1. Repeat every 3 weeks [1]
- 6 week cycle length: 4 mg/kg for one doses on day 1. Max 400 mg. Repeat every 6 weeks [4]
  Alternatively 400 mg as a fixed dose for one dose on day 1. Repeat every 6 weeks [4]

ELDERLY

- Dose as above [1]

PEDIATRIC

- Not used in pediatrics in Island Health; patients would be treated in Vancouver at BC Children's Hospital

RENAL IMPAIRMENT ADJUSTMENTS

- Mild to moderate impairment: no dose adjustment required [1,4]
- Severe renal impairment: no information available at this time

HEPATIC IMPAIRMENT ADJUSTMENTS

- Mild impairment (total bilirubin ULN or less and AST greater than ULN OR total bilirubin 1 to 1.5 X ULN and any AST): no dose adjustment required [4]
- Moderate or severe impairment (total bilirubin greater than 1.5 X ULN AND any AST): no information available at this time

HEMO/PERITONEAL DIALYSIS

- No information available at this time

MISCELLANEOUS

- Extravasation hazard: none [4]
- Environmental concerns - none
- Subcutaneous /IM administration: no information available at this time

pembrolizumab - references

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OTHER NAMES	CLASSIFICATION	pH 12	*ELDER ALERT
Dilantin, diphenylhydantoin	Anticonvulsant - irritant		See Cautions

INDICATIONS FOR IV USE

HEALTH CANADA APPROVED[1]

- Treatment of status epilepticus; prophylaxis/treatment of seizures

CONTRAINDICATIONS[1,2]

- ➢ *Hypersensitivity to phenytoin or other hydantoins or any component of the formulation*
- Sinus bradycardia, sino-atrial block, second or third degree AV block, and Adams-Stokes syndrome

CAUTIONS

- * ***'High risk'*** patients are: patients with - cardiac disease, hypotension, over 60 years of age, compromised pulmonary function or an abnormal ECG prior to administration. Increased risk of cardiovascular adverse effects[3,4]
- Hypoalbuminemia: (eg burns, hepatic cirrhosis, nephrotic syndrome, pregnancy, cystic fibrosis); increased free fraction of phenytoin in serum and increased pharmacologic response[5]
- Renal failure, jaundice (severe), hyperbilirubinemia (total bilirubin greater than 256 mcmol/L); decreased protein binding and increased pharmacologic response[5]
- Asians with variant HLA-B*1502 may be at increased risk of developing Stevens-Johnson syndrome and/or toxic epidermal necrolysis[5]

DRUG INTERACTIONS:

- Phenytoin interacts with many drugs; contact pharmacy for further information. Review drug profile at time of initiation and with any change in medication regimen

PREGNANCY/BREAST FEEDING: Consult pharmacy or specialised on-line references for most recent information

ADMINISTRATION

MODE	DIRECT INTO IV TUBING	INTERMITTENT INFUSION	CONTINUOUS INFUSION
	YES	YES	NO
WHO MAY GIVE	Registered nurse with specialized skills - see required monitoring	All registered nurses	
ADULT	For doses 100 mg or less: Max rate: 25 mg/min	**Mix with NS only**: Max conc 10 mg/mL Doses up to 300 mg in 50 mL NS Doses of 300 to 1000 mg in 100 mL NS Doses greater than 1 g in 250 mL NS Infuse over 30 to 60 minutes Max rate 50 mg/min *Max rate in 'high risk' patients: 25 mg/min*	
PEDIATRIC	Max rate: 1 mg/kg/min[6] or 25 mg/min, whichever is less	See Syringe pump infusion table and/or large volume pump infusion table Max rate: 1 mg/kg/min or 50 mg/min, whichever is less[6]	
NEONATE	Max rate: 1 mg/kg/min[7] See Neonatal ICU IV Recon and Dilution Table	See Pediatric Syringe Pump Infusion Table or Neonatal ICU IV Recon and Dilution Table	
REQUIREMENTS	• Administration via PICC not recommended if avoidable (high potential for line occlusion) • Flush with NS before and after each dose • 0.2/ 0.22 micron in-line filter and electronic infusion device for intermittent infusions		

MONITORING

REQUIRED

- **Direct IV:** Continuous ECG monitoring[8]
- **Intermittent infusion:** monitor IV site for pain, redness or swelling prior to initiating infusion and every 15 minutes until completion of infusion

With initial dose and any subsequent dose of 10 mg/kg or greater

- Baseline BP, HR, RR; then every 5 minutes x 3 and until stable, then every 15 minutes during infusion

RECOMMENDED

- Continuous ECG monitoring during infusion[1]
- Advise patients to report burning/stinging/pain at IV site promptly
- Serum phenytoin and albumin concentrations

RECONSTITUTION

- None required. Contains propylene glycol and alcohol

COMPATIBILITY/STABILITY

- **DO NOT** mix with dextrose containing solutions: **Incompatible:** precipitation occurs within minutes [9]
- **Dilute with NS only** to conc of 1 to 10 mg/mL. Prepare dilution just before use. Infusion must be completed within 4 hour of mixing[10] **Do not refrigerate** diluted solution [9]
- Check vial for haziness or precipitation. A faint yellow colour does not affect potency [9]
- For drug-drug compatibility, consult pharmacy or specialised on-line references for most recent information

ADVERSE EFFECTS

CARDIOVASCULAR

- Hypotension, bradycardia - responds to a decrease in infusion rate.[3,4] Rates as low as 5 to 10 mg/min may be required[4]
- Heart block, ventricular tachycardia, ventricular fibrillation, cardiovascular collapse; may occur with rapid administration[5]

LOCAL REACTIONS/EXTRAVASATION

- Phlebitis and local pain. Administer through a large bore needle into a large vein.[1] Slowing infusion rate or increasing volume of NS diluent (minimum concentration 1 mg/mL) may also help[10]
- Severe local reactions with or without extravasation: may lead to necrosis and sloughing[1,10]
- Adults and Pediatrics: See VIHA Intravenous Therapy Practice and Clinical Standards - Extravasation
  Neonates: Refer to VIHA Extravasation Guidelines for neonates

CNS[1,2]

- Nystagmus, ataxia, confusion, (symptoms of elevated CNS concentrations), blurred vision, dizziness

HEMATOPOIETIC[1]

- Neonatal coagulation defects: maternal administration of vitamin K is suggested if phenytoin is used chronically

HYPERSENSITIVITY SYNDROME[1,2]

- Scarlatinform or morbilliform rashes, fever. If rash recurs on rechallenge, stop phenytoin. Rare: Stevens-Johnson syndrome, toxic epidermal necrolysis, lupus erythematosis

DOSE

NOTE: Small increases in dose may cause disproportionately large increases in serum concentrations

ADULT

- **Loading dose:** 15 to 20 mg/kg [5]
  Reduce dose if pretreatment serum phenytoin levels are known or suspected[3]
  Known level: Dose = 0.2 x total body weight (kg) x (desired level - observed level). Levels in micromol/L[11]
- **Maintenance:** 100 mg every 6 to 8 hours, start 12 to 24 hours post loading dose[5]
  alternatively 5 to 7 mg/kg/day every 8 to 12 hours[12,13]
- **Obesity:** Loading dose use adjusted body weight = [(Actual body weight – ideal body weight [IBW]) x 1.33] + IBW
  Maintenance doses should be based on IBW, with adjustments based upon therapeutic drug monitoring and clinical effectiveness[5]

PEDIATRIC

- **Loading dose:** 15 to 20 mg/kg[6] Maximum dose: 1000 mg/dose;[2] 1500 mg/24 hours[6]
- **Maintenance:** 5 to 10 mg/kg/day divided every 8 to 12 hours[6]

NEONATE

- **Loading dose:** 15 to 20 mg/kg [7]
- **Maintenance dose:** 4 to 8 mg/kg every 24 hours,[7] start 24 hours after last loading dose. [14] Up to 8 mg/kg per dose every 8 to 12 hours after 1 week of age [7]

RENAL IMPAIRMENT ADJUSTMENTS

- Caution; the unbound fraction of phenytoin increases and patients may have a lower serum albumin.[1,5] See Therapeutic Drug Monitoring

HEPATIC IMPAIRMENT ADJUSTMENTS

- Safe in usual doses in mild liver disease; clearance may be substantially reduced in cirrhosis and plasma level monitoring with dose adjustment advisable. Free phenytoin levels should be monitored closely[5]

HEMO/PERITONEAL DIALYSIS[15]

- No supplementation required

THERAPEUTIC DRUG MONITORING

- Phenytoin is approximately 90% protein bound.[1] Reported levels are based on total phenytoin (bound + free) and levels must be adjusted when serum albumin is reduced.[2] Contact pharmacy for assistance if required
- **Optimal serum level:** 40 to 80 micromol/L[1,2]
- Blood should be drawn 2 hours post loading dose to determine if therapeutic range achieved. When adjusting maintenance dose, a trough level (just prior to dose) is measured after 5 to 8 days to allow for steady state [5,13]

MISCELLANEOUS

- IM administration; not recommended due to potential pain, erratic absorption, necrosis and abscess formation[2]
- Subcutaneous/intraosseous administration: No

INFORMATION SHEET FOR NURSES

ADULT IV Phenytoin (Dilantin®) Administration: Nursing Recommendations to Meet IV Monograph Requirements

The alkalinity of phenytoin (pH 12) causes vein irritation and tissue damage with extravasation. Phenytoin easily precipitates when in contact with dextrose-containing solutions or whenever the alkalinity is decreased. This can leads to line occlusion in central venous catheters.

ADMINISTRATION via PICC is NOT RECOMMENDED, **due to high incidence of occlusion**, caused from precipitation of medication in small lumen catheters.

If there are no other options **USE TURBULENT FLUSHING** technique, before and after administration

A. MINIBAG ADMINISTRATION

1. Set up 250 mL Normal Saline primary bag with basic solution set
2. Flush catheter with minimum of 20 mL of Normal Saline
3. Attach a secondary med line to administer the phenytoin, as per drug monograph
4. Attach 0.2/ 0.22 micron in-line IV filter to distal end of the IV set (ie as close to the vascular access device hub as possible)
5. Flush catheter **post** with minimum of 20 mL of Normal Saline with a push pause technique

B. IV Direct – ECG monitoring required

1. Use a separate CVAD lumen **without** a solution containing dextrose. **STOP INFUSION**
2. Flush catheter with a minimum of 20 mL Normal Saline
3. **Give IV DIRECT** as per drug monograph
4. Flush catheter post with minimum 20 mL of Normal Saline with a push pause technique

Updated by: A. Derosenroll CNE IV Therapy; edited by: C Bailey Editor IV monographs Oct 2016 filter Jan 2017 v2

phenytoin - references

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VIHA IV MONOGRAPH — phytonadione (vitamin K_1)

OTHER NAMES	CLASSIFICATION	
Phytomenadione	Vitamin	pH 4.4 to 6.5

INDICATIONS FOR IV USE

HEALTH CANADA APPROVED[1]

- Hypoprothrombinemia, including that due to oral anticoagulants
- Vitamin K deficiency bleeding (formerly known as hemorrhagic disease of the newborn): Preferred route of administration is IM

CONTRAINDICATIONS[1]

- *Hypersensitivity to phytonadione and any component of the formulation*

CAUTIONS[1]

- IV route should be reserved for situations where other routes are not feasible. Severe reactions, including fatalities have occurred during and immediately after administration
- Hepatic impairment: condition may be inherently unresponsive to phytonadione
- Severe bleeding: reduction of INR begins within 2 hours and other supportive measures may be required

DRUG INTERACTIONS:

- heparin: anticoagulant action of heparin **will not** be counteracted by phytonadione
- Oral anticoagulants, eg warfarin: temporary resistance to prothrombin depressing anticoagulants may result

PREGNANCY/BREAST FEEDING: Contact pharmacy or specialised on-line references for most recent information

ADMINISTRATION

MODE	DIRECT IV	INTERMITTENT INFUSION	CONTINUOUS INFUSION
	YES	YES	NO
WHO MAY GIVE	All registered nurses	All registered nurses	
ADULT	Dilute with 10 mL NS Maximum rate 1 mg per minute[1]	Dilute in 50 to 100 mL minibag and infuse over at least 20 minutes [2] Max rate 1 mg per minute	
PEDIATRIC	Dilute with 10 mL NS Maximum rate 1 mg per minute[1]	Dilute in 50 to 100 mL minibag and infuse over 10 to 20 minutes [3]	
NEONATE	See Pediatric Syringe Pump Infusion Table or Neonatal ICU IV Recon and Dilution Table		
REQUIREMENTS	None		

MONITORING

REQUIRED

Direct IV and during intermittent infusion:

- Baseline BP, HR and RR, then q 5 minutes x 3 and until stable

RECOMMENDED

- Baseline INR and 6 to 8 hours after administration

RECONSTITUTION

- None required

COMPATIBILITY/STABILITY

- Compatible with dextrose, saline, dextrose-saline combinations, Ringer's and lactated Ringer's solutions[4]
- D5W and NS are recommended for dilution.[2] No stability information is available at this time and dilutions should be used immediately[1]
- For drug-drug compatibility, contact pharmacy or specialised on-line references for most recent information

ADVERSE EFFECTS[1]

HYPERSENSITIVITY

- Severe reactions resembling hypersensitivity or anaphylaxis, including shock and cardiac or respiratory arrest
- Dizziness, rapid and weak pulse, profuse sweating, brief hypotension, dyspnea, cyanosis; generally been associated with an excessively rapid rate of administration

MISCELLANEOUS

- Newborn, especially premature infants: Hemolytic anemia, hyperbilirubinemia and kernicterus. Associated with high doses (10 to 20 mg/dose)
- Pain, swelling and tenderness at injection site
- Transient flushing sensations and peculiar sensations of taste

DOSE

- Preferred route of administration: see MISCELLANEOUS below

ADULT/ELDERLY

Vitamin K deficiency (supratherapeutic INR) secondary to warfarin:

INR	Bleeding	Recommended action
less than 4.5	No	Lower or hold next warfarin dose and monitor frequently [5]
between 4.5 and 10	No	2012 ACCP guidelines recommend against routine phytonadione administration.[6] Others recommend consideration of oral dosing or 0.5 mg IV [5]
greater than 10	No	2012 ACCP guidelines recommend oral administration.[6] Others recommend consideration of oral dosing or 0.5 to 1 mg IV [5]
any INR elevation	Minor bleeding	Hold warfarin, may administer phytonadione orally [5]
any INR elevation	Major bleeding	2012 ACCP guidelines recommend administration of four-factor prothrombin complex concentrate and phytonadione 5 to 10 mg IV [6]

- Use of high doses (eg, 10 to 15 mg) may cause warfarin resistance for 1 week or longer. During this period of resistance, heparin or low-molecular-weight heparin may be given until INR responds [7]

PEDIATRIC

Vitamin K deficiency (supratherapeutic INR) secondary to warfarin: [8]

- *Significant life-threatening bleeding:* 5 mg IV
- *Significant non-life threatening bleeding*: subcut administration preferred

Vitamin K deficiency due to malabsorption or decreased synthesis: [3]

- 1 to 2 mg parenterally. May repeat dose depending on severity of deficiency and response to treatment

NEONATE[9]

Vitamin K deficiency bleeding (formerly known as hemorrhagic disease of the newborn):

- *Prophylaxis:* preferred route is IM. May be given IV if IV access is available [10]
  less than 1500 g: 0.5 mg: 1500 g and greater: 1 mg
- *Treatment:* 1 mg. Higher doses may be necessary. Dose ranges were 1 to 5 mg. Subcut is an alternative route

RENAL IMPAIRMENT ADJUSTMENTS

- None required [11]

HEPATIC IMPAIRMENT ADJUSTMENTS

- Dose determined by prothrombin-time response and clinical condition[1]

HEMO/PERITONEAL DIALYSIS

- Unlikely to be removed by dialysis [11]

MISCELLANEOUS

- According to the manufacturer, subcutaneous is preferred parenteral route; IM should be avoided due to risk of hematoma formation; IV should be restricted for emergency use only.[2]
  American College of Chest Physicians recommends IV use **only** in patients with major bleeding secondary to use of warfarin 6
  Note: IM is the preferred route for prophylaxis of vitamin K deficiency at birth [9]
- Parenteral form can be used orally. Given undiluted or diluted in water or juice just prior to administration[1]

phytonadione - references

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OTHER NAMES	CLASSIFICATION pH 3.8 to 4.2	
Zemuron	Nondepolarizing neuromuscular blocker	

INDICATIONS FOR IV USE

HEALTH CANADA APPROVED[1]

- Adjunct to general anesthesia to facilitate routine endotracheal intubation or rapid sequence intubation
- Skeletal muscle relaxation during surgery or mechanical ventilation

NON APPROVED INDICATION BUT SUBSTANTIATED IN THE LITERATURE

- Prevention of shivering due to therapeutic hypothermia after cardiac arrest[2]

CONTRAINDICATIONS[1]

➢ *Hypersensitivity to rocuronium, bromide or any component of formulation*

CAUTIONS

- rocuronium has **no analgesic, amnestic or sedative properties. Must be given with sedation/ analgesia**
- Not recommended for facilitating endotracheal intubation during rapid sequence induction in Caesarean patients[1]
- Pulmonary hypertension or valvular heart disease– may cause increased pulmonary vascular resistance[1]
- Hypokalemia, hypocalcemia, hypermagnesemia, hyponatremia, neuromuscular disorders, hypothermia, cachectic or debilitated patients, carcinomatosis: **decrease** rocuronium dosing requirements[1,3]
- Hypercalcemia, sepsis, major burns, multiple trauma, denervation syndromes, disuse atrophy, peripheral neuropathies: **increase** rocuronium dosing requirements[1,3]

DRUG INTERACTIONS:[1]

- Potentiated by many drugs including some antibiotics (eg aminoglycosides, clindamycin, vancomycin), calcium-channel blockers (eg verapamil), other neuromuscular blockers, inhalation anesthetics (eg desflurane, sevoflurane)
- Antagonised by anticholinesterases, furosemide, phenytoin, theophylline, and carBAMazepine
- Corticosteroids: prolong recovery from neuromuscular blockade. In addition increased muscle weakness, possibly progressing to polyneuropathies and myopathies, may occur [4]

PREGNANCY/BREAST FEEDING: Consult pharmacy or specialised on-line references for most recent information

ADMINISTRATION

MODE	DIRECT IV	INTERMITTENT INFUSION	CONTINUOUS INFUSION
	YES	NO	YES
WHO MAY GIVE	RN with specialised skills – see requirements		RN with specialized skills - see requirements
ADULT	Over 5 to 15 seconds[5]		Refer to Adult IV Dose Rate/Mix Chart
PEDIATRIC	Over 5 seconds[6]		Refer to Pediatric IV Dose Rate/Mix Chart
NEONATE	Over 5 to 10 seconds[7]		Refer to Neonatal IV Dose Rate/Mix Chart
REQUIREMENTS	**Direct IV**: Assisted or mechanically ventilated patient or if patient is not intubated physician competent in airway management and resuscitation is **at the bedside** **Continuous infusion**: Electronic infusion device and mechanically ventilated patient		

MONITORING

REQUIRED

- See requirements above

RECOMMENDED

- Peripheral nerve stimulation is recommended to guide sustained neuromuscular blockade
- Blood gases and serum electrolytes

RECONSTITUTION

- None required
- Store vials in the refrigerator. Unopened vials stable at room temperature for up to 90 days. Use punctured vials within 28 days[1, 8]

COMPATIBILITY/STABILITY[1]

- Stable in D5W and NS for at least 24 hours
- Compatible with D5S and lactated Ringer's solutions
- Unstable in alkaline solutions, eg sodium bicarbonate, phenytoin, barbiturates
- For additional drug-drug compatibility, consult pharmacy or specialised on-line references for most recent information

ADVERSE EFFECTS[1, 5]

Note: Adverse effects are infrequent, generally mild, and are extensions of rocuronium's pharmacological actions

NEUROMUSCULAR

- Prolonged paralysis and/or skeletal muscle weakness
- Incomplete reversal of neuromuscular blockade when stopped. Manage with manual or mechanical ventilation until complete recovery of normal respiration is assured

MISCELLANEOUS

- Injection site pain
- Hypersensitivity: bronchospasm, flushing, hypotension and tachycardia. Rare

ANTIDOTE

- Neostigmine IV given with atropine will usually antagonise muscle relaxation. This is dose dependent and not guaranteed

DOSE

ADULT

- **Rapid sequence intubation**: 0.6 to 1.2 mg/kg[4]
  Morbid obesity (BMI greater than 40 kg/m^2): 1.2 mg/kg using ideal body weight provided short onset of action and excellent/good intubating conditions at 60 seconds in one study [4]
- **Endotracheal intubation**: Initial: 0.45 to 0.6 mg/kg; administration of 0.3 mg/kg may also provide optimal conditions for endotracheal intubation. Maintenance for continued surgical relaxation: 0.1 to 0.2 mg/kg; repeat as needed or a continuous infusion of 10 to 12 mcg/kg/minute only after recovery of neuromuscular function is evident; infusion rates have ranged from 4 to 16 mcg/kg/minute [4]
  Morbid obesity (BMI greater than 40 kg/m^2): May use ideal body weight (IBW), onset time may be slightly delayed [4]
- **Facilitate mechanical ventilation in ICU:** Initial bolus dose: 0.6 to 1 mg/kg, then a continuous infusion of 8 to 12 mcg/kg/minute; monitor depth of blockade every 2 to 3 hours initially until stable dose, then every 8 to 12 hours; adjust rate of administration by 10% increments according to peripheral nerve stimulation response or desired clinical response[4]
- **Prevention of shivering due to therapeutic hypothermia after cardiac arrest**: 1 mg/kg then 0.5 mg/kg q30 minutes (local experience). Duration of action is increased during hypothermia[1,3]

ELDERLY

- Dose as for adults above. Slightly prolonged clinical duration may occur[1]

PEDIATRIC

- 1 mg/kg/dose every 20 to 30 minutes PRN (range 0.5 to 1.2 mg/kg/dose). Dose is based on actual body weight even if patient is obese [9]
- Continuous infusion: 5 to 13 mcg/kg/minute [6]

NEONATE [7]

- **0**.5 to 1 mg/kg/dose PRN (Usual starting dose: 0.5 mg/kg/dose)
- Continuous infusion range: 8 to 33 **mcg**/kg/min

RENAL IMPAIRMENT ADJUSTMENTS [10]

- Has a variable duration of action in renal failure. Use normal loading dose; and lowest possible further doses in those with CrCl less than 20 mL/min due to risk of prolonged paralysis

HEPATIC IMPAIRMENT ADJUSTMENTS [4]

- Dosage reductions may be necessary in patients with liver disease; duration of neuromuscular blockade may be prolonged due to increased volume of distribution. When rapid sequence intubation is required in patients with ascites, a dose on the higher end of the dosage range may be necessary to achieve adequate neuromuscular blockade

HEMO/PERITONEAL DIALYSIS [10]

- Unknown dialysability; dose as in CrCl less than 10 mL/min

MISCELLANEOUS

- IM/subcutaneous; not recommended [1]

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VIHA IV MONOGRAPH — sodium bicarbonate

OTHER NAMES	CLASSIFICATION	*ELDER ALERT
$NaHCO_3$, bicarbonate of soda	pH 7 to 8.5 Alkalinising agent - irritant	See Cautions

INDICATIONS FOR IV USE

HEALTH CANADA APPROVED [1,2]

- Metabolic acidosis associated with many conditions including; severe renal disease (eg renal tubular acidosis), uncontrolled diabetes (ketoacidosis – *low dose insulin preferred*), extracorporeal circulation of the blood, cardiac arrest and lactic acidosis. *Routine use in cardiac arrest is not recommended* [3]
- When urinary alkalisation is required in the treatment of certain drug intoxications, and in hemolytic reactions
- In severe diarrhea when loss of bicarbonate has been significant: as an adjunct in the treatment of hyperkalemia

NON HEALTH CANADA APPROVED INDICATIONS BUT SUBSTANTIATED IN THE LITERATURE:[1]

- Drug overdose with agents that produce cardiotoxic effects involving sodium channel blockade
- Urine alkalinization to reduce frequency of contrast medium-induced nephrotoxicity

CONTRAINDICATIONS [1]

- Metabolic or respiratory alkalosis: hypocalcemia (because of an increased risk of alkalosis-induced tetany): excessive chloride loss from vomiting or from continuous gastrointestinal suction
- States of hypoventilation: patients at risk of developing diuretic-induced hypochloremic alkalosis eg receiving thiazide diuretics: treatment of acute ingestion of strong acids

CAUTIONS

- Elderly – contains sodium; caution in those with renal or cardiovascular insufficiency with or without heart failure [2]
- **Full correction of acidosis should not be attempted** in the first 24 hours of therapy [1]
- Cardiac, liver or renal disease; heart failure, fluid/solute overload and postoperative patients with renal or cardiovascular insufficiency, and those receiving corticosteroids [1]
- Use in cardiac arrest indicated only if prolonged resuscitation with effective ventilation or after return of spontaneous circulation after a longer arrest interval. Adequate alveolar ventilation should control acid-base balance in most arrest situations except prolonged cardiac arrest, arrested patient with pre-existing metabolic acidosis, hyperkalemia, or tricyclic antidepressant overdose [1]

PREGNANCY/BREAST FEEDING: Consult pharmacy or specialised on-line references for most recent information

ADMINISTRATION

MODE	DIRECT INTO IV TUBING	INTERMITTENT INFUSION	CONTINUOUS INFUSION
	YES	YES	YES
WHO MAY GIVE	All registered nurses	All registered nurses	All registered nurses
ADULT	Prefilled syringe 8.4% (1 mmol/mL) Over 1 to 5 minutes [1]	Undiluted or diluted in appropriate volume compatible IV fluid Infuse over 4 to 8 hours Max rate 50 mmoL/hour [2]	Dilute in appropriate volume compatible IV fluid Infuse at prescribed rate
PEDIATRIC	**Emergency use only:** undiluted 8.4% solution (1 mmol/mL) **Children less than 2:** use 4.2% (0.5 mmol/mL) [1] Over 1 to 3 minutes [2]	See Syringe pump infusion table and/or large volume pump infusion table Infusion rate: see DOSE	Dilute in appropriate volume compatible IV fluid
NEONATE	**Emergency use only:** use 4.2% (0.5 mmol/mL) [1] Over 2 to 5 minutes [4]	See Pediatric Syringe Pump Infusion Table or Neonatal ICU IV Recon and Dilution Table	No information
REQUIREMENTS	Flush line before and after administration Central line required for intermittent or continuous infusions of concentrations greater than 4.2% (0.5 mmol/mL)		

MONITORING

REQUIRED

- None

RECOMMENDED

- Blood gases and serum electrolyte concentrations, several times daily during intensive treatment and daily in most other situations[2]
- Urine pH, if goal is to alkalinise urine

RECONSTITUTION

- None required

COMPATIBILITY/STABILITY[5]

- Stability in D5W and NS for at least 24 hours at room temperature and in the refrigerator is assumed
- Compatible with sterile water, dextrose, saline and dextrose-saline combination solutions
- Incompatible with calcium and solutions containing calcium, eg Ringer's and lactated Ringer's solutions
- For additional drug-drug compatibility, consult pharmacy or specialised on-line references for most recent information

ADVERSE EFFECTS[1]

EXTRAVASATION

- 8.4% sodium bicarbonate is hypertonic: may cause tissue inflammation and necrosis at IV site and surrounding infiltrated area
- **Treatment**: Discontinue drug immediately and notify physician. Apply cold intermittent compresses. See VIHA Intravenous Therapy Practice and Clinical Standards – Extravasation

ENDOCRINE/METABOLIC

- Excessive alkalosis, hypocalcemic tetany, paradoxical intracellular acidosis, hypokalemia
- Hypernatremia (edema, heart failure), hyperosmolality

DOSE Dosage is determined by severity of acidosis, laboratory tests, age, weight and clinical condition. Frequent evaluation is essential during therapy, to monitor fluid and electrolyte changes, and acid-balance

ADULT

- **Acidosis (less urgent)**: 2 to 5 mmol/kg/dose over 4 to 8 hours [1] or
  HCO_3 required (mmol) = (desired HCO_3 – current HCO_3) x 0.5 x weight (kg). [6] Administer ½ dose, then assess need for remainder
- **Severe cardiotoxicity or cardiac arrest due to tricyclic antidepressants or other sodium channel blockers**: 1 to 2 mmol/kg over 1 to 2 minutes[1]; repeat every 3 to 5 minutes until QRS interval narrows or until serum pH reaches 7.55 [7]
- **Severe cardiotoxicity or cardiac arrest due to hyperkalemia**: 50 mmol over 5 minutes [8]
- **Contrast medium-induced nephrotoxicity**: Add 150 mmol of sodium bicarbonate to 850 mL D5W; 3 mL/kg/hour for 1 hour immediately before contrast injection, then 1mL/kg/h during and for 6 hours after procedure. Other regimen have been suggested [1,6]
- **Urinary alkalinisation**: 100 to 150 mmol/L D5W at 150 to 200 mL/h. Adjust rate to a target urinary pH of 7 to 8 [1]

ELDERLY No specific dosing guidelines available

PEDIATRIC

- **Metabolic acidosis:**[9] Continuous infusion 0.2 to 2 mmol/kg/h (sufficient to control acidosis) or
  Intermittent infusion: HCO_3 (mmol) = 0.3 x weight (kg) x base deficit (mmol/L) administer ½ dose over 30 to 60 minutes
- **Maximum dose in children 2 years or less:** 8 mmol/kg/24 hours[1]
- **Cardiac arrest/ventricular arrhythmia,** consider 1 to 2 mmol/kg in addition to standard treatment [10]
- **Severe cardiotoxicity or cardiac arrest due to tricyclic antidepressants or other sodium channel blockers**; 1 to 2 mmol/kg boluses until arterial pH is greater than 7.45; then provide an infusion of 150 mmol $NaHCO_3$/L D5W to maintain alkalosis. In cases of severe intoxication increase pH to 7.50 to 7.55 [10]

NEONATE

- **Cardiac arrest:** 1 to 2 mmol/kg/dose over 2 to 5 minutes [4,11]
- **Acidosis:** HCO_3 needed (mmol) = (desired HCO_3 – current HCO_3) x 0.3 x body weight (kg). Administer half of calculated dose over 30 to 60 minutes, then assess need for remainder based on arterial blood gas results [4,11]

RENAL IMPAIRMENT ADJUSTMENTS

- Excessive sodium loading should be avoided in patients with severe renal impairment

HEPATIC IMPAIRMENT ADJUSTMENTS

- Excessive sodium loading should be avoided in patients with severe hepatic impairment

HEMO/PERITONEAL DIALYSIS

- Not applicable

MISCELLANEOUS

- 1 mmol (1 mEq) of sodium bicarbonate = 1 mmol (1 mEq) each of sodium and bicarbonate ions
- 50 mL 8.4% sodium bicarbonate = 50 mmol (50 mEq) sodium bicarbonate
- Extravasation - 8.4% sodium bicarbonate is hypertonic - see ADVERSE REACTIONS and VIHA Intravenous Therapy Practice and Clinical Standards - Extravasation
- May be given by subcutaneous injection if diluted to isotonicity (1.5% solution - 0.178 mmol/L)[5] IM: not recommended
- May be given via IO cannulation but acid-base analysis is inaccurate [10]

sodium bicarbonate - references

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VIHA IV MONOGRAPH

succinylcholine

OTHER NAMES	CLASSIFICATION	*HIGH ALERT DRUG –
Quelicin, suxamethonium	Depolarising neuromuscular blocker pH 3.5	Neuromuscular Blocking Agent

INDICATIONS FOR IV USE

HEALTH CANADA APPROVED[1]

- As an adjunct to general anaesthesia, to facilitate endotracheal intubation and to provide skeletal muscle relaxation during surgery, or mechanical ventilation

NON HEALTH CANADA APPROVED INDICATION BUT SUBSTANTIATED IN THE LITERATURE:[2]

- Production of skeletal muscle relaxation during procedures of short duration (eg, endotracheal intubation, endoscopic examinations, electrically or pharmacologically induced convulsive therapy) after general anaesthesia has been induced

CONTRAINDICATIONS

- *Hypersensitivity to succinylcholine or any component of formulation*[1]
- Personal or familial history of malignant hyperthermia [1,3]
- Skeletal muscle myopathies [1,3]
- Use after acute phase of injury following major burns, multiple trauma, extensive denervation of skeletal muscle, or upper motor neuron injury [1,3]

CAUTIONS

- Succinylcholine has **no analgesic, amnestic or sedative properties**
- Pulmonary impairment or respiratory depression [2]
- Severe hypocalcemia, severe hypokalemia, hypermagnesemia, metabolic acidosis, respiratory acidosis; may potentiate neuromuscular blockade [3]
- Respiratory alkalosis, hypercalcemia; antagonize neuromuscular blockade [3]
- Pre-existing hyperkalemia or those at increased risk of hyperkalemia (eg, paraplegia, chronic abdominal infection, tetanus, subarachnoid haemorrhage, degenerative or dystrophic neuromuscular disease, or conditions that may cause degeneration of central and peripheral nervous systems) [3]
- Closed angle glaucoma or penetrating eye injuries, due to possible increased intraocular pressure. [3] Use with extreme caution, if at all, during ocular surgery; nondepolarizing neuromuscular blocking agent may be preferred
- Infants and children, especially boys under 8 years of age: If patient has an undiagnosed myopathy, rare possibility of inducing life-threatening hyperkalemia, cardiac arrest and death from hyperkalemic rhabdomyolysis [1,3]

DRUG INTERACTIONS:

- Potentiated by aminoglycosides, metoclopramide and anticholinesterases (eg echothiopate eye drops) [3]

PREGNANCY/BREAST FEEDING: Contact pharmacy for most recent information

ADMINISTRATION

MODE	DIRECT IV	INTERMITTENT INFUSION	CONTINUOUS INFUSION
	YES	NO	NO
WHO MAY GIVE	Registered nurses with specialized skills - see required monitoring and requirements		
ADULT	Undiluted; rapid push [3]		
PEDIATRIC	As above		
NEONATE	See Neonatal ICU IV Recon and Dilution Table		
REQUIREMENTS	Assisted or mechanical ventilation Direct IV for adults/pediatrics: Under the ***direct*** supervision of a physician, ie physician must be *physically* present Direct IV for neonates: Healthcare professional certified in neonatal intubation must be physically present		

MONITORING

REQUIRED

- ECG monitoring

RECOMMENDED

- Observe for early signs of malignant hyperthermia (jaw muscle spasm, increased end-tidal CO_2 concentration, lack of laryngeal relaxation, and unresponsive tachycardia)

RECONSTITUTION

- None required

COMPATIBILITY/STABILITY [6]

- Compatible in dextrose, saline, dextrose-saline combinations, Ringer's, and lactated Ringer's solutions
- Unstable and decomposes in alkaline solutions, eg sodium bicarbonate, barbiturates
- For additional drug-drug compatibility, contact pharmacy

ADVERSE EFFECTS [3,7]

NEUROMUSCULAR/SKELETAL

- Fasciculations, jaw tightness, myalgia (postoperative), rhabdomyolysis (with possible myoglobinuric acute renal failure)

CARDIOVASCULAR

- Bradycardia (more common in children), other arrhythmias, and hypotension. Premedication with atropine recommended [1,8]
- Cardiac arrhythmia, hypertension, hypotension, tachycardia
- Malignant hyperthermia (jaw muscle spasm, increased end-tidal CO_2 concentration, lack of laryngeal relaxation, and unresponsive tachycardia, rigidity, cyanosis, mottling) Dantrolene IV required (dose for adults/pediatrics: 2.5 mg/kg IV ASAP (contact OR for dantrolene) repeat Q4 to 8 h until symptoms resolve to a max cumulative dose of 10 mg/kg [9]

ELECTROLYTE

- Hyperkalemia

MISCELLANEOUS

- Hypersensitivity: flushing, skin rash, bronchospasm and shock
- Respiratory depression and apnea: associated with repeated or prolonged administration and conversion to a non-depolarising block or in those with decreased pseudocholinesterase activity
- Raised intra-abdominal pressure, raised intra-ocular pressure, raised intracranial pressure

DOSE

ADULT

- Intubation: 0.6 mg/kg (range: 0.3 to 1.1 mg/kg) [1,3]
- Intubation (rapid sequence): 1 to 1.5 mg/kg [3,10]
- Long surgical procedures: Initial: 0.3 to 1.1 mg/kg; administer 0.04 to 0.07 mg/kg at appropriate intervals as needed [3]
- Electroconvulsive therapy: 0.75 to 1 mg/kg [11]

ELDERLY

- Start at low end of dosage range

PEDIATRIC

- Infants to children less than 2 years: 1 to 2 mg/kg [8]
- Children 2 years or older: 1 mg/kg. Doses up to 2 mg/kg may be required [8]

NEONATE

- Intubation: 2 mg/kg/dose.[5,12]
  Short onset: less than 30 seconds and short duration: less than 5 minutes. Dose may be repeated. Refer to VIHA Guideline, “Neonatal Intubation Medications” [4]

RENAL IMPAIRMENT ADJUSTMENTS [13]

- None required. Use with caution due to potential to cause hyperkalemia

HEPATIC IMPAIRMENT ADJUSTMENTS

- No dosing guidelines available at this time

HEMO/PERITONEAL DIALYSIS

- Use with caution due to potential to cause hyperkalemia
- Hemodialysis: not applicable
- CAPD: none required [13]

MISCELLANEOUS

- Can be given IM when suitable vein is inaccessible[1]
- Subcutaneous/Intraosseous: no information available at this time

succinylcholine - references

1. Succinylcholine chloride injection [Product Monograph], Toronto, ON: Alveda Pharmaceuticals Inc.; Aug 2014.

2. Succinylcholine Chloride In: Lexi-Comp Online™ , AHFS Essentials (Adult and Pediatric) ™, Hudson, Ohio: Lexi-Comp, Inc.; [cited 2017 Mar].

3. Succinylcholine In: Lexi-Comp Online™ , Lexi-Drugs Online™, Hudson, Ohio: Lexi-Comp, Inc.; [cited 2017 Mar].

4. VIHA Interprofessional Practice & Clinical Standards Guideline: Neonatal Intubation Medications, 12.5.52G. February 2009. [cited 2017 Mar)

5. Succinylcholine In: BC Children's and Women's Hospital (C&W) Online Formulary. Neonatal Drugs, Vancouver, BC: BC Children's and Women's Hospital; [cited 2017 Mar].

6. Succinylcholine In: Trissel LA, editor. Handbook of injectable drugs. 16th ed. Bethesda, MD: American Society of Hospital Pharmacists; 2011:p. 1420-1423.

7. Isenstein DA, Venner DS, Duggan J. Neuromuscular blockade in the intensive care unit. Chest 1992; 102:1258-66.

8. Phelps SJ, Hagemann TM, Lee KR, Thompson AJ, editors. Pediatric injectable drugs. Teddy Bear Book. 10th ed. Bethesda: American Society of Hospital Pharmacists; 2013. p. 584-6.

9. Sessler DI. Malignant hyperthermia-update. West J Med. 1988 Jul;149(1):76.

10. Caro D. Neuromuscular blocking agents (NMBA) for rapid sequence intubation in adults outside the operating room. In: UpToDate, Basow, DS (Ed), UpToDate, Waltham, MA, 2017. Literature review current through: Mar 2017. Last updated: Oct 17, 2016.

11. Kellner C. Technique for performing electroconvulsive therapy (ECT) in adults. In: UpToDate, Basow, DS (Ed), UpToDate, Waltham, MA, 2017. Literature review current through: Mar 2017. Last updated: Jan 12, 2017.

12. Barrington K. Premedication for endotracheal intubation in the newborn infant. Paediatr Child Health. 2011 Mar;16(3):159-71.

13. Ashley C and Dunleavy A. editors. UK Renal Pharmacy Group. The Renal Drug handbook. 4th ed. London; Radcliffe Publishing; 2014. p 892-3.

VIHA IV MONOGRAPH

tigecycline

OTHER NAMES	CLASSIFICATION	pH 7.8	
Tygacil	Antibiotic - tetracycline		

- Formulary restrictions apply to the IV use of tigecycline for details see VIHA Pharmacy Web site: http://intranet.viha.ca/pharmacy/

INDICATIONS FOR IV USE

HEALTH CANADA APPROVED[1]

- Treatment of various infections due to susceptible organisms, including the following: complicated intra-abdominal, or skin and soft tissue infections

CONTRAINDICATIONS

- *Hypersensitivity to tigecycline or other tetracyclines*[1]

CAUTIONS

- Pediatrics: safety and efficacy has not been established. Use only if no alternative antibiotics are available. Because of effects on tooth development (yellow-gray-brown discoloration), use in patients less than 8 years is not recommended[1]

DRUG INTERACTIONS:

- Warfarin: may enhance the anticoagulant effect of warfarin. Monitor therapy[2]

PREGNANCY/BREAST FEEDING: Contact pharmacy or specialised on-line references for most recent information

ADMINISTRATION

MODE	DIRECT IV	INTERMITTENT INFUSION	CONTINUOUS INFUSION
	NO	YES	NO
WHO MAY GIVE		All registered nurses	
ADULT		Dilute in 100 mL minibag Infuse over 30 to 60 minutes	
PEDIATRIC		See Syringe pump infusion table	
NEONATE		-	
REQUIREMENTS	None		

MONITORING

REQUIRED

- None

RECOMMENDED

- None

RECONSTITUTION[1]

- Reconstitute each 50 mg vial with 5.3 mL of NS or D5W for 10 mg/mL. There is overfill in each vial – **a reconstitution device should not be used**
- The reconstituted solution should be yellow to orange in color; if not, the solution should be discarded
- After reconstitution, immediately further dilute in NS or D5W minibag

COMPATIBILITY/STABILITY

- Stable in NS or D5W minibags for up to 24 hours at room temperature or in the refrigerator (up to 6 hours as a reconstituted solution in the vial and the remaining time diluted in the minibag)[1]
- Reconstituted vial stable for 6 hours at room temperature[3]
- Compatible by Y site with DOBUTamine, DOPamine, potassium chloride, ranitidine and lactated Ringer's solution[3]
- Incompatible by Y site with amphotericin B, methylPREDNISolone and voriconazole[3]
- For additional drug-drug compatibility, contact pharmacy or specialised on-line references for most recent information

ADVERSE EFFECTS[1]

COMMON

- Diarrhea, nausea, vomiting

SERIOUS

- Acute pancreatitis

DOSE[1]

ADULT

- 100 mg followed by 50 mg every 12 hours.
- Duration: 5 to 14 days depending on the severity and site of infection and clinical and bacteriological progress

ELDERLY

- No specific dosage adjustment required however, may be more sensitive to adverse effects

PEDIATRICS[4]

- Use should be reserved for situations when no effective alternative therapy is available; should not be used in pediatric patients less than 8 years due to adverse effects on tooth development, unless no alternatives are available
- Infants and children less than 8 years: optional loading dose 1.5 to 3 mg/kg, maintenance 1 to 2 mg/kg/dose every 12 hours; maximum dose: 50 mg/dose
- Children 8 to 11 years old: 1.2 to 2 mg/kg/dose every 12 hours; maximum dose: 50 mg/dose
- Children 12 years and older: 50 mg every 12 hours

NEONATE

- No information available at this time

RENAL IMPAIRMENT ADJUSTMENTS

- None required

HEPATIC IMPAIRMENT ADJUSTMENTS

- Mild to moderate hepatic impairment, no adjustment necessary
- Severe hepatic impairment, 100 mg followed by 25 mg every 12 hours

HEMO/PERITONEAL DIALYSIS[5]

- Not removed by hemodialysis. No dosing adjustment or supplementation required
- CAPD: no dosing adjustment or supplementation required

MISCELLANEOUS

- IM or subcutaneous administration: no information available at this time

tigecycline - references

1. Tygacil [Product Monograph], Kirkland, QC: Pfizer Canada, Inc.; Dec 2012

2. Tigecycline In: Lexi-Comp Online™, Lexi-Drugs Online™, Hudson, Ohio: Lexi-Comp, Inc.; [cited 2014 Mar].

3. Trissel LA, editor. Handbook of injectable drugs. 16th ed. Bethesda, MD: American Society of Hospital Pharmacists; 2011: 1469-1471.

4. Tigecycline In: Lexi-Comp Online™, Pediatric and Neonatal Lexi-Drugs Online™ , Hudson, Ohio: Lexi-Comp, Inc.; [cited 2020 Apr].

5. Ashley C, Currie A, editors. UK Renal Pharmacy Group. The Renal Drug handbook. 3rd ed. Oxford; Radcliffe Publishing; 2009. p 722.

VIHA
Department of Pharmacy

Pediatric
tranexamic acid infusion

Concentration: 20 mg/mL

Admixture:
200 mg diluted to a total volume of 10 mL with NS or D5W for 20 mg/mL
or
1000 mg diluted to a total volume of 50 mL with NS or D5W for 20 mg/mL

	PATIENT WEIGHT (kg)																		
DOSE (mg/kg/h)	**2**	**4**	**6**	**8**	**10**	**12**	**14**	**16**	**18**	**20**	**25**	**30**	**35**	**40**	**45**	**50**	**55**	**60**	**62.5**
	INFUSION RATE (mL/h)																		
2	0.2	0.4	0.6	0.8	1	1.2	1.4	1.6	1.8	2	2.5	3	3.5	4	4.5	5	5.5	6	6.25

For patient weight greater than 62.5 kg, use infusion rate of 6.25 mL/h (max dose 125 mg/h)

Date created: Jan 2018
Revised: May 2020

* BIOSIMILAR ALERT	CLASSIFICATION pH 6 Antineoplastic – non vesicant	* ELDER ALERT See Cautions	HAZARDOUS DRUG Low Reproductive Risk

- BCHA Provincial Formulary restrictions apply to the IV use of trastuzumab

INDICATIONS FOR IV USE

*** Herceptin, Herzuma, Ogivri and Trazimera are NOT interchangeable**

HEALTH CANADA APPROVED[1-4]

- Treatment of certain patient groups with breast and gastric cancer

CONTRAINDICATIONS[1-4]

- *Hypersensitivity to trastuzumab or other Chinese hamster ovary cell proteins eg bevacizumab*

CAUTIONS

- Elderly; increased risk of cardiotoxicity including severe heart failure and hematologic toxicities (leukopenia and thrombocytopenia)[5]
- Pre-existing cardiac disease or prior cardiotoxic therapy, eg anthracycline; increased risk of cardiotoxicity including severe heart failure [1-4]
- Pulmonary insufficiency (ie dyspnea at rest) and other pulmonary/cardiac conditions; may be at increased risk of a fatal reaction of the infusion related syndrome or pulmonary events[1-4]

DRUG INTERACTIONS:

- Anthracyclines (DOXOrubicin or epirubicin) and cyclophosphamide; higher incidence and severity of cardiotoxicity [1-4]
- PACLitaxel: increased trastuzumab serum levels; monitor for signs of cardiac dysfunction [5]

PREGNANCY/BREAST FEEDING: Consult pharmacy or specialised on-line references for most recent information

ADMINISTRATION BCCA administration guideline in ***bold, italics***

MODE	DIRECT IV	INTERMITTENT INFUSION	CONTINUOUS INFUSION
	NO	YES	NO
WHO MAY GIVE		All registered nurses	
ADULT		Dilute in 250 mL NS ***Loading dose over 90 minutes*** ***1st maintenance dose over 60 minutes*** ***2nd and subsequent maintenance doses over 30 minutes if no adverse reactions***	
PEDIATRIC		No information	
REQUIREMENTS	Health Care Professionals who are pregnant, breast feeding or attempting to conceive; personal protective equipment (gloves, mask and goggles) if preparing the drug and one pair of chemotherapy approved gloves when risk of direct contact Electronic infusion device		

MONITORING

REQUIRED

- Observe continuously for signs of anaphylactoid reaction (ie dyspnea, hypotension, bronchospasm, wheezing) for 10 minutes after the start of **each dose**
- **Initial dose**: observe for 60 minutes post infusion for infusion related symptoms [6]
- **Maintenance dose:** observe for 30 minutes post infusion for infusion related symptoms. Observation period not required after 3 treatments with no reaction [6]

RECOMMENDED

- Baseline CBC and differential, platelets. Further testing if indicated; see individual protocol for details
- Assess cardiac function prior to and during treatment; see individual protocol for details[1-4]

RECONSTITUTION[1-4]

- Reconstitute trastuzumab 440 mg vial with 20 mL (150 mg vial with 7.2 mL) bacteriostatic water or sterile water for injection. Swirl vial gently; allow to stand undisturbed for 5 minutes. Do not shake. Resulting concentration trastuzumab 21 mg/mL

COMPATIBILITY/STABILITY[1-4]

- Stable in NS for 24 hours at room temperature and in the refrigerator
- **Incompatible** with D5W
- For drug-drug compatibility consult pharmacy or specialised on-line references for most recent information

ADVERSE EFFECTS[1-4,5]

CARDIOVASCULAR

- Decreased left ventricular function
- Congestive heart failure

INFUSION RELATED REACTIONS Note: usually mild and transient. Respond to decreasing rate of infusion

- Mild reactions, chills and/or fever; responds to an analgesic/antipyretic such as acetaminophen, an antihistamine eg diphenhydrAMINE, or meperidine. Occur in 40% of patients with first infusion
- Mild to moderate reactions: nausea, vomiting, pain, rigors, headache, dizziness, rash and asthenia
- Severe reactions: dyspnea, hypotension, bronchospasm, wheezing. Most commonly associated with the initial infusion, occurring during or immediately following the infusion

HEMATOLOGICAL

- Anemia, leukopenia; mild to moderate in intensity when used as a single agent. More common and more severe when used in combination with other myelosuppressive chemotherapy

MISCELLANEOUS

- Interstitial lung disease with dyspnea, can be fatal. Occur from within 24 hours to over 30 days
- Increased incidence of infections; primarily mild upper respiratory infections or catheter infections
- Fetal harm when administered to a pregnant woman
- Emetogenic potential: low
- Extravasation hazard: none

DOSE

Dosing schedule will vary depending on disease, response and concomitant therapy. Refer to individual protocol whenever possible

ADULT[5] BCCA usual dose noted in ***bold, italics*** **Brand must be specified as biosimilar agents exist**

- ***8 mg/kg loading dose, then 6 mg/kg once every 3 weeks***
- 4 mg/kg loading dose, then 2 mg/kg once a week
- Missed doses: The manufacturer recommends a reloading dose after any delay of more than 1 week [1-4]; others suggest reloading is probably only needed after a delay of more than 6 weeks.[7] See protocol by which patient is being treated

ELDERLY

- No specific dose adjustments required [5]

PEDIATRIC

- No information available at this time

RENAL IMPAIRMENT ADJUSTMENTS

- No adjustment required[5]

HEPATIC IMPAIRMENT ADJUSTMENTS

- No information available at this time

HEMO/PERITONEAL DIALYSIS

- No significant removal[5]

MISCELLANEOUS

- Environmental concerns: none. Safe handling precautions for reproductive risk employees only – see Med Policy D 23, Appendix 1 for more information.
- IM: no information available at this time
- Subcutaneous use: Herceptin™ SC is specifically formulated for subcut use with a different concentration and dosing from IV product [8] Note: this product is not currently used in BC Cancer protocols

trastuzumab - references

1. Herceptin [Product Monograph], Mississauga, ON: Hoffmann-La Roche Limited; May 2019.

2. Herzuma [Product Monograph], Manufactured by: Celltrion Healthcare Co., Ltd. Yeonsu-gu, Incheon, Republic of Korea. Distributed by: Teva Canada Limited, Toronto, ON; Sept 2019.

3. Ogivri [Product Monograph], Etobicoke, ON: BGP Pharma ULC; May 2019.

4. Trazimera [Product Monograph],Kirkland, QC: Pfizer Canada ULC; Dec 2019.

5. Trastuzumab. Badry N, editor. B.C. Cancer Cancer Drug Manual. Vancouver, BC: B.C. Cancer; revised; Revised Oct 2014 [cited 2020 Jan]. Available from http://www.bccancer.bc.ca.

6. BC Cancer Policy. Drug reaction management – physician coverage during delivery of selected systemic therapy drugs. III-60 Appendix. Vancouver, BC: B.C. Cancer; Rev Nov 2019. [cited 2020 Jan]. Available from http://www.bccancer.bc.ca

7. de Lemos ML, Mason K, Badry N, Kyritsis V. Trastuzumab therapy in breast cancer: To reload or not to reload? J Oncol Pharm Pract. 2014 Aug;20(4):319-20. Epub 2013 Oct 8.

8. Herceptin SC [Product Monograph], Mississauga, ON: Hoffmann-La Roche Limited; May 2019.

NEONATAL INTENSIVE CARE UNIT
INTRAMUSCULAR (IM) AND SUBCUTANEOUS (subcut) RECONSTITUTION AND DILUTION TABLE

Revised: April 2020

Intramuscular Administration (IM)

DRUG	STRENGTH	RECONSTITUTION VOLUME	CONCENTRATION
ampicillin	500 mg	1.8 mL SWFI	250 mg/mL
ceFAZolin	500 mg	2 mL SWFI	225 mg/mL
cefotaxime	1 g	3 mL SWFI	300 mg/mL
cefTRIAXone	1 g	2.2 mL SWFI	350 mg/mL
cloxacillin	500 mg	1.7 mL SWFI	250 mg/mL
gentamicin	40 mg/mL (higher strength vial for IM use)	-	40 mg/mL
glucagon	1 mg	1 mL of provided diluent	1 mg/mL
morphine	2 mg/mL	-	2 mg/mL
penicillin G sodium	1 million units	1.8 mL SWFI	500 000 units/mL
phytonadione	10 mg/mL	-	10 mg/mL
pyridoxine	100 mg/mL	-	100 mg/mL
tobramycin	40 mg/mL (higher strength vial for IM use)	-	40 mg/mL

IMPORTANT STABILITY NOTE: Prepare dose immediately. Discard remainder after administration.

Notes:

- Unless otherwise specified, all information from NeoFax[1]
- Verify route of administration with NeoFax and IV monographs

SWFI = preservative-free sterile water for injection, NS = preservative free normal saline for injection

References:

1. IBM Micromedex® Neofax® and Pediatrics (electronic version). IBM Watson Health, Greenwood Village, Colorado, USA. Available at: https://www.micromedexsolutions.com/
2. Lexi-Comp OnlineTM , Pediatric and Neonatal Lexi-Drugs OnlineTM, Hudson, Ohio: Lexi-Comp, Inc.

NEONATAL INTENSIVE CARE UNIT
INTRAMUSCULAR (IM) AND SUBCUTANEOUS (subcut) RECONSTITUTION AND DILUTION TABLE

Revised: April 2020

Subcutaneous Administration (subcut)

DRUG	STRENGTH	DILUTION INSTRUCTIONS	CONCENTRATION
epoetin alfa	2000 units/0.5 mL	-	2000 units/0.5 mL
enoxaparin	**Pharmacy to prepare – call on-call pharmacists if outside operational hours**		20 mg/mL (preservative-free)
	100 mg/mL	-	100 mg/mL (multi-dose vial contains benzyl alcohol; preservative free formulation preferred)
insulin regular	**Pharmacy to prepare during operational hours**		10 units/mL[2]
	100 units/mL	1 mL solution + 9 mL NS	
morphine	2 mg/mL	-	2 mg/mL

IMPORTANT STABILITY NOTE: Prepare dose immediately. Discard remainder after administration.

Notes:

- Unless otherwise specified, all information from NeoFax[1]
- Verify route of administration with NeoFax and IV monographs

SWFI = preservative-free sterile water for injection, NS = preservative free normal saline for injection

References:

1. IBM Micromedex® Neofax® and Pediatrics (electronic version). IBM Watson Health, Greenwood Village, Colorado, USA. Available at: https://www.micromedexsolutions.com/
2. Lexi-Comp OnlineTM , Pediatric and Neonatal Lexi-Drugs OnlineTM, Hudson, Ohio: Lexi-Comp, Inc.

VGH NEONATAL INTENSIVE CARE UNIT
INTRAVENOUS (IV) RECONSTITUTION AND DILUTION TABLE

[To be used in conjunction with Island Health IV monographs]
Last revised: July 2020

DRUG	STRENGTH	RECONSTITUTION VOLUME	CONC AFTER RECONSTITUTION	DILUTION INSTRUCTIONS	TOTAL VOLUME IN SYRINGE	STANDARD CONC	ADMINISTRATION
acyclovir Zovirax®	50 mg/mL	-		1.4 mL solution + 8.6 mL D5W or NS	10 mL	7 mg/mL	Infuse over 60 minutes
adenosine Adenocard®	3 mg/mL	-		-		3 mg/mL (3000 mcg/mL)	Bolus over 1 to 2 seconds, closest to patient's heart, flush with 5 to 10 mL NS after each bolus
				1 mL solution + 2 mL NS	3 mL	1,000 mcg/mL[3]	Use undiluted solution for doses greater than 600 mcg Not on Medfusion pump
alprostadil Prostin VR®	500 mcg/mL	-		1 mL solution + 49 mL D5W or NS	50 mL	10 mcg/mL	Infuse continuously Large vein preferred
alteplase (tPAse) – for blocked line Cathflo®	2 mg	2.2 mL SWFI (Gently swirl contents; DO NOT SHAKE)	1 mg/mL	-		1 mg/mL	Instil and dwell for 30 to 120 minutes before aspiration[3] Use 5 mL syringe[3] Not on Medfusion pump

IMPORTANT STABILITY NOTE: Prepare dose within 60 minutes of administration. Discard remainder after administration.

Notes:

- All information from NeoFax[1] unless otherwise specified. References provided at the end of the table on page 23
- SWFI = preservative-free sterile water for injection, NS = preservative free normal saline for injection, D5W = 5% dextrose in water, D10W = 10% dextrose in water

VGH NEONATAL INTENSIVE CARE UNIT
INTRAVENOUS (IV) RECONSTITUTION AND DILUTION TABLE
[To be used in conjunction with Island Health IV monographs]
Last revised: July 2020

DRUG	STRENGTH	RECONSTITUTION VOLUME	CONC AFTER RECONSTITUTION	DILUTION INSTRUCTIONS	TOTAL VOLUME IN SYRINGE	STANDARD CONC	ADMINISTRATION
amiodarone Cordarone®	50 mg/mL	-		1.8 mL solution + 48.2 mL D5W	50 mL	1.8 mg/mL (1,800 mcg/mL)[3]	**Load**: Infuse over 20 to 60 minutes (Dosed in **mg/kg**; pump defaults to 60 minutes) **Maintenance**: Infuse continuously (Dosed in **mcg/kg/min**) Central line preferred Use 0.2/0.22 micron in-line filter Note separate load and maintenance programs on Medfusion pump
amphotericin B (conventional) Fungizone®	50 mg	10 mL SWFI	5 mg/mL	0.6 mL solution + 29.4 mL D5W or D10W[2]	30 mL	0.1 mg/mL	Infuse over 2 to 6 hours (pump defaults to 2 hours) Flush before and after with D5W
amphotericin B liposomal AmBisome®	**Pharmacy to prepare – call on-call pharmacists if outside operational hours**					2 mg/mL	Infuse over 2 hours Flush before and after with D5W
ampicillin	250 mg	5 mL SWFI[2]	50 mg/mL[2]	-		50 mg/mL	Infuse over 3 to 5 minutes (pump defaults to 5 minutes) Except for the first dose, all penicillins should be spaced 1 hour from gentamicin and tobramycin[3]

IMPORTANT STABILITY NOTE: Prepare dose within 60 minutes of administration. Discard remainder after administration.

Notes:

- All information from NeoFax[1] unless otherwise specified. References provided at the end of the table on page 23
- SWFI = preservative-free sterile water for injection, NS = preservative free normal saline for injection, D5W = 5% dextrose in water, D10W = 10% dextrose in water

VGH NEONATAL INTENSIVE CARE UNIT
INTRAVENOUS (IV) RECONSTITUTION AND DILUTION TABLE
[To be used in conjunction with Island Health IV monographs]
Last revised: July 2020

DRUG	STRENGTH	RECONSTITUTION VOLUME	CONC AFTER RECONSTITUTION	DILUTION INSTRUCTIONS	TOTAL VOLUME IN SYRINGE	STANDARD CONC	ADMINISTRATION
atropine	0.6 mg/mL	-		-		0.6 mg/mL (600 mcg/mL)	Give over 1 minute Use undiluted solution if 2 kg or greater Not on Medfusion pump
				1 mL solution + 9 mL D5W or NS	10 mL	0.06 mg/mL (60 mcg/mL)	
caffeine citrate Cafcit®	20 mg/mL	-				20 mg/mL	**Load:** Infuse over 30 minutes **Maintenance**: Infuse over 10 minutes Note separate load and maintenance programs on Medfusion pump
calcium gluconate	100 mg/mL	-		10 mL solution + 40 mL D5W or NS	50 mL	20 mg/mL[2]	Slow push by physician only for resuscitation **OR** Infuse over 30 minutes Central line preferred [2] **High alert drug** Intermittent infusion available on Medfusion pump
caspofungin Cancidas®	50 mg	10.5 mL NS or SWFI[5]	5 mg/mL	1 mL solution + 9 mL NS	10 mL	0.5 mg/mL	Infuse over 60 minutes (Dosed in **mg/m²/dose**) Incompatible with dextrose solution

IMPORTANT STABILITY NOTE: Prepare dose within 60 minutes of administration. Discard remainder after administration.

Notes:
- All information from NeoFax[1] unless otherwise specified. References provided at the end of the table on page 23
- SWFI = preservative-free sterile water for injection, NS = preservative free normal saline for injection, D5W = 5% dextrose in water, D10W = 10% dextrose in water

VGH NEONATAL INTENSIVE CARE UNIT
INTRAVENOUS (IV) RECONSTITUTION AND DILUTION TABLE
[To be used in conjunction with Island Health IV monographs]
Last revised: July 2020

DRUG	STRENGTH	RECONSTITUTION VOLUME	CONC AFTER RECONSTITUTION	DILUTION INSTRUCTIONS	TOTAL VOLUME IN SYRINGE	STANDARD CONC	ADMINISTRATION
ceFAZolin	500 mg	**Pharmacy to prepare during operational hours**				100 mg/mL	Infuse over 3 to 5 minutes (pump defaults to 5 minutes)
		4.8 mL SWFI[2]	100 mg/mL	-			
cefotaxime	1 g	9.6 mL SWFI	100 mg/mL	-		100 mg/mL	Infuse over 3 to 5 minutes (pump defaults to 5 minutes)
cefOXitin	1 g	9.5 mL SWFI	100 mg/mL	-		100 mg/mL	Infuse over 3 to 5 minutes[3] (pump defaults to 5 minutes)
ceftaroline	600 mg	20 mL SWFI	30 mg/mL	2 mL reconstituted solution + 8 mL D5W or NS	10 mL	6 mg/mL	Infuse over 30 to 60 minutes (pump defaults to 60 minutes) Colour ranges from clear and light to dark yellow; potency is not affected
cefTAZidime	1 g	9.4 mL SWFI[2]	100 mg/mL[2]	-		100 mg/mL[2]	Infuse over 3 to 5 minutes (pump defaults to 5 minutes)
cefTRIAXone	1 g	9.6 mL SWFI	100 mg/mL	2 mL reconstituted solution + 3 mL D5W or NS	5 mL	40 mg/mL	Infuse over 60 minutes Cefotaxime preferred Fatal reaction reported when co-administered with IV calcium; calcium containing IV solutions or products (e.g. TPN) should not be administered within 48 hours of the last dose of ceftriaxone[2]

IMPORTANT STABILITY NOTE: Prepare dose within 60 minutes of administration. Discard remainder after administration.

Notes:

- All information from NeoFax[1] unless otherwise specified. References provided at the end of the table on page 23
- SWFI = preservative-free sterile water for injection, NS = preservative free normal saline for injection, D5W = 5% dextrose in water, D10W = 10% dextrose in water

VGH NEONATAL INTENSIVE CARE UNIT
INTRAVENOUS (IV) RECONSTITUTION AND DILUTION TABLE
[To be used in conjunction with Island Health IV monographs]
Last revised: July 2020

DRUG	STRENGTH	RECONSTITUTION VOLUME	CONC AFTER RECONSTITUTION	DILUTION INSTRUCTIONS	TOTAL VOLUME IN SYRINGE	STANDARD CONC	ADMINISTRATION
cefuroxime	750 mg	7.2 mL SWFI	100 mg/mL	2 mL reconstituted solution + 8 mL of SWFI	10 mL	20 mg/mL[3]	Infuse over 15 to 30 minutes[3] (pump defaults to 15 minutes)
ciprofloxacin	2 mg/mL	-				2 mg/mL	Infuse over 60 minutes
clindamycin Dalacin-C®	150 mg/mL	**Pharmacy to prepare during operational hours**				12 mg/mL	Infuse over 10 to 60 minutes (pump defaults to 15 minutes)
		-		2 mL reconstituted solution + 23 mL D5W or NS	25 mL		
cloxacillin	500 mg	**Pharmacy to prepare during operational hours**				50 mg/mL	Infuse over 20 minutes[2] Except for the first dose, all penicillins should be spaced 1 hour from gentamicin and tobramycin
		4.8 mL SWFI[2]	100 mg/mL[2]	5 mL reconstituted solution + 5 mL SWFI	10 mL		
cosyntropin – low dose ACTH stim test Cortrosyn®	**Pharmacy to prepare 24 hr notice to pharmacy required**					1 mcg/mL[3]	Push rapidly over 5 to 10 seconds[6] Not on Medfusion pump
cosyntropin – high dose ACTH stim test Cortrosyn®	250 mcg	1 mL NS[3]	250 mcg/mL	-		250 mcg/mL[3]	Push rapidly over 5 to 10 seconds[6] Not on Medfusion pump
dexamethasone	**Pharmacy to prepare during operational hours**					0.2 mg/mL	Use 10 mg/mL single use vials Infuse over 1 to 4 minutes[3] (pump defaults to 2 minutes)
	10 mg/mL	-		0.5 mL solution + 24.5 mL NS	25 mL		

IMPORTANT STABILITY NOTE: Prepare dose within 60 minutes of administration. Discard remainder after administration.

Notes:

- All information from NeoFax[1] unless otherwise specified. References provided at the end of the table on page 23
- SWFI = preservative-free sterile water for injection, NS = preservative free normal saline for injection, D5W = 5% dextrose in water, D10W = 10% dextrose in water

VGH NEONATAL INTENSIVE CARE UNIT
INTRAVENOUS (IV) RECONSTITUTION AND DILUTION TABLE
[To be used in conjunction with Island Health IV monographs]
Last revised: July 2020

DRUG	STRENGTH	RECONSTITUTION VOLUME	CONC AFTER RECONSTITUTION	DILUTION INSTRUCTIONS	TOTAL VOLUME IN SYRINGE	STANDARD CONC	ADMINISTRATION
dexmedetomidine Precedex®	100 mcg/mL	-		2 mL solution + 48 mL NS[3]	50 mL	4 mcg/mL	Infuse continuously
dextrose - Bolus Baxter	10%	-				10%[2]	Infuse over 15 minutes[2]
dextrose – Infusion Baxter	Max 25%[3]	**Pharmacy to prepare during operational hours** **Prepare solutions according to 12.5.41G outside of pharmacy operational hours; Pharmacy to prepare any solution not listed in chart** https://intranet.viha.ca/pnp/pnpdocs/admixing-non-standard-dextrose-solutions-make-50ml.pdf				Variable: 5%, 7.5%, 10%, 12.5%, 15%, 20%	Infuse continuously Use central line for concentration above 12.5%[3]
diazePAM Valium®	5 mg/mL	-		-		5 mg/mL[2]	Slow push over 3 minutes[2] May use undiluted solution for doses greater than 1 mg[2] **Pharmacy will send drug and empty vials for mixing; add diazepam to the vial first, then add NS** Not on Medfusion pump
				0.2 mL solution + 9.8 mL NS[2]	10 mL	0.1 mg/mL[2]	

IMPORTANT STABILITY NOTE: Prepare dose within 60 minutes of administration. Discard remainder after administration.

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VGH NEONATAL INTENSIVE CARE UNIT
INTRAVENOUS (IV) RECONSTITUTION AND DILUTION TABLE
[To be used in conjunction with Island Health IV monographs]
Last revised: July 2020

DRUG	STRENGTH	RECONSTITUTION VOLUME	CONC AFTER RECONSTITUTION	DILUTION INSTRUCTIONS	TOTAL VOLUME IN SYRINGE	STANDARD CONC	ADMINISTRATION
digoxin Lanoxin®	0.25 mg/mL (250 mcg/mL)	-		1 mL solution + 9 mL D5W, D10W or NS	10 mL	25 mcg/mL[2]	Infuse over 15 minutes Use diluted product immediately Note separate load and maintenance programs on Medfusion pump
DOBUTamine Dobutrex®	12.5 mg/mL	-		4 mL solution + 21 mL D5W or NS	25 mL	2,000 mcg/mL	Infuse continuously Large vein preferred
DOPamine Inotropin®	1,600 mcg/mL premixed	-				1,600 mcg/mL	Infuse continuously Large vein preferred
enalaprilat Vasotec®	1.25 mg/mL (1,250 mcg/mL)	-		1 mL solution + 49 mL NS	50 mL	25 mcg/mL	Infuse over 5 minutes
EPINEPHrine – Resuscitation	0.1 mg/mL	-				0.1 mg/mL[4]	Push over seconds[4]
EPINEPHrine – Infusion	1 mg/mL	-		1 mL solution + 19 mL D5W	20 mL	50 mcg/mL	Infuse continuously Central line preferred[3] Dilution in NS may be an option[3] **High alert drug**

IMPORTANT STABILITY NOTE: Prepare dose within 60 minutes of administration. Discard remainder after administration.

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epoprostenol Caripul®	0.5 mg (500 mcg)	5 mL SWFI or NS[5] (Gently swirl contents; DO NOT SHAKE)	100 mcg/mL	1 mL reconstituted solution + 49 mL SWFI or NS	50 mL	2 mcg/mL[2] (2,000 ng/mL)	Infuse continuously Central line preferred[3] Protect from light[7] Use infusion set with in-line 0.22 micron filter[7]
erythromycin lactobionate Erythrocin®	500 mg	10 mL SWFI	50 mg/mL	1 mL reconstituted solution + 19 mL NS[3]	20 mL	2.5 mg/mL	Infuse over 60 minutes
esmolol Brevibloc®	2500 mg/250 mL (10 mg/mL) premixed	-				10 mg/mL (10,000 mcg/mL)	Infuse continuously[2]
ethacrynic acid Edecrin®	50 mg	50 mL D5W or NS[3]	1 mg/mL[3]	-		1 mg/mL[3]	Infuse over 10 minutes[2]
fentaNYL – for analgesia or sedation Sublimaze®, Duragesic®	50 mcg/mL	-		2 mL solution + 8 mL D5W or NS[3]	10 mL	10 mcg/mL	Infuse over 5 minutes[2] **OR** Infuse continuously (optional load over 10 minutes)[2] Note separate continuous and intermittent programs on Medfusion pump
fentaNYL – for intubation Sublimaze®, Duragesic®	50 mcg/mL	-		-		50 mcg/mL	Slow push over 1 minute[8] Use undiluted solution if 2 kg or greater Not on Medfusion pump
				1 mL solution + 9 mL D5W or NS[3]	10 mL	5 mcg/mL	

IMPORTANT STABILITY NOTE: Prepare dose within 60 minutes of administration. Discard remainder after administration.

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fluconazole Diflucan®	2 mg/mL (200 mg/100 mL)	-				2 mg/mL	**Load:** Infuse over 2 hours[3] **Maintenance/Prophylactic:** Infuse over 1 hour[3] Note separate load and maintenance programs on Medfusion pump
fosphenytoin Cerebyx®	50 mg PE/mL	-		2 mL solution + 8 mL D5W or NS	10 mL	10 mg PE/mL	**Load:** Infuse over 10 minutes (max rate: 2 mg PE/kg/min) **Maintenance:** Infuse over 4 minutes (max rate: 1 – 2 mg PE/kg/min) **PE = phenytoin sodium equivalents** Note separate load and maintenance programs on Medfusion pump
furosemide Lasix®	10 mg/mL	-		1 mL solution + 4 mL NS or D5W[3]	5 mL	2 mg/mL	Infuse over 15 minutes OR Infuse continuously[3] Note separate intermittent and continuous programs on Medfusion pump
ganciclovir Cytovene®	**Pharmacy to prepare – call on-call pharmacists if outside operational hours**					5 mg/mL	Infuse over 60 minutes **Hazardous drug**

IMPORTANT STABILITY NOTE: Prepare dose within 60 minutes of administration. Discard remainder after administration.

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gentamicin	10 mg/mL	-		2 mL solution + 8 mL NS or D5W	10 mL	2 mg/mL	Infuse over 30 minutes Except for the first dose, all penicillins should be spaced 1 hour from gentamicin and tobramycin
glucagon GlucaGen®	1 mg	1 mL of provided diluent	1 mg/mL	-		1 mg/mL	Push over 1 minute Flush with D5W or D10W before and after use[2] Not on Medfusion pump
				1 mL reconstituted solution + 24 mL D5W[3] or D10W	25 mL	40 mcg/mL[2]	Infuse continuously Flush with D5W or D10W before and after use[2]
heparin – hep lock	10 units/mL	-				10 units/mL[3]	0.5 to 1 mL/flush, frequency dependent on line (central vs peripheral lines)[3] Not on Medfusion pump
heparin – UAC line	0.5 unit heparin /mL	**Pharmacy to prepare – in 0.45% sodium chloride (77 mmol sodium chloride per litre), ward stock**				0.5 unit heparin/mL[3]	Infuse continuously[3]
heparin and sodium acetate – UAC line	0.5 unit heparin/mL + 77 mmol/L sodium acetate	**Pharmacy to prepare – in 77 mmol sodium acetate per litre, call on-call pharmacists if outside operational hours**				0.5 unit heparin/mL[3]	Infuse continuously[3]

IMPORTANT STABILITY NOTE: Prepare dose within 60 minutes of administration. Discard remainder after administration.

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heparin – thrombosis	25,000 units/500 mL (50 units/mL) premixed	-				50 units/mL[2]	Infuse continuously (optional load over 10 minutes) **High alert drug**
hydrALAZINE Apresoline®	20 mg/mL	-				20 mg/mL	Slow push over 30 seconds to 2 minutes May use undiluted if doses greater than 4 mg[2] Not on Medfusion pump
		-		0.5 mL solution + 9 mL NS	10 mL	1 mg/mL	
hydrocortisone Solu-Cortef®	100 mg	1.8 mL SWFI[2]	50 mg/mL[2]	0.1 mL reconstituted solution + 4.9 mL NS or D5W	5 mL	1 mg/mL	Infuse over 5 minutes[2] For Act-O-Vial: press activator to force diluent into powder compartment[3]
ibuprofen lysine NeoProfen®	10 mg/mL	-		2 mL solution + 3 mL D5W or NS	5 mL	4 mg/mL	Administer within 30 minutes of preparation Infuse over 15 minutes Flush IV line before and after administration of ibuprofen with 2 mL NS over 15 minutes[2]

IMPORTANT STABILITY NOTE: Prepare dose within 60 minutes of administration. Discard remainder after administration.

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imipenem = imipenem/ cilastatin combo Primaxin®	250 mg	Use 50 mL D5W or NS minibag with reconstitution device	5 mg/mL	-		5 mg/mL	Infuse over 20 to 30 minutes (pump defaults to 30 minutes)
	500 mg	Use 100 mL D5W or NS minibag with reconstitution device					
indomethacin Indocid®	**Pharmacy to prepare – call on-call pharmacists if outside operational hours**					0.1 mg/mL[2]	Infuse over 20 to 30 minutes (pump defaults to 30 minutes)
insulin regular	100 units/mL	-		**Two-step dilution**			Infuse continuously Final concentration is 0.1 units/mL Flush new tubing with 20 mL of the **diluted** insulin solution (0.1 units/mL) prior to start of infusion **High alert drug**
				First dilution: Pharmacy to prepare during operational hours 1 mL solution + 9 mL NS[4]	10 mL	10 units/mL	
				Second dilution: 0.5 mL diluted solution + 49.5 mL NS[4]	50 mL	0.1 units/mL	
isoproterenol Isuprel ®	0.2 mg/mL (200 mcg/mL)	-		1 mL solution + 9 mL D5W or NS	10 mL	20 mcg/mL	Infuse continuously

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levETIRAcetam	100 mg/mL	-		3 mL solution + 17 mL D5W or NS	20 mL	15 mg/mL	Infuse over 15 minutes
lidocaine – anti-arrhythmia	0.4% (4 mg/mL) premixed	-				4 mg/mL (4,000 mcg/mL)	**Load:** Infuse over 5 minutes (dosed in **mg/kg**) **Maintenance:** Infuse continuously (dosed in **mcg/kg/min**) **Use lidocaine cardiac programs on Medfusion pump** Note separate load and maintenance programs on Medfusion pump
lidocaine – seizure	0.4% (4 mg/mL) premixed	-				4 mg/mL (4,000 mcg/mL)	Infuse continuously (dosed in **mg/kg/hr**, optional load over 10 minutes) **Use lidocaine seizure program on Medfusion pump**

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linezolid Zyvoxam ®	200 mg/100 mL (2 mg/mL) premixed	-				2 mg/mL	Infuse over 30 to 60 minutes (pump defaults to 30 minutes)[2] Yellow discoloration doesn't affect potency[9]
LORazepam Ativan®	4 mg/mL	-		5 mL solution + 5 mL SWFI	10 mL	2 mg/mL	Slow push over 2 minutes[3] May use 2 mg/mL solution if doses greater than 0.4 mg **Pharmacy will send drug and empty vials for mixing** Not on Medfusion pump
				0.5 mL solution + 9.5 mL SWFI	10 mL	0.2 mg/mL[4]	
magnesium sulfate	20% solution (200 mg/mL)	-				200 mg/mL	Bolus over 1 to 2 minutes for resuscitation (pulseless torsades) **OR** Infuse over 30 minutes to 4 hours for hypomagnesemia (pump defaults to 60 minutes)[3] **High alert drug** Intermittent infusion available on Medfusion pump
meropenem Merrem®	500 mg	10 mL SWFI	50 mg/mL	4 mL reconstituted solution + 6 mL NS	10 mL	20 mg/mL	Infuse over 30 minutes

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metroNIDAZOLE	5 mg/mL premixed	-				5 mg/mL	Infuse over 30 to 60 minutes (pump defaults to 45 minutes)
micafungin Mycamine ®	50 mg	5 mL NS or D5W (gently swirl, don't shake)	10 mg/mL	2 mL reconstituted solution + 18 mL NS or D5W	20 mL	1 mg/mL	Infuse over 60 minutes Protect from light Flush before and after with NS
midazolam	5 mg/mL (5,000 mcg/mL)	-		1 mL solution + 9 mL D5W or NS	10 mL	0.5 mg/mL[3] (500 mcg/mL)	Infuse over 10 minutes or Infuse continuously (optional load/bolus over 30 minutes[2]) **Pharmacy will send drug and empty vials for mixing** Note separate intermittent and continuous programs on Medfusion pump
				2.5 mL solution + 22.5 mL D5W or NS	25 mL		
milrinone Primacor®	1 mg/mL (1,000 mcg/mL)	-		3 mL solution + 27 mL D5W or NS	30 mL	100 mcg/mL	Infuse continuously (optional load over 15 or 60 minutes depending on dose) No load recommended less than 30 weeks gestational age

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morphine	2 mg/mL (2,000 mcg/mL)	-		0.5 mL solution + 19.5 mL D5W or NS[3]	20 mL	50 mcg/mL	Infuse over 5 to 30 minutes[2,4] (pump defaults to 10 minutes) **OR** Infuse continuously (optional load/bolus over 30 minutes)[2] Note separate continuous and intermittent programs on Medfusion pump
naloxone Narcan®	0.4 mg/mL	-				0.4 mg/mL	Push over 30 seconds[3,4] Not on Medfusion pump
norepinephrine Levophed®	1 mg/mL (1,000 mcg/mL)	-		1 mL solution + 19 mL D5W	20 mL	50 mcg/mL[2]	Infuse continuously Central line or large peripheral vein Administer with dextrose-containing solution **High alert drug**
octreotide Sandostatin®	100 mcg/mL	-		1 mL solution + 9 mL D5W or NS	10 mL	10 mcg/mL	Infuse over 15 to 30 minutes (pump defaults to 15 minutes) **OR** Infuse continuously Note separate intermittent and continuous programs on Medfusion pump

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pamidronate	3 mg/mL (30 mg/10 mL)	-		1 mL solution + 29 mL D5W or NS[3]	30 mL	0.1 mg/mL[3]	Slow infusion over 4 hours[3] **Hazardous drug**
pantoprazole	40 mg	10 mL NS	4 mg/mL	5 mL reconstituted solution + 20 mL NS or D5W	25 mL	0.8 mg/mL	Infuse over 15 to 30 minutes (pump defaults to 15 minutes) **OR** Infuse continuously (optional load over 15 minutes)[2] Flush line with D5W or NS before and after administration Note separate intermittent and continuous programs on Medfusion pump
penicillin G sodium	1 million-units	1.8 mL SWFI	500,000 units/mL	2 mL reconstituted solution + 8 mL SWFI	10 mL	100,000 units/mL	Infuse over 15 to 30 minutes[4] (pump defaults to 30 minutes, minimum 30 minutes for meningitis dose) **Medfusion program set as volume over time** Except for the first dose, all penicillins should be spaced 1 hour from gentamicin and tobramycin

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PHENobarbital	30 mg/mL	-		-		30 mg/mL	**Load:** Infuse over 15 to 30 minutes (pump defaults to 20 minutes) **Max rate is 1 mg/kg/min[2]**
				1 mL solution + 2 mL NS	3 mL	10 mg/mL	**Maintenance:** Infuse over 15 minutes **Max rate is 1 mg/kg/min[2]**
phenytoin Dilantin®	50 mg/mL	-		2 mL solution + 8 mL NS	10 mL	10 mg/mL	**Load:** Infuse over 30 minutes[3] **Maintenance:** Infuse over 10 minutes **Max rate is 0.5 to 1 mg/kg/min[2,3]** Flush IV with saline before and after administration Use 0.22 micron filter Incompatible with dextrose solution Administration via PICC not recommended if avoidable (high potential for line occlusion) Note separate load and maintenance programs on Medfusion pump

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phytonadione (Vitamin K)	10 mg/mL	-				10 mg/mL	Give slowly over 1 minute **Max rate is 1 mg/min** Not on Medfusion pump
piperacillin/ tazobactam Tazocin®	2 g piperacillin/ 0.25 g tazobactam	8.4 mL SWFI, D5W or NS	200 mg piperacillin/mL	2 mL reconstituted solution + 6 mL D5W or NS	8 mL	50 mg piperacillin/mL[3]	Infuse over 30 minutes Except for the first dose, all penicillins should be spaced 1 hour from gentamicin and tobramycin
potassium chloride	10 mmoL in 100 mL premixed	-				0.1 mmol/mL[2]	Consider K+ from all IV sources Peripheral line max rate: 0.2 mmol/kg/hr Central Line max rate: 0.5 mmol/kg/hr Pump does not check this, confirm IV rate with Pharmacist **High alert drug**
procainamide Pronestyl®	100 mg/mL	-		1 mL solution + 4 mL NS	5 mL	20 mg/mL	Infuse over 30 to 60 minutes (Pump defaults to 60 minutes, dosed in **mg/kg**)
				0.2 mL + 9.8 mL NS	10 mL	2 mg/mL (2,000 mcg/mL)	Infuse continuously (Dosed in **mcg/kg/min**)
				1 mL solution + 49 mL NS	50 mL		

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propranolol Inderal®	1 mg/mL	-		1 mL solution + 9 mL NS	10 mL	0.1 mg/mL	Infuse over 10 minutes
pyridoxine Vitamin B_6	100 mg/mL	-				100 mg/mL	Push over 1 to 2 minutes[2] Not on Medfusion pump
raNITIdine Zantac®	1 mg/mL premixed	-				1 mg/mL	Infuse over 5 minutes
rocuronium Zemuron®	10 mg/mL	-		-		10 mg/mL	Push over 5 to 10 seconds (Dosed in **mg/kg/dose**) **High alert drug** Use undiluted solution if 2 kg or greater Not on Medfusion pump
				1 mL solution + 1 mL NS	2 mL	5 mg/mL	
				2 mL solution + 8 mL NS or D5W	10 mL	2 mg/mL (2,000 mcg/mL)	Infuse continuously (Dosed in **mcg/kg/min**) **High alert drug**
				10 mL solution + 40 mL NS or D5W	50 mL		
sodium bicarbonate	0.5 mEq/mL (0.5 mmol/mL)	-				0.5 mmol/mL	Infuse slowly over 30 to 60 minutes[2] (pump defaults to 60 minutes) Avoid infusing with phosphate or calcium containing solutions

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sodium chloride (normal saline)	0.9%	-				0.9% (0.154 mmol/mL)	Bolus over 5 to 60 minutes[3,4] (pump defaults to 20 minutes) **OR** Infuse continuously Note separate bolus and continuous programs on Medfusion pump
sodium chloride (hypertonic saline)	3%	-				3% (0.51 mmol/mL)	Infuse over 10 minutes to 6 hours depending on severity of hyponatremia[2] **High alert drug**
succinylcholine	20 mg/mL	-		-		20 mg/mL	Push over 10 to 30 seconds[4] Use undiluted solution if 2 kg or greater Not on Medfusion pump
				0.5 mL solution + 0.5 mL D5W or NS	1 mL	10 mg/mL	
tobramycin	10 mg/mL	-		2 mL solution + 8 mL D5W or NS	10 mL	2 mg/mL	Infuse over 20 to 60 minutes (pump defaults to 30 minutes) Except for the first dose, all penicillins should be spaced 1 hour from gentamicin and tobramycin

IMPORTANT STABILITY NOTE: Prepare dose within 60 minutes of administration. Discard remainder after administration.

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Last revised: July 2020

<table>
<tr><th>DRUG</th><th>STRENGTH</th><th>RECONSTITUTION VOLUME</th><th>CONC AFTER RECONSTITUTION</th><th>DILUTION INSTRUCTIONS</th><th>TOTAL VOLUME IN SYRINGE</th><th>STANDARD CONC</th><th>ADMINISTRATION</th></tr>
<tr><td rowspan="3">vancomycin
Vancocin®</td><td rowspan="3">500 mg</td><td colspan="5">Pharmacy to prepare 5 or 10 mg/mL during operational hours
Please indicate line access to pharmacy</td><td rowspan="3">Infuse over
60 to 120 minutes
(pump defaults to
60 minutes)</td></tr>
<tr><td rowspan="2">10 mL SWFI</td><td rowspan="2">50 mg/mL</td><td>1 mL reconstituted solution + 4 mL D5W or NS</td><td>5 mL</td><td>Central line:
10 mg/mL</td></tr>
<tr><td>1mL reconstituted solution + 9 mL D5W or NS</td><td>10 mL</td><td>Peripheral line:
5 mg/mL</td></tr>
<tr><td>vasopressin</td><td>20 units/mL</td><td colspan="2">-</td><td>0.5 mL solution + 49.5 mL D5W or NS[3]</td><td>50 mL</td><td>0.2 units/mL[3]
(200 milliunits/mL)</td><td>Infuse continuously[3]

Central line preferred[3]

(Dosed in milliunits/kg/min)</td></tr>
<tr><td>zidovudine
Retrovir®</td><td>10 mg/mL</td><td colspan="2">-</td><td>4 mL solution + 6 mL D5W or NS</td><td>10 mL</td><td>4 mg/mL</td><td>Infuse over 60 minutes[2]

Pharmacy to prepare for ongoing use due to hazardous nature of drug

Hazardous drug</td></tr>
</table>

References:
1. IBM Micromedex® Neofax® and Pediatrics (electronic version). IBM Watson Health, Greenwood Village, Colorado, USA. Available at: https://www.micromedexsolutions.com/
2. BC Children's and Women's Hospital (C&W) Online Formulary. Pediatric Drugs, Vancouver, BC: BC Children's and Women's Hospital
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5. Cancidas [Product Monograph], Kirkland, QC: Merck Canada Inc.; Apr 2017.
6. Bailey C editor. Cosyntropin in IV drug monograph. Island Health, Victoria, BC. June 2018.
7. Caripul [Product Monograph], Toronto, ON: Janssen, Inc.; May 2019.
8. Barrington KJ. Premedication for endotracheal intubation in the newborn infant. Paediatr Child Health 2011; 16(3): 159-164.
9. Zyvoxam [Product Monograph], Krikland, QC: Pfizer Canada, Inc.; Jan 2015.

IMPORTANT STABILITY NOTE: Prepare dose within 60 minutes of administration. Discard remainder after administration.

Notes:
- All information from NeoFax[1] unless otherwise specified. References provided at the end of the table on page 23
- SWFI = preservative-free sterile water for injection, NS = preservative free normal saline for injection, D5W = 5% dextrose in water, D10W = 10% dextrose in water

PEDIATRIC SYRINGE PUMP RECONSTITUTION AND DILUTION TABLE*

PART 1 - INTERMITTENT MEDICATIONS

***This table to be used in conjunction with relevant Island Health IV monographs**

May 2020

Medication	Dose Limit for Syringe Pump – Higher doses must be given via Minibag	Vial Strength	Use this volume to reconstitute vial*	Concentration after Reconstitution	Dilution Instructions	Total Volume in Syringe	Standard Concentration for Infusion	Standard Infusion Time
acetaZOLAMIDE	All doses via syringe pump	500 mg	5 mL	100 mg/mL			100 mg/mL	15 minutes
acyclovir	350 mg	50 mg/mL	n/a		7 mL solution + 43 mL SWFI	50 mL	7 mg/mL	60 minutes
amikacin	500 mg	250 mg/mL	n/a		2 mL solution + 48 mL SWFI	50 mL	10 mg/mL	30 minutes
aminophylline LOADING DOSE	500 mg	25 mg/mL	n/a		20 mL solution + 30 mL SWFI	50 mL	10 mg/mL	30 minutes
amiodarone	150 mg	50 mg/mL	n/a		3 mL solution + 47 mL SWFI	50 mL	3 mg/mL	30 minutes
amphotericin B conventional	5 mg	50 mg vial	10 mL	5 mg/mL	1 mL solution + 49 mL **D5W**	50 mL	0.1 mg/mL	2 hours
amphotericin B liposomal			Pharmacy to prepare				2 mg/mL	2 hours
ampicillin	2500 mg	250 mg vial	1.2 mL	200 mg/mL	Withdraw entire reconstituted volume; add SWFI to make total volume of 5 mL	5 mL	50 mg/mL	30 minutes pediatrics 10 minutes **newborn**
ampicillin	2500 mg	500 mg vial	2.3 mL	200 mg/mL	Withdraw entire reconstituted volume; add SWFI to make total volume of 10 mL	10 mL	50 mg/mL	30 minutes pediatrics 10 minutes **newborn**
ampicillin	2500 mg	1 g vial	4.5 mL	200 mg/mL	Withdraw entire reconstituted volume; add SWFI to make total volume of 20 mL	20 mL	50 mg/mL	30 minutes pediatrics 10 minutes **newborn**
ampicillin	2500 mg	2 g vial	9 mL	200 mg/mL	Withdraw entire reconstituted volume; add SWFI to make total volume of 40 mL	40 mL	50 mg/mL	30 minutes pediatrics 10 minutes **newborn**
azithromycin	100 mg	500 mg vial	4.8 mL	100 mg/mL	1 mL reconstituted solution + 49 mL SWFI	50 mL	2 mg/mL	60 minutes

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‡Note: multiple concentrations available; confirm concentration before preparing dose

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caffeine citrate	All doses via syringe pump	20 mg/mL	n/a				20 mg/mL	Loading: 30 mins Maintenance: 10 mins
calcium gluconate	All doses via syringe pump	100 mg/mL	n/a		10 mL solution + 10 mL SWFI	20 mL	50 mg/mL	20 minutes
caspofungin	25 mg	50 mg vial	10.5 mL **NS**	5 mg/mL	5 mL reconstituted solution + 45 mL **NS**	50 mL	0.5 mg/mL	60 minutes
caspofungin	25 mg	70 mg vial	10.5 mL **NS**	7 mg/mL	3.6 mL reconstituted solution + 46.4 mL **NS**	50 mL	0.5 mg/mL	60 minutes
ceFAZolin	All doses via syringe pump	500 mg vial	4.8 mL	100 mg/mL			100 mg/mL	30 minutes
ceFAZolin	All doses via syringe pump	1 g vial	9.5 mL	100 mg/mL			100 mg/mL	30 minutes
cefepime	All doses via syringe pump	1 g vial	10 mL	100 mg/mL			100 mg/mL	30 minutes
cefepime	All doses via syringe pump	2 g vial	17.5 mL	100 mg/mL			100 mg/mL	30 minutes
cefotaxime	All doses via syringe pump	1 g vial	9.6 mL	100 mg/mL			100 mg/mL	30 minutes pediatrics 10 minutes **newborn**
ceFOXitin	All doses via syringe pump	1 g vial	9.5 mL	100 mg/mL			100 mg/mL	30 minutes
ceFOXitin	All doses via syringe pump	2 g vial	19 mL	100 mg/mL			100 mg/mL	30 minutes

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ceftaroline	All doses via syringe pump	600 mg	20 mL	30 mg/mL	20 mL solution + 30 mL NS	50 mL	12 mg/mL	60 minutes
cefTAZidime	All doses via syringe pump	1 g vial	9.4 mL	100 mg/mL			100 mg/mL	30 minutes
cefTAZidime	All doses via syringe pump	2 g vial	18.8 mL	100 mg/mL			100 mg/mL	30 minutes
cefTRIAXone	All doses via syringe pump	250 mg vial	2.4 mL	100 mg/mL			100 mg/mL	30 minutes
cefTRIAXone	All doses via syringe pump	1 g vial	9.6 mL	100 mg/mL			100 mg/mL	30 minutes
cefTRIAXone	All doses via syringe pump	2 g vial	19.2 mL	100 mg/mL			100 mg/mL	30 minutes
cefuroxime	All doses via syringe pump	750 mg vial	7.2 mL	100 mg/mL			100 mg/mL	30 minutes
cefuroxime	All doses via syringe pump	1.5 g vial	14.4 mL	100 mg/mL			100 mg/mL	30 minutes
chloramphenicol	All doses via syringe pump	1 g vial	10 mL	100 mg/mL	Withdraw entire reconstituted volume; add SWFI to make total volume of 40 mL	40 mL	25 mg/mL	30 minutes
ciprofloxacin	100 mg	2 mg/mL	n/a				2 mg/mL	60 minutes
clindamycin	600 mg	150 mg/mL (2 mL vial)	n/a		2 mL solution + 23 mL SWFI	25 mL	12 mg/mL	45 minutes
clindamycin	600mg	150 mg/mL (4 mL vial)	n/a		4 mL solution + 46 mL SWFI	50 mL	12 mg/mL	45 minutes

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cloxacillin	2500 mg	250 mg vial	2.4 mL	100 mg/mL	Withdraw entire reconstituted volume; add SWFI to make total volume of 5 mL	5 mL	50 mg/mL	60 minutes
cloxacillin	2500 mg	500 mg vial	4.8 mL	100 mg/mL	Withdraw entire reconstituted volume; add SWFI to make total volume of 10 mL	10 mL	50 mg/mL	60 minutes
cloxacillin	2500 mg	1 g vial	9.6 mL	100 mg/mL	Withdraw entire reconstituted volume; add SWFI to make total volume of 20 mL	20 mL	50 mg/mL	60 minutes
cloxacillin	2500 mg	2 g vial	18.8 mL	100 mg/mL	Withdraw entire reconstituted volume; add SWFI to make total volume of 40 mL	40 mL	50 mg/mL	60 minutes
colistin (as colistimethate)	All doses via syringe pump	150 mg	2 mL	75 mg/mL	2 mL solution + 13 mL NS	15 mL	10 mg/mL	30 minutes
cotrimoxazole	80 mg trimethoprim component (5 mL solution)	16 mg/mL (trimethoprim component) 5 mL amp	n/a		5 mL solution + 45 mL D5W (preferred) or NS	50 mL	1.6 mg/mL (trimethoprim component)	60 minutes
DAPTOmycin	All doses via syringe pump	500 mg	10 mL **DO NOT SHAKE**	50 mg/mL	Use solution undiluted		50 mg/mL	30 minutes
desmopressin	All doses via syringe pump	4 mcg/mL	n/a		2 mL solution + 2 mL SWFI	4 mL	2 mcg/mL	30 minutes
dexamethasone	All doses via syringe pump	4 mg/mL‡	n/a		2 mL solution‡ + 2 mL SWFI	4 mL	2 mg/mL	10 minutes
diazepam IV push	All doses via syringe pump	5 mg/mL	n/a		Use solution undiluted		5 mg/mL	3 – 5 minutes; refer to IV monograph
digoxin	1250 mcg (1.25 mg)	250 mcg/mL (0.25 mg/mL)	n/a		1 mL solution + 9 mL SWFI	10 mL	25 mcg/mL	15 minutes
dihydroergotamine	All doses via syringe pump	1 mg/mL	n/a		1 mL solution + 19 mL **NS**	20 mL	0.05 mg/mL	15 minutes

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dimenhyDRINATE	All doses via syringe pump	50 mg/mL	n/a		1 mL solution + 4 mL SWFI	5 mL	10 mg/mL	20 minutes
diphenhydrAMINE	All doses via syringe pump	50 mg/mL	n/a		1 mL solution + 9 mL SWFI	10 mL	5 mg/mL	15 minutes
enalaprilat	All doses via syringe pump	1.25 mg/mL	n/a		2 mL solution + 8 mL SWFI	10 mL	0.25 mg/mL	5 minutes
ertapenem	All doses via syringe pump	1 g vial	10 mL	100 mg/mL	Withdraw entire reconstituted volume; add SWFI to make total volume of 50 mL	50 mL	20 mg/mL	30 minutes
erythromycin	125 mg	500 mg vial	10 mL	50 mg/mL	2.5 mL reconstituted solution + 47.5 mL SWFI	50 mL	2.5 mg/mL	60 minutes
erythromycin	125 mg	1 g vial	20 mL	50 mg/mL	2.5 mL reconstituted solution + 47.5 mL SWFI	50 mL	2.5 mg/mL	60 minutes
estrogens, conjugated	All doses via syringe pump	25mg vial	5 mL	5 mg/mL		5 mL	5 mg/mL	5 minutes
ethacrynic acid	All doses via syringe pump	50 mg vial	25 mL NS	2 mg/mL		25 mL	2 mg/mL	30 minutes
fluconazole	100 mg	2 mg/mL	n/a				2 mg/mL	60 minutes
fomepizole	1000 mg	1000 mg/mL			1 mL solution + 49 mL SWFI	50 mL	20 mg/mL	30 minutes
fosphenytoin	500 mg **PE**	50 mg/mL **PE**	n/a		10 mL solution + 40mL SWFI	50 mL	10 mg/mL **PE**	15 minutes

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furosemide	250 mg	10 mg/mL	n/a		2 mL solution + 2 mL SWFI	4 mL	5 mg/mL	20 minutes
ganciclovir			Pharmacy to prepare				10 mg/mL	60 minutes
gentamicin dose less than 80 mg	All doses via syringe pump	40 mg/mL‡	n/a		2 mL solution‡ + 6 mL SWFI	8 mL	10 mg/mL	30 minutes
gentamicin 80 mg to 160 mg	All doses via syringe pump	40 mg/mL‡	n/a		4 mL solution‡ + 12 mL SWFI	16 mL	10 mg/mL	30 minutes
gentamicin 160 mg to 320 mg	All doses via syringe pump	40 mg/mL‡	n/a		8 mL solution‡ + 24 mL SWFI	32 mL	10 mg/mL	30 minutes
gentamicin 320 mg to 400 mg	All doses via syringe pump	40 mg/mL‡	n/a		10 mL solution‡ + 30 mL SWFI	40 mL	10 mg/mL	30 minutes
gentamicin 400 mg to 500 mg	500 mg	40 mg/mL‡	n/a		12.5 mL solution‡ + 37.5 mL SWFI	50 mL	10 mg/mL	30 minutes
glycopyrrolate	All doses via syringe pump	200 mcg/mL	n/a		1 mL solution + 9 mL SWFI	10 mL	20 mcg/mL	15 minutes
heparin Loading Dose	5000 units	5000 units in 0.5 mL	n/a		0.5mL solution + 49.5 mL NS or D5W	50 mL	100 unit/mL	10 minutes
hydrALAZINE	All doses via syringe pump	20 mg/mL	n/a		1 mL solution + 19 mL SWFI	20 mL	1 mg/mL	15 minutes
hydrocortisone	250 mg	100 mg vial	2 mL	50 mg/mL	2 mL solution + 18 mL SWFI	20 mL	5 mg/mL	30 minutes
hydrocortisone	250 mg	250 mg vial	2 mL	125 mg/mL	2 mL solution + 48 mL SWFI	50 mL	5 mg/mL	30 minutes
HYDROmorphone intermittent	All doses via syringe pump	2 mg/mL‡	n/a		1 mL solution‡ + 9 mL SWFI	10 mL	0.2 mg/mL	15 minutes
hyoscine butylbromide (Buscopan®)	All doses via syringe pump	20 mg/mL	n/a		1 mL solution + 49 mL SWFI	50 mL	0.4 mg/mL	20 minutes

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imipenem	250 mg	250 mg	Use 50 mL minibag with reconstitution device	5 mg/mL		Up to 50 mL	5 mg/mL	30 minutes
imipenem	250 mg	500 mg	Use 100 mL minibag with reconstitution device	5 mg/mL		Up to 50 mL	5 mg/mL	30 minutes
iron sucrose	100 mg	20 mg/mL	n/a		5 mL solution + 45 mL **NS**	50 mL	2 mg/mL	30 minutes
ketorolac	All doses via syringe pump	10 mg/mL‡	n/a		1 mL solution + 9 mL SWFI	10 mL	1 mg/mL	20 minutes
ketorolac	All doses via syringe pump	30 mg/mL‡	n/a		1 mL solution + 29 mL SWFI	30 mL	1 mg/mL	20 minutes
lacosamide	All doses via syringe pump	10 mg/mL	n/a				10 mg/mL	30 minutes
levETIRAcetam doses up to 500 mg	All doses via syringe pump	100 mg/mL	n/a		5 mL solution + 5 mL NS	10 mL	50 mg/mL	10 minutes For status epilepticus only
levETIRAcetam 501 mg to 1000 mg	All doses via syringe pump	100 mg/mL	n/a		10 mL solution + 10 mL NS	20 mL	50 mg/mL	10 minutes For status epilepticus only
levETIRAcetam 1001 mg to 1500 mg	All doses via syringe pump	100 mg/mL	n/a		15 mL solution + 15 mL NS	30 mL	50 mg/mL	10 minutes For status epilepticus only
levETIRAcetam 1501 mg – 2000 mg	All doses via syringe pump	100 mg/mL	n/a		20 mL solution + 20 mL NS	40 mL	50 mg/mL	10 minutes For status epilepticus only
levETIRAcetam 2001 – 2500 mg	2500 mg	100 mg/mL	n/a		25 mL solution + 25 mL NS	50 mL	50 mg/mL	10 minutes For status epilepticus only
levOCARNitine	400 mg	200 mg/mL	n/a		2 mL solution + 48 mL NS	50 mL	8 mg/mL	15 minutes
linezolid	100 mg	2 mg/mL	n/a				2 mg/mL	30 minutes

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magnesium sulfate	All doses via syringe pump	200 mg/mL	n/a		Use solution undiluted		200 mg/mL	20 minutes OR 4 hours See IV monograph
meperidine	50 mg	50 mg/mL‡	n/a		1 mL solution‡ + 49 mL SWFI	50 mL	1 mg/mL	15 minutes
meropenem	All doses via syringe pump	500 mg	10 mL	50 mg/mL			50 mg/mL	30 minutes
meropenem	All doses via syringe pump	1 g	20 mL	50 mg/mL			50 mg/mL	30 minutes
mesna	1000 mg	100 mg/mL	n/a		10 mL solution + 40 mL SWFI	50 mL	20 mg/mL	15 minutes
methotrimeprazine	All doses via syringe pump	25 mg/mL	n/a		1 mL solution + 24 mL SWFI	25 mL	1 mg/mL	30 minutes
methylPREDNISolone	125 mg	40 mg vial	1 mL	40 mg/mL	1 mL solution + 15 mL SWFI	16 mL	2.5 mg/mL	30 minutes
methylPREDNISolone	125 mg	125 mg vial	2 mL	62.5 mg/mL	2 mL solution + 48 mL SWFI	50 mL	2.5 mg/mL	30 minutes
metoclopramide	All doses via syringe pump	5 mg/mL	n/a		2 mL solution + 18 mL SWFI	20 mL	0.5 mg/mL	20 minutes
metroNIDAZOLE	250 mg	5 mg/mL	n/a				5 mg/mL	30 minutes
morphine intermittent	All doses via syringe pump	2 mg/mL‡	n/a		1 mL solution‡ + 1 mL SWFI	2 mL	1 mg/mL **pediatric concentration**	15 minutes
morphine intermittent	All doses via syringe pump	10 mg/mL‡	n/a		1 mL solution‡ + 9 mL SWFI	10 mL	1 mg/mL **pediatric concentration**	15 minutes
morphine intermittent newborn	All doses via syringe pump	2 mg/mL‡	n/a		0.5 mL solution‡ + 4.5 mL SWFI	5 mL	0.2 mg/mL **newborn concentration**	5 minutes
morphine intermittent newborn	All doses via syringe pump	10 mg/mL‡	n/a		0.1 mL solution‡ + 4.9 mL SWFI	5 mL	0.2 mg/mL **newborn concentration**	5 minutes
mycophenolate	500 mg Pharmacy to prepare during pharmacy hours	500 mg vial	14 mL **D5W**		Withdraw entire reconstituted volume; add **D5W** to make total volume of 50 mL	50 mL	10 mg/mL	2 hours Hazardous Drug-Low Risk

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octreotide	All doses via syringe pump	50 mcg/mL ‡	n/a		1 mL solution‡ + 1.5 mL SWFI	2.5 mL	20 mcg/mL	15 minutes
octreotide	All doses via syringe pump	100 mcg/mL‡	n/a		1 mL solution‡ + 4 mL SWFI	5 mL	20 mcg/mL	15 minutes
octreotide	All doses via syringe pump	500 mcg/mL ‡	n/a		1 mL solution ‡ + 24 mL SWFI	25 mL	20 mcg/mL	15 minutes
ondansetron	All doses via syringe pump	2 mg/mL 2 mL vial	n/a		2 mL solution + 6 mL SWFI	8 mL	0.5 mg/mL	15 minutes
ondansetron	All doses via syringe pump	2 mg/mL 4 mL vial	n/a		4 mL solution + 12 mL SWFI	16 mL	0.5 mg/mL	15 minutes
pamidronate	18 mg	3 mg/mL‡			6 mL solution‡ + 44 mL SWFI	50 mL	0.36 mg/mL	4 hours
pantoprazole	80mg loading dose 40 mg intermittent dose	40 mg vial	10 mL **NS**	4 mg/mL	Withdraw entire reconstituted volume	10 mL	4 mg/mL	15 minutes
penicillin G Sodium	All doses via syringe pump	1 million units vial	1.8 mL	500, 000 units/mL	Withdraw entire reconstituted volume; add SWFI to make total volume of 10 mL	10 mL	100,000 units/mL	30 minutes
penicillin G Sodium	All doses via syringe pump	5 million units vial	8.2 mL	500, 000 units/mL	Withdraw entire reconstituted volume; add SWFI to make total volume of 50 mL	50 mL	100,000 units/mL	30 minutes
pentamidine	300 mg	300 mg vial	3 mL	100 mg/mL	Withdraw entire reconstituted volume; add SWFI to make total volume of 50 mL	50 mL	6 mg/mL	60 minutes
PHENobarbital	500 mg	30 mg/mL‡	n/a		1 mL solution‡ + 2 mL **NS**	3 mL	10 mg/mL	60 minutes* See monograph
PHENobarbital	500 mg	120 mg/mL‡	n/a		1 mL solution‡ + 11 mL **NS**	12 mL	10 mg/mL	60 minutes* See monograph

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PEDIATRIC SYRINGE PUMP RECONSTITUTION AND DILUTION TABLE*

PART 1 - INTERMITTENT MEDICATIONS

***This table to be used in conjunction with relevant Island Health IV monographs**

May 2020

Medication	Dose Limit for Syringe Pump – Higher doses must be given via Minibag	Vial Strength	Use this volume to reconstitute vial*	Concentration after Reconstitution	Dilution Instructions	Total Volume in Syringe	Standard Concentration for Infusion	Standard Infusion Time
phenytoin	250 mg	50 mg/mL (2 mL vial)	n/a		2 mL solution + 18 mL **NS**	20 mL	5 mg/mL	Loading: 30 mins Maintenance: 20 mins
phenytoin	250 mg	50 mg/mL (5 mL vial)	n/a		5 mL solution + 45 mL **NS**	50 mL	5 mg/mL	Loading: 30 mins Maintenance: 20 mins
phosphate potassium for administration via **peripheral line**	3mmol	15 mmol in 250 mL minibag‡	n/a		Use solution undiluted	50 mL	0.06 mmol/mL	4 hours
		15 mmol in 125mL minibag‡	n/a		25 mL solution + 25 mL D5W			
phosphate potassium for administration via **central line**	6 mmol	15 mmol in 125mL minibag‡	n/a		Use solution undiluted		0.12 mmol/mL **via central line only**	4 hours
phosphate sodium	6 mmol	15 mmol in 125 mL minibag	n/a		Use solution undiluted		0.12 mmol/mL	4 hours
piperacillin-tazobactam	All doses via syringe pump	2.25 g vial (2 g piperacillin + 0.25 g tazobactam)	8.4 mL	200 mg/mL (as piperacillin)	Withdraw entire reconstituted volume; add SWFI to make total volume of 20 mL	20 mL	100 mg/mL (as piperacillin)	30 minutes
piperacillin-tazobactam	All doses via syringe pump	3.375 g vial (3 g piperacillin + 0.375 g tazobactam)	12.6 mL	200 mg/mL (as piperacillin)	Withdraw entire reconstituted volume; add SWFI to make total volume of 30 mL	30 mL	100 mg/mL (as piperacillin)	30 minutes
piperacillin-tazobactam	All doses via syringe pump	4.5 g vial (4 g piperacillin + 0.5 g tazobactam)	16.8 mL	200 mg/mL (as piperacillin)	Withdraw entire reconstituted volume; add SWFI to make total volume of 40 mL	40 mL	100 mg/mL (as piperacillin)	30 minutes

* Use SWFI to reconstitute vial unless otherwise specified **SWFI = Sterile Water For Injection **without** preservatives

‡Note: multiple concentrations available; confirm concentration before preparing dose

Medications prepared by pharmacy during regular hours at VGH site only include ceFAZolin, cefTRIAXone, cefUROXIME, clindamycin, cloxacillin, vancomycin

IMPORTANT STABILITY NOTE: Prepare dose within 60 minutes of administration. Discard remainder after administration.

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potassium chloride via **peripheral** line	5 mmol	10 mmol in 100 mL minibag			Use solution undiluted		0.1 mmol/mL	Consider K+ from all IV sources. **Max rate 0.3mmol/kg/h peripheral line** **Max rate 0.5mmol/kg/h central line** Pump does not check this. Confirm IV rate with Pharmacy
potassium chloride via **central** line	19 mmol	40 mmol in 100 mL minibag			Use solution undiluted		0.4 mmol/mL **central line only**	
pralidoxime	All doses via syringe pump	1000 mg vial	20 mL	50 mg/mL			50 mg/mL	15 minutes
propranolol	All doses via syringe pump	1 mg/mL	n/a		1 mL solution + 9 mL SWFI	10 mL	0.1 mg/mL	10 minutes
propranolol	All doses via syringe pump	1 mg/mL	n/a		3 mL solution + 27 mL SWFI	30 mL	0.1 mg/mL	10 minutes
protamine	All doses via syringe pump	10 mg/mL	n/a				10 mg/mL	
pyridoxine	1000 mg	100 mg/mL			1 mL solution + 4 mL SWFI	5 mL	20 mg/mL	15 minutes
ranitidine	All doses via syringe pump	25 mg/mL	n/a		2 mL solution + 23 mL SWFI	25 mL	2 mg/mL	20 minutes
sodium chloride 4 mmol/mL (23.4%)	All doses via syringe pump	4 mmol/mL	n/a		Use solution undiluted		4 mmol/mL	10 minutes
sodium ferric gluconate	125 mg	12.5 mg/mL	n/a		5 mL solution + 20 mL **NS**	25 mL	2.5 mg/mL	60 minutes
tacrolimus	1 mg		Pharmacy to prepare				0.02 mg/mL	See monograph
tigecycline	All dose via syringe pump	50 mg	5.3 mL NS or D5W	10 mg/mL	5 mL solution + 45 mL NS	50 mL	1 mg/mL	30 minutes

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tobramycin dose less than 80 mg	All doses via syringe pump	40 mg/mL‡	n/a		2 mL solution‡ + 6 mL SWFI	8 mL	10 mg/mL	30 minutes
tobramycin 80 mg to 160 mg	All doses via syringe pump	40 mg/mL‡	n/a		4 mL solution‡ + 12 mL SWFI	16 mL	10 mg/mL	30 minutes
tobramycin 160 mg to 320 mg	All doses via syringe pump	40 mg/mL‡	n/a		8 mL solution‡ + 24 mL SWFI	32 mL	10 mg/mL	30 minutes
tobramycin 320 mg to 400 mg	All doses via syringe pump	40 mg/mL‡	n/a		10 mL solution‡ + 30 mL SWFI	40 mL	10 mg/mL	30 minutes
tobramycin 400 mg to 500 mg	500 mg	40 mg/mL‡	n/a		12.5 mL solution‡ + 37.5 mL SWFI	50 mL	10 mg/mL	30 minutes
tranexamic acid	All doses via syringe pump	100 mg/mL	n/a				100 mg/mL	10 minutes
valproate sodium	500 mg	100 mg/mL	n/a		5 mL solution + 45 mL SWFI	50 mL	10 mg/mL	15 minutes
vancomycin **central** line	500 mg	500 mg vial	10 mL	50 mg/mL	Withdraw entire reconstituted volume; add SWFI to make total volume of 50 mL	50 mL	10 mg/mL **central line only**	60 minutes
vancomycin **central** line	500 mg	1 g vial	20 mL	50 mg/mL	10 mL solution + 40 mL SWFI	50 mL	10 mg/mL **central line only**	60 minutes
vancomycin **peripheral** line	250 mg	500 mg vial	10 mL	50 mg/mL	5 mL solution + 45 mL SWFI	50 mL	5 mg/mL **peripheral line**	60 minutes
vancomycin **peripheral** line	250 mg	1 g vial	20 mL	50 mg/mL	5 mL solution + 45 mL SWFI	50 mL	5 mg/mL **peripheral line**	60 minutes

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voriconazole	200 mg	200 mg vial	19 mL	10 mg/mL	Withdraw entire reconstituted volume; add SWFI to make total volume of 50 mL	50 mL	4 mg/mL	2 hours
zidovudine (AZT)	All doses via syringe pump Pharmacy to prepare during pharmacy hours	10 mg/mL	n/a		4 mL solution + 6 mL **D5W**	10 mL	4 mg/mL	60 minutes Hazardous Drug –Low Risk
zoledronic acid	2 mg	0.8 mg/mL Zometa® concentrate			2.5 mL solution + 47.5 mL SWFI	50 mL	0.04 mg/mL	30 minutes

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Yukon

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