

# GUIDELINES FOR DRUG DOSING IN RENAL FAILURE AND HAEMOFILTRATION & HAEMODIAFILTRATION

In general, dosing schedules for haemofiltration (CAV/VVH) are as for haemodiafiltration (CAV/VVHD). However haemofiltration may have a lower drug clearance capacity. Specific doses have been cited where there are known differences between techniques.

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DRUG	ADULT DOSE IN NORMAL RENAL FUNCTION	DOSE IN RENAL FAILURE (GFR in ML/MIN)			RENAL REPLACEMENT		PROTEIN BINDING
		MILD (20-50)	MODERATE (10-20)	SEVERE (<10)	CAV/VVHD & CAV/VVH		
ACETAZOLAMIDE <sup>1</sup>	0.25-1G DAILY IN DIVIDED DOSES	250MG UP TO QDS <sup>1</sup>	250MG UP TO BD <sup>1</sup>	250MG OD <sup>1</sup>	250MG UP TO BD <sup>1</sup>	U	70-95%
ACETYLCYSTEINE <sup>1,3</sup>	VARIABLE	AS NORMAL <sup>1</sup>	AS NORMAL <sup>1</sup>	AS NORMAL <sup>1,3</sup>	AS NORMAL <sup>1</sup>	PD	50%
ACICLOVIR IV <sup>1,3,4,B</sup>	5-10MG/KG TDS	5-10MG/KG BD <sup>1</sup> (GFR 25-50)	5-10MG/KG OD <sup>1</sup> (GFR 10-25) OR 3.5-7MG/KG OD <sup>1</sup>	2.5-5MG/KG OD <sup>1</sup>	HDF: 5-10MG/KG OD OR 3.5 <sup>3,4</sup> -7 <sup>4</sup> MG/KG OD <sup>1</sup> HF: 3.5 – 7MG/KG OD <sup>3</sup>	D	15-30%
ACICLOVIR oral SIMPLEX <sup>1</sup>	200-400MG 5 X DAILY	200-400MG 5X DAILY <sup>1</sup>	200mg 3-4 X DAILY <sup>1</sup>	200MG BD <sup>1</sup>	200MG 3-4 X DAILY <sup>1</sup>	D	15-30%
ACICLOVIR oral ZOSTER <sup>1,B</sup>	800MG 5 X DAILY	800MG 5 X DAILY <sup>1</sup>	400 - 800MG TDS <sup>1</sup>	400 - 800MG BD <sup>1</sup>	400 - 800MG TDS <sup>1</sup>	D	15-30%
ADENOSINE <sup>1</sup>	3-12MG VARIABLE	AS NORMAL <sup>1</sup>	AS NORMAL <sup>1</sup>	AS NORMAL <sup>1</sup>	AS NORMAL <sup>1</sup>	N	0%
ADRENALINE <sup>1</sup>	VARIABLE	AS NORMAL <sup>1</sup>	AS NORMAL <sup>1</sup>	AS NORMAL <sup>1</sup>	AS NORMAL <sup>1</sup>	N	50%
ALFENTANIL <sup>1</sup>	VARIABLE	AS NORMAL <sup>1</sup>	AS NORMAL <sup>1</sup>	AS NORMAL <sup>1</sup>	AS NORMAL <sup>1</sup>	N	88-95%
ALLOPURINOL ORAL <sup>1,C</sup>	100-900MG/OD	200-300MG/OD <sup>1</sup>	100-200MG/OD <sup>1</sup>	100MG 24-48 HOURLY <sup>1</sup>	100-200MG/OD <sup>1</sup>	D	< 5%
AMIKACIN <sup>1</sup>	15MG/KG IN 2 DIVIDED DOSES (MAX 1.5G/OD)	5-6MG/KG BD <sup>1</sup>	3-4MG/KG OD <sup>1</sup>	2MG/KG 24 –48 HOURLY <sup>1</sup>	3-4MG/KG OD AND MONITOR LEVELS <sup>1</sup>	D	< 5%
AMINOPHYLLINE IV /ORAL <sup>1,3</sup>	VARIABLE	AS NORMAL <sup>3</sup> OR 200 – 400MG 12 HOURLY MONITOR LEVELS <sup>1</sup>	AS NORMAL <sup>3</sup> OR 200-300MG 12 HOURLY MONITOR LEVELS <sup>1</sup>	AS NORMAL <sup>3</sup> OR 200-300MG 12 HOURLY MONITOR LEVELS <sup>1</sup>	AS NORMAL <sup>3</sup> OR 200-300MG 12 HOURLY MONITOR LEVELS <sup>1</sup>	N	40-60% Theophylline
AMIODARONE <sup>1,3</sup>	UP TO 1.2G PER DAY	AS NORMAL <sup>1</sup>	AS NORMAL <sup>1</sup>	AS NORMAL <sup>1,3</sup>	AS NORMAL <sup>1,3</sup>	N	96%
AMITRIPTYLINE ORAL <sup>1</sup>	VARIABLE (MAX 200MG DAY)	AS NORMAL INTRODUCE GRADUALLY <sup>1</sup>	AS NORMAL INTRODUCE GRADUALLY <sup>1</sup>	AS NORMAL INTRODUCE GRADUALLY <sup>1</sup>	AS NORMAL INTRODUCE GRADUALLY <sup>1</sup>	N	96%
AMLODIPINE <sup>1</sup>	5-10MG OD	AS NORMAL <sup>1</sup>	AS NORMAL <sup>1</sup>	AS NORMAL <sup>1</sup>	AS NORMAL <sup>1</sup>	N	>95%
AMOXICILLIN <sup>1</sup>	MAX 12G DAILY IN DIVIDED DOSES	AS NORMAL <sup>1</sup>	AS NORMAL <sup>1</sup>	250MG TDS <sup>1</sup>	AS NORMAL <sup>1</sup>	D	15-25%
AMPHOTERICIN -							
ABELCET (LIPID COMPLEX AMPHOTERICIN B) <sup>1,2,3,A</sup>	5MG/KG/DAY	5MG/KG/DAY <sup>1,2</sup>	5MG/KG/DAY <sup>1,2</sup>	AS NORMAL <sup>1</sup> OR 5MG/KG 24-36 HOURLY <sup>2,3</sup>	AS NORMAL <sup>1</sup>	N	90 –97%

<sup>A</sup> – Monitor renal function before treatment and at least once weekly. Abecet<sup>1</sup> (lipid complex amphotercin B) - should be administered into the venous return of the filtration circuit.

<sup>B</sup> – Reports of neurological toxicity at maximum recommended doses<sup>1</sup>.

<sup>C</sup> – Increased risk of skin rash in renal impairment<sup>1</sup>

Key:

HDF = Haemodiafiltration, HF = Haemofiltration, LD = Loading dose, MD = Maintenance Dose D = Dialysed, U = Unknown Dialysability, I = Insignificant Dialysis, P = Probably Significant Dialysis, L = Low Dialysability, N = Not Dialysed, PD = Possibly Dialysed.

APPLIES TO INTRAVENOUS ADMINISTRATION UNLESS OTHERWISE STATED. PLEASE NOTE, THESE GUIDELINES MAY INCLUDE DOSAGE RECOMMENDATIONS OUTSIDE OF INDIVIDUAL PRODUCT LICENSES. TREATMENT DOSES FOR NORMAL RENAL FUNCTION HAVE BEEN TAKEN FROM THE BNF (NO 49 MARCH 2005).

DRUG	ADULT DOSE IN NORMAL RENAL FUNCTION	DOSE IN RENAL FAILURE (GFR in ML/MIN)			RENAL REPLACEMENT		PROTEIN BINDING
		MILD (20-50)	MODERATE (10-20)	SEVERE (<10)	CAV/VVHD & CAV/VVH		
AMBISOME (LIPOSOMAL AMPHOTERICIN B) <sup>1,A</sup>	1-3MG/KG OD	AS NORMAL <sup>1</sup>	AS NORMAL <sup>1</sup>	AS NORMAL <sup>1</sup>	AS NORMAL <sup>1</sup>	N	90-97%
FUNGIZONE (AMPHOTERICIN B) <sup>1,A</sup>	250MCG – 1.5MG/KG OD	AS NORMAL <sup>1</sup>	AS NORMAL <sup>1</sup>	NORMAL DOSE 24 – 36 HOURLY <sup>1</sup>	AS NORMAL <sup>1</sup>	N	> 90%
ATRACURIUM <sup>1,3</sup>	VARIABLE	AS NORMAL <sup>1</sup>	AS NORMAL <sup>1</sup>	AS NORMAL <sup>1,3</sup>	AS NORMAL <sup>1,3</sup>	U	82%
AZATHIOPRINE <sup>1</sup>	1-5MG/KG OD	AS NORMAL <sup>1</sup>	75-100% OF NORMAL DOSE <sup>1</sup>	50-75% OF NORMAL DOSE <sup>1</sup>	75-100% OF NORMAL DOSE <sup>1</sup>	D	20-30%
BENZYLPENICILLIN <sup>1,3</sup>	0.6-14.4G DAILY IN DIVIDED DOSES	AS NORMAL <sup>1</sup>	75% OF NORMAL DOSE <sup>1</sup>	20-50% OF NORMAL DOSE <sup>1</sup> MAX 3.6G/DAY <sup>1</sup>	HDF: 50 <sup>3</sup> : 75% <sup>1</sup> OF NORMAL DOSE HF: 20 – 50% NORMAL <sup>3</sup>	D	50%
BISOPROLOL <sup>1</sup>	1.25-20MG DAILY	AS NORMAL <sup>1</sup>	AS NORMAL <sup>1</sup>	1.25-10MG/OD <sup>1</sup>	AS NORMAL <sup>1</sup>	U	30 %
BUMETANIDE <sup>1</sup>	VARIABLE	AS NORMAL <sup>1</sup>	AS NORMAL <sup>1</sup>	AS NORMAL <sup>1</sup>	AS NORMAL <sup>1</sup>	N	99%
CARBAMAZEPINE ORAL <sup>1</sup>	100MG – 2G DAILY IN DIVIDED DOSES	AS NORMAL <sup>1</sup>	AS NORMAL <sup>1</sup>	AS NORMAL <sup>1</sup>	AS NORMAL <sup>1</sup>	N	75%
CEFOTAXIME <sup>1,3</sup>	2G-12G DAILY IN DIVIDED DOSES	AS NORMAL <sup>1</sup>	AS NORMAL <sup>1</sup>	0.5G-1G BD/TDS <sup>1</sup> OR 50% OF NORMAL DOSE <sup>3</sup>	HDF: 1G BD <sup>1</sup> HF: 50% OF NORMAL DOSE <sup>3</sup>	N	13-37%
CEFTAZIDIME <sup>1,3</sup>	1-2G BD/TDS 3G BD IN SEVERE INF	GFR 31-50 1G BD <sup>1</sup> GFR 16-30 1G OD <sup>1</sup>	GFR 6-15 0.5-1G OD <sup>1</sup>	GFR < 5 0.5-1G 48 HOURLY <sup>1</sup>	HDF: 0.5-1G BD <sup>1</sup> HF: 500MG BD <sup>3</sup>	N	17%
CEFTRIAXONE <sup>1</sup>	1-4G OD	AS NORMAL <sup>1</sup>	AS NORMAL <sup>1</sup>	AS NORMAL <sup>1</sup> MAX 2G OD <sup>1</sup>	AS NORMAL (MAX 2G OD) <sup>1</sup>	U	90%
CEFUROXIME IV <sup>1,3</sup>	0.75-1.5G TDS/QDS	0.75-1.5G TDS <sup>1</sup>	0.75-1.5G BD/TDS <sup>1</sup>	0.75-1.5G OD <sup>1</sup>	HDF: 0.75-1.5G BD <sup>3</sup> /TDS <sup>1</sup> HF: 750MG BD <sup>3</sup>	U	33%
CHORAL HYDRATE ORAL <sup>1</sup>	0.5-2G DAILY	AS NORMAL <sup>1</sup>	500MG AT NIGHT <sup>1</sup>	AVOID <sup>1</sup>	500 MG ON <sup>1</sup>	U	70-80%
CICLOSPORIN ORAL <sup>1</sup>	2-15MG/KG OD	AS NORMAL <sup>1</sup>	AS NORMAL <sup>1</sup>	AS NORMAL <sup>1</sup>	AS NORMAL <sup>1</sup>	N	96-99%
CICLOSPORIN IV <sup>1</sup>	0.5-7.5MG/KG OD	AS NORMAL <sup>1</sup>	AS NORMAL <sup>1</sup>	AS NORMAL <sup>1</sup>	AS NORMAL <sup>1</sup>	N	96-99%
CIPROFLOXACIN ORAL <sup>1</sup>	250-750MG BD	AS NORMAL <sup>1</sup>	50% OF NORMAL DOSE <sup>1</sup>	50% OF NORMAL DOSE <sup>1</sup>	500-750MG BD <sup>1</sup>	D	20-40%
CIPROFLOXACIN IV <sup>1,3</sup>	100-400MG BD	AS NORMAL <sup>1</sup>	50% OF NORMAL DOSE <sup>1</sup>	50% OF NORMAL DOSE <sup>1</sup>	HDF: 200- 400MG BD <sup>1</sup> HF: 200MG BD <sup>3</sup>	D	20-40%
CLARITHROMYCIN ORAL <sup>1</sup>	250-500MG BD	AS NORMAL <sup>1</sup>	250-500MG OD/BD <sup>1</sup>	250MG OD/BD <sup>1</sup>	250-500MG OD/BD <sup>1</sup>	U	70%
CLARITHROMYCIN IV <sup>1</sup>	500MG BD	AS NORMAL <sup>1</sup>	250MG-500MG BD <sup>1</sup>	250MG BD <sup>1</sup>	250MG-500MG BD <sup>1</sup>	U	70%

<sup>A</sup> – Monitor renal function before treatment and at least once weekly. Abelcet<sup>1</sup> (lipid complex amphotericin B) - should be administered into the venous return of the filtration circuit.

Key:

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APPLIES TO INTRAVENOUS ADMINISTRATION UNLESS OTHERWISE STATED. PLEASE NOTE, THESE GUIDELINES MAY INCLUDE DOSAGE RECOMMENDATIONS OUTSIDE OF INDIVIDUAL PRODUCT LICENSES. TREATMENT DOSES FOR NORMAL RENAL FUNCTION HAVE BEEN TAKEN FROM THE BNF (NO 49 MARCH 2005).

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		MILD (20-50)	MODERATE (10-20)	SEVERE (<10)	CAV/VVHD & CAV/VVH		
CLINDAMYCIN ORAL <sup>1</sup>	150-450MG QDS	AS NORMAL <sup>1</sup>	AS NORMAL <sup>1</sup>	AS NORMAL <sup>1</sup>	AS NORMAL <sup>1</sup>	N	60-95%
CLINDAMYCIN IV <sup>1</sup>	0.6-4.8G DAILY IN 2-4 DIVIDED DOSES	AS NORMAL <sup>1</sup>	AS NORMAL <sup>1</sup>	AS NORMAL <sup>1</sup>	AS NORMAL <sup>1</sup>	N	60-95%
CLONIDINE <sup>1</sup>	VARIABLE	AS NORMAL <sup>1</sup>	AS NORMAL <sup>1</sup>	AS NORMAL <sup>1</sup>	AS NORMAL <sup>1</sup>	U	20 - 40%
CO-AMOXICLAV ORAL <sup>1</sup>	375- 625MG TDS	AS NORMAL <sup>1</sup>	AS NORMAL <sup>1</sup>	375MG TDS <sup>1</sup>	AS NORMAL <sup>1</sup>	D	AMOX 15-25% CLAV 22%
CO-AMOXICLAV IV <sup>1</sup>	1.2G TDS/QDS	AS NORMAL <sup>1</sup>	1.2G BD <sup>1</sup>	1.2G STAT THEN 0.6-1.2G BD <sup>1</sup>	1.2G BD <sup>1</sup>	D	AMOX 15-25% CLAV 22%
CODEINE PHOSPHATE ORAL <sup>1</sup>	30-60MG QDS	AS NORMAL <sup>1</sup>	75% OF NORMAL DOSE <sup>1</sup>	50% OF NORMAL DOSE <sup>1</sup>	75%OF NORMAL DOSE <sup>1</sup>	U	7%
CO-TRIMOXAZOLE <sup>1, D</sup>	PCP TREATMENT 120MG/KG IN 2-4 DIVIDED DOSES	AS NORMAL <sup>1</sup>	AS NORMAL FOR 3 DAYS THEN 50% OF NORMAL DOSE <sup>1</sup>	50% OF NORMAL DOSE <sup>1</sup>	AS NORMAL FOR 3 DAYS THEN 50% OF NORMAL DOSE <sup>1</sup>	D	SUL 50% TRI 30-70%
CO-TRIMOXAZOLE ORAL <sup>1</sup>	PCP PROPHYLAXIS 480-960MG OD OR 960MG ALT DAY	AS NORMAL <sup>1</sup>	50% OF NORMAL DOSE <sup>1</sup>	50% OF NORMAL DOSE <sup>1</sup>	50% OF NORMAL DOSE <sup>1</sup>	D	SUL 50% TRI 30-70%
CO-TRIMOXAZOLE <sup>1, D</sup>	960MG-1.44G BD	AS NORMAL <sup>1</sup>	50% OF NORMAL DOSE <sup>1</sup>	50% OF NORMAL DOSE <sup>1</sup>	50% OF NORMAL DOSE <sup>1</sup>	D	SUL 50% TRI 30-70%
CYCLZINE ORAL/IM/IV <sup>1</sup>	50MG TDS	AS NORMAL <sup>1</sup>	AS NORMAL <sup>1</sup>	AS NORMAL <sup>1</sup>	AS NORMAL <sup>1</sup>	U	-
DALTEPARIN SC <sup>1, E</sup>	PROPHYLAXIS 2,500-5000 UNITS OD	AS NORMAL <sup>1</sup>	AS NORMAL <sup>1</sup>	AS NORMAL <sup>1</sup>	AS NORMAL <sup>1</sup>	N	-
DALTEPARIN SC <sup>1, E</sup>	TREATMENT VARIABLE	AS NORMAL <sup>1</sup>	AVOID <sup>1</sup>	AVOID <sup>1</sup>	AVOID <sup>1</sup>	N	-
DIAMORPHINE <sup>1</sup>	VARIABLE	AS NORMAL <sup>1</sup>	START LOW TITRATE SLOWLY (e.g. 2.5MG) <sup>1</sup>	START LOW TITRATE SLOWLY (e.g. 2.5MG) <sup>1</sup>	START LOW TITRATE SLOWLY (e.g. 2.5MG) <sup>1</sup>	U	30 - 40%
DIAZEPAM <sup>1</sup>	VARIABLE	AS NORMAL <sup>1</sup>	START LOW TITRATE SLOWLY <sup>1</sup>	START LOW TITRATE SLOWLY <sup>1</sup>	START LOW TITRATE SLOWLY <sup>1</sup>	U	94-99%

<sup>D</sup> - Recommended to not be given in severe renal impairment unless renal replacement facilities available<sup>1</sup>

<sup>E</sup> - Low molecular weight heparins are renally excreted and hence accumulate in severe renal impairment. While doses recommended for prophylaxis against DVT and prevention of thrombus formation in extra-corporeal circuits are well tolerated in patients with ESRD, the doses recommended for the treatment of DVT and PE have been associated with severe, sometimes fatal, bleeding episodes in patients. Hence unfractionated heparin would be preferable in these patients<sup>1</sup>.

Key:

HDF = Haemodiafiltration, HF = Haemofiltration, LD = Loading dose, MD = Maintenance Dose D = Dialysed, U = Unknown Dialysability, I = Insignificant Dialysis, P = Probably Significant Dialysis, L = Low Dialysability, N = Not Dialysed, PD = Possibly Dialysed.

APPLIES TO INTRAVENOUS ADMINISTRATION UNLESS OTHERWISE STATED. PLEASE NOTE, THESE GUIDELINES MAY INCLUDE DOSAGE RECOMMENDATIONS OUTSIDE OF INDIVIDUAL PRODUCT LICENSES. TREATMENT DOSES FOR NORMAL RENAL FUNCTION HAVE BEEN TAKEN FROM THE BNF (NO 49 MARCH 2005).

DRUG	ADULT DOSE IN NORMAL RENAL FUNCTION	DOSE IN RENAL FAILURE (GFR in ML/MIN)			RENAL REPLACEMENT		PROTEIN BINDING
		MILD (20-50)	MODERATE (10-20)	SEVERE (<10)	CAV/VVHD & CAV/VVH		
DICLOFENAC <sup>1</sup>	75-150MG DAILY IN DIVIDED DOSES	AS NORMAL <sup>1</sup>	AS NORMAL BUT AVOID IF POSSIBLE <sup>1</sup>	AS NORMAL BUT ONLY USE IF ESRD ON DIALYSIS <sup>1</sup>	AS NORMAL <sup>1</sup>	N	99%
DIGOXIN <sup>1,2</sup>	LD: 1-1.5MG OVER 24 HOURS MD: 62.5-500MCG OD	LD: AS NORMAL MD: 125-250MCG OD <sup>1</sup>	LD: AS NORMAL MD: 62.5-125MCG OD MONITOR LEVELS <sup>2</sup>	LD: AS NORMAL MD: 62.5MCG ALT DAYS MONITOR LEVELS <sup>1</sup>	LD: AS NORMAL MD: 62.5-125MCG OD MONITOR LEVELS <sup>2</sup>	U	20-30%
DIHYDROCODEINE ORAL <sup>1</sup>	30MG 4-6HRLY	AS NORMAL <sup>1</sup>	AVOID OR START LOW TITRATE SLOWLY <sup>1</sup>	AVOID OR START LOW TITRATE SLOWLY <sup>1</sup>	AVOID OR START LOW TITRATE SLOWLY <sup>1</sup>	U	-
DOBUTAMINE <sup>1</sup>	VARIABLE	AS NORMAL <sup>1</sup>	AS NORMAL <sup>1</sup>	AS NORMAL <sup>1</sup>	AS NORMAL <sup>1</sup>	N	-
DOMPERIDONE ORAL <sup>1</sup>	10-20MG 4-8 HOURLY	AS NORMAL <sup>1</sup>	AS NORMAL <sup>1</sup>	AS NORMAL <sup>1</sup>	AS NORMAL <sup>1</sup>	U	>90%
DOPAMINE <sup>1</sup>	VARIABLE	AS NORMAL <sup>1</sup>	AS NORMAL <sup>1</sup>	AS NORMAL <sup>1</sup>	AS NORMAL <sup>1</sup>	N	-
DOPEXAMINE <sup>1</sup>	VARIABLE	AS NORMAL <sup>1</sup>	AS NORMAL <sup>1</sup>	AS NORMAL <sup>1</sup>	AS NORMAL <sup>1</sup>	U	-
DROTRECOGIN ALFA (ACTIVATED) <sup>1</sup>	24MCG/KG/HOUR FOR 96 HOURS	AS NORMAL <sup>1</sup>	AS NORMAL <sup>1</sup>	AS NORMAL <sup>1</sup>	AS NORMAL <sup>1</sup>	U	-
ENOXAPARIN SC <sup>1,E</sup>	PROPHYLAXIS 20-40MG OD	AS NORMAL <sup>1</sup>	AS NORMAL <sup>1</sup>	AS NORMAL <sup>1</sup>	AS NORMAL <sup>1</sup>	N	-
ENOXAPARIN SC <sup>1,E</sup>	VARIABLE DEPENDING ON INDICATION	AS NORMAL <sup>1</sup>	AVOID <sup>1</sup>	AVOID <sup>1</sup>	AVOID <sup>1</sup>	N	-
EPOPROSTENOL <sup>1</sup>	VARIABLE	AS NORMAL <sup>1</sup>	AS NORMAL <sup>1</sup>	AS NORMAL <sup>1</sup>	AS NORMAL <sup>1</sup>	U	-
ERYTHROMYCIN ORAL <sup>1,3</sup>	1-2G IN 2-4 DIVIDED DOSES	AS NORMAL <sup>1</sup>	AS NORMAL <sup>1</sup>	50-75% OF NORMAL <sup>1</sup>	AS NORMAL <sup>1,3</sup>	U	60-95%
ERYTHROMYCIN IV <sup>1,3</sup>	2-4G IN 4 DIVIDED DOSES	AS NORMAL <sup>1</sup>	AS NORMAL <sup>1</sup>	50-75% OF NORMAL <sup>1</sup>	AS NORMAL <sup>1,3</sup>	U	60-95%
FENTANYL <sup>1</sup>	VARIABLE	AS NORMAL AND TITRATE <sup>1</sup>	75%OF NORMAL AND TITRATE <sup>1</sup>	50%OF NORMAL AND TITRATE <sup>1</sup>	75% OF NORMAL AND TITRATE <sup>1</sup>	N	79-87%
FLUCLOXACILLIN ORAL <sup>1</sup>	250-500MG QDS	AS NORMAL <sup>1</sup>	AS NORMAL <sup>1</sup>	AS NORMAL <sup>1</sup>	AS NORMAL <sup>1</sup>	N	95%
FLUCLOXACILLIN IV <sup>1</sup>	0.25-2G QDS Endocarditis 12G DAILY IN DIVIDED DOSE	AS NORMAL <sup>1</sup>	AS NORMAL <sup>1</sup>	MAX 4G DAILY IN 4 DIVIDED DOSES <sup>1</sup>	AS NORMAL <sup>1</sup>	N	95%
FLUCONAZOLE <sup>1,3,C</sup>	50-400MG OD	AS NORMAL <sup>1</sup>	AS NORMAL <sup>1</sup>	50 <sup>1</sup> -100% <sup>2</sup> OF NORMAL DOSE	HDF: AS NORMAL <sup>1</sup> HF: AS NORMAL <sup>3</sup>	D	12%

<sup>C</sup> – Increased risk of skin rash in renal impairment<sup>1</sup>

<sup>E</sup> – Low molecular weight heparins are renally excreted and hence accumulate in severe renal impairment. While doses recommended for prophylaxis against DVT and prevention of thrombus formation in extra-corporeal circuits are well tolerated in patients with ESRD, the doses recommended for the treatment of DVT and PE have been associated with severe, sometimes fatal, bleeding episodes in patients. Hence unfractionated heparin would be preferable in these patients<sup>1</sup>

<sup>Z</sup> – Thames Valley Critical Care Network Pharmacist Group consensus.

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		MILD (20-50)	MODERATE (10-20)	SEVERE (<10)	CAV/VVHD & CAV/VVH		
FLUOXETINE ORAL <sup>1</sup>	20-80MG DAILY	AS NORMAL <sup>1</sup>	AS NORMAL OR ALT DAYS <sup>1</sup>	AS NORMAL OR ALT DAYS <sup>1</sup>	NORMAL OR ALT DAYS <sup>1</sup>	N	94.5%
FUROSEMIDE <sup>1</sup>	20MG – 2G OD VARIABLE	AS NORMAL <sup>1</sup>	AS NORMAL (may need increased doses) <sup>1</sup>	AS NORMAL (may need increased doses) <sup>1</sup>	AS NORMAL (may need increased doses) <sup>1</sup>	N	95-99%
GENTAMICIN	VARIABLE	CONTACT PHARMACY	CONTACT PHARMACY	CONTACT PHARMACY	CONTACT PHARMACY		0-20%
GLICLAZIDE ORAL <sup>1</sup>	MAX 320MG DAILY IN DIVIDED DOSES	INITIALLY 20-40MG DAILY, USE CAUTION and MONITOR <sup>1</sup>	INITIALLY 20-40MG DAILY, USE CAUTION and MONITOR <sup>1</sup>	INITIALLY 20-40MG DAILY. USE CAUTION and MONITOR <sup>1</sup>	INITIALLY 20-40MG DAILY. USE CAUTION and MONITOR <sup>1</sup>	U	85-95%
GRANISETRON IV <sup>1</sup>	1-9MG DAILY IN DIVIDED DOSES	AS NORMAL <sup>1</sup>	AS NORMAL <sup>1</sup>	AS NORMAL <sup>1</sup>	AS NORMAL <sup>1</sup>	U	≈ 65%
HYDROCORTISONE SODIUM SUCCINATE <sup>1</sup>	100-500MG TDS-QDS	AS NORMAL <sup>1</sup>	AS NORMAL <sup>1</sup>	AS NORMAL <sup>1</sup>	AS NORMAL <sup>1</sup>	L	90-95%
IMIPENEM & CILASTIN <sup>1, 3, F</sup>	250MG – 1G QDS	GFR 31-70 0.5-1G TDS <sup>1</sup>	GFR 21-30 0.5-1G BD <sup>1</sup>	GFR < 20 THE LOWER OF 250MG OR 3.5MG/KG BD <sup>1</sup>	HDF: 500MG-1G BD <sup>1</sup> HF: 250-500MG BD <sup>3</sup>	D	IM 13-21% CIL 35%
LABETALOL <sup>1</sup>	VARIABLE	AS NORMAL <sup>1</sup>	AS NORMAL <sup>1</sup>	AS NORMAL <sup>1</sup>	AS NORMAL <sup>1</sup>	N	50%
LANSOPRAZOLE <sup>1</sup>	15 – 60MG IN 1-2 DOSES	AS NORMAL <sup>1</sup>	AS NORMAL <sup>1</sup>	AS NORMAL <sup>1</sup>	AS NORMAL <sup>1</sup>	U	99.8%
LINEZOLID <sup>1</sup>	600MG BD	AS NORMAL <sup>1</sup>	AS NORMAL <sup>1</sup>	AS NORMAL <sup>1</sup>	AS NORMAL <sup>1</sup>	D	31%
LIOTHYRONINE <sup>1</sup>	VARIABLE	AS NORMAL <sup>1</sup>	AS NORMAL <sup>1</sup>	AS NORMAL <sup>1</sup>	AS NORMAL <sup>1</sup>	N	<99%
LORAZEPAM <sup>1</sup>	VARIABLE	AS NORMAL <sup>1</sup>	AS NORMAL <sup>1</sup>	AS NORMAL <sup>1</sup>	AS NORMAL <sup>1</sup>	U	85%
MEROPENEM <sup>1</sup>	500MG – 2G TDS	500MG –1G BD <sup>1</sup>	250MG – 1G BD OR 500MG TDS <sup>1</sup>	250MG – 1G OD <sup>1</sup>	250MG – 1G BD OR 500MG TDS <sup>1</sup>	D	2%
METHYLPREDNISOLONE <sup>1</sup>	VARIABLE	AS NORMAL <sup>1</sup>	AS NORMAL <sup>1</sup>	AS NORMAL <sup>1</sup>	AS NORMAL <sup>1</sup>	D	50-77%
METOCLOPRAMIDE <sup>1, G</sup>	10 – 20MG TDS	AS NORMAL <sup>1</sup>	75 – 100% OF NORMAL DOSE <sup>1</sup>	50 – 100% OF NORMAL DOSE <sup>1</sup>	HDF: 75 – 100% OF NORMAL DOSE <sup>G, 1</sup>	PD	40%
METRONIDAZOLE ORAL <sup>1</sup>	200-400MG BD – TDS	AS NORMAL <sup>1</sup>	AS NORMAL <sup>1</sup>	NORMAL DOSE 12 HOURLY <sup>1</sup>	AS NORMAL <sup>1</sup>	U	20%

<sup>F</sup> – Patients with a GFR < 5ml/min should not receive the drug unless renal replacement therapy is started within 48 hrs. Clearance of imipenem and cilastatin are not equal in renal replacement therapy.

<sup>G</sup> - Increased risk of extrapyramidal side effects.

Key:

HDF = Haemodiafiltration, HF = Haemofiltration, LD = Loading dose, MD = Maintenance Dose D = Dialysed, U = Unknown Dialysability, I = Insignificant Dialysis, P = Probably Significant Dialysis, L = Low Dialysability, N = Not Dialysed, PD = Possibly Dialysed.

APPLIES TO INTRAVENOUS ADMINISTRATION UNLESS OTHERWISE STATED. PLEASE NOTE, THESE GUIDELINES MAY INCLUDE DOSAGE RECOMMENDATIONS OUTSIDE OF INDIVIDUAL PRODUCT LICENSES. TREATMENT DOSES FOR NORMAL RENAL FUNCTION HAVE BEEN TAKEN FROM THE BNF (NO 49 MARCH 2005).

DRUG	ADULT DOSE IN NORMAL RENAL FUNCTION	DOSE IN RENAL FAILURE (GFR in ML/MIN)			RENAL REPLACEMENT		PROTEIN BINDING
		MILD (20-50)	MODERATE (10-20)	SEVERE (<10)	CAV/VVHD & CAV/VVH		
METRONIDAZOLE IV <sup>1</sup>	500MG TDS	AS NORMAL <sup>1</sup>	AS NORMAL <sup>1</sup>	NORMAL DOSE 12 HOURLY <sup>1</sup>	AS NORMAL <sup>1</sup>	U	20%
MIDAZOLAM <sup>1</sup>	VARIABLE	AS NORMAL <sup>1</sup>	AS NORMAL <sup>1</sup>	50% OF NORMAL DOSE & ADJUST <sup>1</sup>	AS NORMAL & ADJUST <sup>1</sup>	U	93-96%
MORPHINE <sup>1, 3, H</sup>	VARIABLE	75% OF NORMAL DOSE <sup>1</sup>	SMALL DOSES & TITRATE <sup>1</sup>	SMALL DOSES & TITRATE <sup>1</sup> OR 50% OF NORMAL DOSE <sup>3</sup>	SMALL DOSES & TITRATE <sup>1</sup> OR 50% OF NORMAL DOSE <sup>3</sup>	D	20-30%
NORADRENALINE <sup>1</sup>	VARIABLE	AS NORMAL <sup>1</sup>	AS NORMAL <sup>1</sup>	AS NORMAL <sup>1</sup>	AS NORMAL <sup>1</sup>	N	~50%
OMEPRAZOLE <sup>1</sup>	10-120MG OD (PO) 20-40MG OD (IV)	AS NORMAL <sup>1</sup>	AS NORMAL <sup>1</sup>	AS NORMAL <sup>1</sup>	AS NORMAL <sup>1</sup>	U	95%
ONDANSETRON <sup>1</sup>	4-32MG DAILY IV IN DIVIDED DOSES	AS NORMAL <sup>1</sup>	AS NORMAL <sup>1</sup>	AS NORMAL <sup>1</sup>	AS NORMAL <sup>1</sup>	U	70-75%
PANCURONIUM <sup>1</sup>	VARIABLE	AS NORMAL <sup>1</sup>	50% OF NORMAL <sup>1</sup>	25% OF NORMAL <sup>1</sup>	50% OF NORMAL <sup>1</sup>	U	80-90%
PANTOPRAZOLE <sup>1</sup>	20- 40MG OD	AS NORMAL <sup>1</sup>	AS NORMAL <sup>1</sup>	AS NORMAL <sup>1</sup>	AS NORMAL <sup>1</sup>	U	98%
PHENYTOIN <sup>1,1</sup>	LD: 15MG/KG MD: 200-500MG OD ADJUST ACCORDING TO LEVELS	AS NORMAL <sup>1</sup>	AS NORMAL <sup>1,1</sup>	AS NORMAL <sup>1,1</sup>	AS NORMAL <sup>1,1</sup>	U	90% <sup>1</sup>
PROCHLORPERAZINE IM/IV <sup>1</sup>	VARIABLE	AS NORMAL <sup>1</sup>	AS NORMAL <sup>1</sup>	START AT 50% OF NORMAL DOSE <sup>1</sup>	AS NORMAL <sup>1</sup>	U	96%
PROPOFOL <sup>1</sup>	VARIABLE	AS NORMAL <sup>1</sup>	AS NORMAL <sup>1</sup>	AS NORMAL <sup>1</sup>	AS NORMAL <sup>1</sup>	U	>95%
RANITIDINE ORAL <sup>1</sup>	150-300MG OD-BD	AS NORMAL <sup>1</sup>	AS NORMAL <sup>1</sup>	50-100%OF NORMAL <sup>1</sup>	AS NORMAL <sup>1</sup>	PD	15%
RANITIDINE IV <sup>1, 3</sup>	50MG TDS - QDS	AS NORMAL <sup>1</sup>	AS NORMAL <sup>1</sup>	50-100%OF NORMAL <sup>1</sup> (USUALLY 50MG BD) <sup>3</sup>	HDF: AS NORMAL <sup>1</sup> OR 50MG BD <sup>3</sup> HF: 50MG BD <sup>3</sup>	PD	15%
RIFAMPICIN <sup>1</sup>	600-1200MG DAILY IN DIVIDED DOSES	AS NORMAL <sup>1</sup>	AS NORMAL <sup>1</sup>	50-100%OF NORMAL <sup>1</sup>	AS NORMAL <sup>1</sup>	U	60-90%
ROCURONIUM BROMIDE <sup>1</sup>	VARIABLE	AS NORMAL <sup>1</sup>	AS NORMAL <sup>1</sup>	AS NORMAL <sup>1</sup>	AS NORMAL <sup>1</sup>	U	25-30%
SIMVASTATIN <sup>1</sup>	10-80MG ON	AS NORMAL <sup>1</sup>	AS NORMAL <sup>1</sup>	10MG ON <sup>1</sup>	AS NORMAL <sup>1</sup>	U	> 94%

<sup>H</sup> - Potential accumulation of morphine-6-glucuronide (an active, renally excreted metabolite- more potent than morphine). The half-life of morphine-6-glucuronide is increased from 3-5 hours in normal renal function to about 50 hours in ESRD

<sup>1</sup> - Free drug fraction is affected by uremia and low plasma albumin concentration. A corrected phenytoin level can be calculated using the following equations<sup>1</sup>:

LOW ALBUMIN CORRECTION	RENAL FAILURE CORRECTION
Corrected Conc = Observed Conc / ((0.02 x albumin) + 0.1)	Corrected Conc = Observed Conc / ((0.01 x albumin) + 0.1)

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DRUG	ADULT DOSE IN NORMAL RENAL FUNCTION	DOSE IN RENAL FAILURE (GFR in ML/MIN)			RENAL REPLACEMENT		PROTEIN BINDING
		MILD (20-50)	MODERATE (10-20)	SEVERE (<10)	CAV/VVHD & CAV/VVH		
TEICOPLANIN <sup>1,J</sup>	LD: 400MG 12 HOURLY FOR 3 DOSES MD: 200-400MG OD	LD: AS NORMAL MD: 50% OF NORMAL DOSE OD OR 100% 48 HOURLY <sup>1</sup>	LD: AS NORMAL MD: 30% OF NORMAL DOSE OD OR 100% 72HRLY <sup>1</sup>	LD: AS NORMAL MD: 30% OF NORMAL DOSE OD OR 100% 72HRLY <sup>1</sup>	LD: AS NORMAL MD: 30% OF NORMAL DOSE OD OR 100% 72HRLY <sup>1,J</sup>	U	90-95%
TRAMADOL IV/ORAL <sup>1</sup>	50-600MG DAILY IN DIVIDED DOSES	AS NORMAL <sup>1</sup>	50-100MG BD <sup>1</sup>	50MG BD <sup>1</sup>	50-100MG BD <sup>1</sup>	D	4 %
TRAZODONE <sup>1</sup>	75-600MG DAILY	AS NORMAL <sup>1</sup>	START LOW AND TITRATE <sup>1</sup>	50% OF NORMAL DOSE OR FREQUENCY <sup>1</sup>	START LOW AND TITRATE <sup>1</sup>	U	89-95%
VANCOMYCIN <sup>1</sup>	1G BD & ADJUST ACCORDING TO LEVELS	500MG OD – BD <sup>1</sup>	500MG 24-48 HOURLY OR GIVE 1G AND MONITOR LEVELS - GIVE ANOTHER DOSE WHEN <10MG/L <sup>1</sup>	500MG 48-96 HOURLY OR GIVE 1G AND MONITOR LEVELS - GIVE ANOTHER DOSE WHEN <10MG/L <sup>1</sup>	500MG 24-48 HOURLY OR GIVE 1G AND MONITOR LEVELS – GIVE ANOTHER DOSE WHEN < 10MG/L <sup>1</sup>	U	10-50%
VECURONIUM BROMIDE <sup>1</sup>	VARIABLE	AS NORMAL <sup>1</sup>	AS NORMAL <sup>1</sup>	AS NORMAL <sup>1</sup>	AS NORMAL <sup>1</sup>	U	30%
VORICONAZOLE IV <sup>1</sup>	LD: 6MG/KG BD FOR 2 DOSES MD: 4MG/KG BD	AS NORMAL <sup>1</sup>	AS NORMAL <sup>1</sup>	AS NORMAL <sup>1</sup>	AS NORMAL <sup>1</sup>	PD	58%

<sup>J</sup> - In impaired renal function reduced dosage is not required until 4<sup>th</sup> day of treatment. Levels may be monitored

## REFERENCES

1. Ashley C, Currie A. The Renal Drug Handbook. Radcliffe Medical Press, Oxon. 2<sup>nd</sup> Edition 2004
2. Aronoff G, Berns J, Brier M, Golper T, Morrison G, Singer I, Swan S, Bennett W. Drug Prescribing in Renal Failure. 4th ed. American College of Physicians, Philadelphia, 1999.
3. Foster P, Gordon F, Holloway S. Drug dosage adjustment during continuous renal replacement therapy. Br J Intensive Care April 1996: 120-124
4. Cotterill S. Antimicrobial prescribing in patients on haemofiltration. J Antimicrobial Chemotherapy 1995; 36:773-780

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