



Report on Antimicrobial Point Prevalence Survey in Acute Hospitals in Ireland 2024

Appendix 2

A2. Appendix 2

A2.1. General Results

Table A2.1: Patient participation and proportion of patients on antimicrobials, over time.

Metric	2019	2020	2021	2022	2023*	2024
All patients (n)	8,916	8,376	10,388	10,463	12,650	9,108
Patients on antimicrobials (n)	3,399	3,256	3,902	3,884	5,087	3,728
<i>Proportion of all patients on antimicrobials (%)</i>	<i>38.1</i>	<i>38.9</i>	<i>37.6</i>	<i>37.1</i>	<i>40.2</i>	<i>40.9</i>

*2023 results taken from ECDC PPS 2023

Table A2.2: Antimicrobial consumption over time.

Metric	2019	2020	2021	2022	2023*	2024
All antimicrobials (n)	4,690	4,463	5,193	5,207	6,715	4,935
<i>Antimicrobials per patient</i>	<i>1.38</i>	<i>1.37</i>	<i>1.33</i>	<i>1.34</i>	<i>1.32</i>	<i>1.32</i>
All IV antimicrobials (n)	3,138	3,009	3,421	3,568	4,695	3,357
<i>Proportion of antimicrobials as IV (%)</i>	<i>66.9</i>	<i>67.4</i>	<i>65.9</i>	<i>68.5</i>	<i>69.9</i>	<i>68.0</i>

*2023 results taken from ECDC PPS 2023

Table A2.3: Variability in proportions of patients on antimicrobials between hospital models.

Hospital model	Upper limit (%)	Lower limit (%)	Standard deviation (%)	Coefficient of variation
Model 2	49.4	17.0	12.6	0.39
Model 3	58.5	36.1	6.6	0.15
Model 4	44.6	39.7	2.1	0.05
Private	67.3	32.8	12.2	0.24
Specialty (Specialist)	72.5	8.6	20.3	0.64
Total	72.5	8.6	14.1	0.35

A2.2. Prevalence of antimicrobial prescribing

Table A2.4: Complete antimicrobial use across years classified by AMRIC Green/Amber/Red and WHO AWaRe ranked by total usage (n) and relative proportion (%).

Antimicrobial	AMRIC G/A/R category	WHO AWaRe category	Drug class	2019		2020		2021		2022		2023*		2024	
				(n)	(%)	(n)	(%)	(n)	(%)	(n)	(%)	(n)	(%)	(n)	(%)
Amoxicillin/clavulanic acid	Amber	Access	Antibiotic	1,010	21.5	908	20.3	988	19.0	994	19.1	1,246	18.6	923	18.7
Piperacillin/tazobactam	Amber	Watch	Antibiotic	703	15.0	772	17.3	874	16.8	897	17.2	1,226	18.3	880	17.8
Cefuroxime	Amber	Watch	Antibiotic	223	4.8	245	5.5	321	6.2	346	6.6	403	6.0	352	7.1
Metronidazole	Green	Access	Antibiotic	294	6.3	286	6.4	297	5.7	299	5.7	369	5.5	279	5.7
Flucloxacillin	Green	Access	Antibiotic	243	5.2	212	4.8	272	5.2	236	4.5	332	4.9	206	4.2
Ceftriaxone	Amber	Watch	Antibiotic	129	2.8	153	3.4	200	3.9	187	3.6	260	3.9	190	3.9
Sulfamethoxazole and trimethoprim	Green	Access	Antibiotic	115	2.5	122	2.7	163	3.1	156	3.0	192	2.9	185	3.7
Vancomycin	Amber	Watch	Antibiotic	188	4.0	201	4.5	237	4.6	213	4.1	305	4.5	178	3.6
Meropenem	Red	Watch	Antibiotic	148	3.2	145	3.2	185	3.6	168	3.2	238	3.5	152	3.1
Clarithromycin	Amber	Watch	Antibiotic	187	4.0	146	3.3	139	2.7	163	3.1	197	2.9	151	3.1
Gentamicin	Amber	Access	Antibiotic	162	3.5	166	3.7	160	3.1	163	3.1	160	2.4	120	2.4
Azithromycin	Amber	Watch	Antibiotic	73	1.6	65	1.5	100	1.9	98	1.9	131	2.0	111	2.2
Doxycycline	Green	Access	Antibiotic	57	1.2	71	1.6	105	2.0	112	2.2	134	2.0	97	2.0
Amoxicillin	Green	Access	Antibiotic	88	1.9	67	1.5	100	1.9	116	2.2	105	1.6	96	1.9

Antimicrobial	AMRIC G/A/R category	WHO AWaRe category	Drug class	2019		2020		2021		2022		2023*		2024	
				(n)	(%)	(n)	(%)	(n)	(%)	(n)	(%)	(n)	(%)	(n)	(%)
Ciprofloxacin	Amber	Watch	Antibiotic	132	2.8	113	2.5	115	2.2	104	2.0	159	2.4	92	1.9
Clindamycin	Amber	Access	Antibiotic	67	1.4	43	1.0	50	1.0	65	1.2	99	1.5	74	1.5
Nitrofurantoin	Green	Access	Antibiotic	68	1.4	56	1.3	90	1.7	64	1.2	62	0.9	67	1.4
Fluconazole	Green	Not classified	Antifungal	74	1.6	56	1.3	63	1.2	85	1.6	64	1.0	66	1.3
Cefotaxime	Amber	Watch	Antibiotic	49	1.0	46	1.0	41	0.8	49	0.9	61	0.9	64	1.3
Cefalexin	Green	Access	Antibiotic	48	1.0	44	1.0	59	1.1	49	0.9	80	1.2	60	1.2
Benzylpenicillin	Green	Access	Antibiotic	105	2.2	65	1.5	83	1.6	78	1.5	98	1.5	51	1.0
Aztreonam	Amber	Reserve	Antibiotic	32	0.7	37	0.8	40	0.8	52	1.0	83	1.2	48	1.0
Linezolid	Red	Reserve	Antibiotic	33	0.7	32	0.7	44	0.8	40	0.8	69	1.0	41	0.8
Trimethoprim	Green	Access	Antibiotic	39	0.8	28	0.6	48	0.9	45	0.9	67	1.0	38	0.8
Rifaximin	Not classified	Watch	Antibiotic		-		-		-	35	0.7	37	0.6	33	0.7
Levofloxacin	Amber	Watch	Antibiotic	40	0.9	24	0.5	36	0.7	34	0.7	42	0.6	32	0.6
Daptomycin	Red	Reserve	Antibiotic	25	0.5	31	0.7	26	0.5	47	0.9	43	0.6	31	0.6
Posaconazole	Red	Not classified	Antifungal	15	0.3	19	0.4	26	0.5	16	0.3	30	0.4	30	0.6
Amphotericin B	Red	Not classified	Antifungal	25	0.5	29	0.6	36	0.7	29	0.6	19	0.3	24	0.5

Antimicrobial	AMRIC G/A/R category	WHO AWaRe category	Drug class	2019		2020		2021		2022		2023*		2024	
				(n)	(%)	(n)	(%)	(n)	(%)	(n)	(%)	(n)	(%)	(n)	(%)
Erythromycin	Amber	Watch	Antibiotic	19	0.4	14	0.3	31	0.6	30	0.6	30	0.4	24	0.5
Ceftazidime	Amber	Watch	Antibiotic	34	0.7	17	0.4	12	0.2	33	0.6	18	0.3	22	0.4
Teicoplanin	Amber	Watch	Antibiotic	17	0.4	13	0.3	12	0.2	11	0.2	20	0.3	22	0.4
Anidulafungin	Red	Not classified	Antifungal	8	0.2	16	0.4	25	0.5	20	0.4	17	0.3	20	0.4
Fidaxomicin	Red	Watch	Antibiotic	3	0.1	6	0.1	5	0.1	14	0.3	12	0.2	20	0.4
Phenoxymethylpenicillin	Green	Access	Antibiotic	22	0.5	25	0.6	26	0.5	23	0.4	12	0.2	19	0.4
Amikacin	Amber	Access	Antibiotic	9	0.2	9	0.2	7	0.1	5	0.1	12	0.2	17	0.3
Cefazolin	Green	Access	Antibiotic	16	0.3	15	0.3	18	0.3	19	0.4	24	0.4	17	0.3
Colistin	Red	Reserve	Antibiotic	22	0.5	11	0.2	10	0.2	10	0.2	13	0.2	12	0.2
Caspofungin	Red	Not classified	Antifungal	13	0.3	14	0.3	25	0.5	17	0.3	35	0.5	8	0.2
Cefaclor	Amber	Watch	Antibiotic	5	0.1	1	0.0	5	0.1	5	0.1	6	0.1	8	0.2
Rifampicin	Red	Watch	Antibiotic	17	0.4	18	0.4	10	0.2	11	0.2	10	0.1	8	0.2
Ceftazidime/avibactam	Red	Reserve	Antibiotic		-	3	0.1	5	0.1	6	0.1	9	0.1	7	0.1
Temocillin	Amber	Watch	Antibiotic	3	0.1		-	3	0.1	4	0.1	4	0.1	6	0.1
Tobramycin	Amber	Watch	Antibiotic	18	0.4	13	0.3	7	0.1	6	0.1	12	0.2	6	0.1
Ertapenem	Red	Watch	Antibiotic	3	0.1	2	0.0	3	0.1	4	0.1	6	0.1	5	0.1

Antimicrobial	AMRIC G/A/R category	WHO AWaRe category	Drug class	2019		2020		2021		2022		2023*		2024	
				(n)	(%)	(n)	(%)	(n)	(%)	(n)	(%)	(n)	(%)	(n)	(%)
Ethambutol	Not classified	Not classified	Antibiotic	5	0.1	7	0.2	4	0.1	1	0.0	4	0.1	5	0.1
Rifampicin, pyrazinamide and isoniazid	Not classified	Not classified	Antibiotic	4	0.1	3	0.1	5	0.1	1	0.0	-		5	0.1
Ceftolozane/tazobactam	Red	Reserve	Antibiotic	5	0.1	3	0.1	-		4	0.1	2	0.0	4	0.1
Minocycline (PO)	Amber	Watch	Antibiotic	11	0.2	6	0.1	3	0.1	2	0.0	2	0.0	4	0.1
Fosfomycin (PO)	Green	Watch	Antibiotic	-		-		1	0.0	4	0.1	1	0.0	3	0.1
Isavuconazole	Red	Not classified	Antifungal	-		1	0.0	-		1	0.0	4	0.1	3	0.1
Tigecycline	Red	Reserve	Antibiotic	8	0.2	10	0.2	5	0.1	7	0.1	14	0.2	3	0.1
Cefixime	Amber	Watch	Antibiotic	3	0.1	1	0.0	1	0.0	1	0.0	5	0.1	2	0.0
Lymecycline	Green	Watch	Antibiotic	4	0.1	2	0.0	-		4	0.1	-		2	0.0
Cefepime	Not classified	Watch	Antibiotic	-		-		-		-		-		1	0.0
Cefiderocol	Red	Reserve	Antibiotic	-		-		-		-		-		1	0.0
Dapsone	Not classified	Not classified	Antibiotic	6	0.1	1	0.0	2	0.0	4	0.1	-		1	0.0
Imipenem and cilastatin	Red	Watch	Antibiotic	-		2	0.0	-		1	0.0	-		1	0.0

Antimicrobial	AMRIC G/A/R category	WHO AWaRe category	Drug class	2019		2020		2021		2022		2023*		2024	
				(n)	(%)	(n)	(%)	(n)	(%)	(n)	(%)	(n)	(%)	(n)	(%)
Isoniazid	Not classified	Not classified	Antibiotic	5	0.1	2	0.0	1	0.0	2	0.0	-		1	0.0
Itraconazole	Green	Not classified	Antifungal	2	0.0	2	0.0	1	0.0	-		-		1	0.0
Moxifloxacin	Red	Watch	Antibiotic	2	0.0	3	0.1	1	0.0	1	0.0	-		1	0.0
Norfloxacin	Not classified	Watch	Antibiotic		-	1	0.0		-		-	-		1	0.0
Pyrazinamide	Not classified	Not classified	Antibiotic	1	0.0	2	0.0		-		-	-		1	0.0
Terbinafine	Green	Not classified	Antifungal	3	0.1	2	0.0	1	0.0	1	0.0	4	0.1	1	0.0
Tetracycline	Not classified	Access	Antibiotic	1	0.0	2	0.0		-		-	2	0.0	1	0.0
Voriconazole	Red	Not classified	Antifungal	7	0.1	9	0.2	14	0.3	7	0.1	11	0.2	1	0.0

*2023 results taken from ECDC PPS 2023 (Appendix F of the HPSC Point Prevalence Survey 2023 National Report)¹

Table A2.5: Number of antimicrobials used based on 2023 WHO AWaRe classifications.

WHO AWaRe category	2019		2020		2021		2022		2023*		2024	
	(n)	(%)	(n)	(%)	(n)	(%)	(n)	(%)	(n)	(%)	(n)	(%)
Access	2,344	52.3	2,119	49.8	2,466	49.9	2,424	48.3	2,994	46.7	2,250	47.2
Reserve	125	2.8	127	3.0	130	2.6	166	3.3	233	3.6	147	3.1
Watch	2,011	44.9	2,009	47.2	2,342	47.4	2,425	48.4	3,185	49.7	2,371	49.7

*2023 results taken from ECDC PPS 2023.

Table A2.6: Number of antimicrobials used based on 2024 AMRIC Green/Amber/Red classifications.

AMRIC G/A/R category	2019		2020		2021		2022		2023*		2024	
	(n)	(%)	(n)	(%)	(n)	(%)	(n)	(%)	(n)	(%)	(n)	(%)
Amber	3,114	67.3	2,993	68.0	3,382	65.9	3,462	67.1	4,481	68.3	3,326	68.1
Green	1,178	25.5	1,053	23.9	1,327	25.9	1,291	25.0	1,544	23.5	1,188	24.3
Red	334	7.2	354	8.0	420	8.2	403	7.8	532	8.1	372	7.6

*2023 results taken from ECDC PPS 2023.

A2.3. Indication and diagnostic site for antimicrobial use

Table A2.7: Relative proportions (%) of antimicrobials used by indication over time.

Indication	2019	2020	2021	2022	2023*	2024
Community-acquired	54.7	53.6	51.4	52.4	56.2	53.1
Healthcare-associated	24.8	24.2	25.1	22.8	18.2	22.3
Surgical prophylaxis	8.0	9.7	9.2	10.8	11.2	10.8
Medical prophylaxis	8.7	8.0	9.5	8.1	9.0	8.7
Longterm care-acquired	2.1	2.2	2.3	3.2	3.0	2.7
Unknown or other	1.7	2.3	2.4	2.4	1.0	1.3
Unknown indication	0.0	0.0	0.1	0.3	1.4	1.0

*2023 results taken from ECDC PPS 2023

Table A2.8: Diagnostic sites for antimicrobial therapy by frequency and relative proportions.

Diagnostic site	Total (n)	Proportion (%)
Pneumonia	967	24.8
Intra-abdominal infection	613	15.7
Skin soft tissue infection	425	10.9
Bronchitis	329	8.5
Pyelonephritis	240	6.2
Cystitis	203	5.2
Clinical sepsis	178	4.6
Bone or joint infection	174	4.5
Gastrointestinal infection	146	3.8
Bacteraemia	140	3.6
Obstetric or gynaecological infections	95	2.4
Ear, nose, throat	94	2.4
Febrile neutropenia	83	2.1
Central nervous system	68	1.7
Cardiovascular system	29	0.7
Undefined	29	0.7
Cystic fibrosis	27	0.7

Diagnostic site	Total (n)	Proportion (%)
Prostatitis/epididymoorchitis	21	0.5
Tuberculosis	13	0.3
Asymptomatic bacteriuria	7	0.2
Perinatal infection	6	0.2
Endophthalmitis	4	0.1
Sexually transmitted infection	2	0.1
Total	3,893	100.0

A2.4. Appropriateness of antimicrobials

Table A2.9: Antimicrobial choice compliance with local guidelines or microbiologist/ infectious diseases physician approved by relative proportions.

Appropriateness of antimicrobial choice	Total (n)	Proportion (%)
Overall compliance*	-	84.5
Compliant	3,881	78.6
Not compliant	714	14.5
No guidelines in place	268	5.4
Cannot be determined	37	0.7
Unknown	35	0.7
Total	4,935	100.0

*Overall compliance is calculated as a percentage of choice appropriate out of the total of choice appropriate and choice not appropriate.

Table A2.10: Antimicrobial duration compliance by relative proportions.

Appropriateness of duration	Total (n)	Proportion (%)
Overall compliance*	-	87.0
Duration appropriate	3,596	73.4
Duration not appropriate	536	10.9
Medical prophylaxis (not applicable)	364	7.4
Unknown	401	8.2

*Overall compliance is calculated as a percentage of duration appropriate out of the total of duration appropriate and duration not appropriate.

Table A2.11: Change of antimicrobial agent and reported reason for change by relative proportions.

Reason	Total (n)	Proportion (%)
Antimicrobial not changed	3,625	74.1
Antimicrobials changed	1,261	25.8
<i>Escalation</i>	689	14.1
<i>De-escalation</i>	274	5.6
<i>Switched</i>	234	4.8
<i>Changed for other or unknown reason</i>	64	1.3
Unknown	6	0.1
Total	4,892	100.0

Appropriateness of antimicrobials – cross-analyses

Table A2.12: Number and proportion of therapies with inappropriate durations relative to all therapies, categorised by antimicrobial.

Antimicrobial	Total (n)	Proportion (%)
Amoxicillin/clavulanic acid	177	19.2
Piperacillin/tazobactam	73	8.3
Cefuroxime	60	17.0
Metronidazole	37	13.3
Clarithromycin	24	15.9
Ceftriaxone	17	8.9
Flucloxacillin	17	8.3
Nitrofurantoin	15	22.4
Ciprofloxacin	11	12.0
Trimethoprim	11	28.9
Amoxicillin	10	10.4
Cefalexin	9	15.0
Doxycycline	9	9.3
Clindamycin	8	10.8
Gentamicin	7	5.8
Meropenem	7	4.6
Vancomycin	6	3.4
Azithromycin	5	4.5
Amikacin	3	17.6
Aztreonam	3	6.2
Fluconazole	3	4.5
Levofloxacin	3	9.4
Teicoplanin	3	13.6
Benzylpenicillin	2	3.9
Cefaclor	2	25.0
Linezolid	2	4.9
Amphotericin B	1	4.2

Antimicrobial	Total (n)	Proportion (%)
Caspofungin	1	12.5
Cefazolin	1	5.9
Cefotaxime	1	1.6
Daptomycin	1	3.2
Erythromycin	1	4.2
Ethambutol	1	20.0
Fidaxomicin	1	5.0
Lymecycline	1	50.0
Rifampicin, pyrazinamide and isoniazid	1	20.0
Rifaximin	1	3.0
Sulfamethoxazole and trimethoprim	1	0.5
Total	536	11.2

Table A2.13: Number and proportion of therapies with inappropriate durations relative to all therapies, categorised by indication.

Indication	Total (n)	Proportion (%)
Community-acquired	256	9.8
Hospital-acquired	90	8.2
Long-term care-acquired	14	10.4
Medical prophylaxis	2	0.5
Other indication	3	6.4
Surgical prophylaxis	129	24.2
>1 day	90	64.7
One day	32	15.8
Single dose	7	3.6
Unknown indication/reason	36	70.6
Unknown or missing information	6	33.3
Total	536	10.9

Table A2.14: Number and proportion of therapies with inappropriate durations relative to all therapies, categorised by diagnostic site.

Diagnostic site	Total (n)	Proportion (%)
Pneumonia	93	9.6
Cystitis	48	23.6
Bronchitis	46	14.0
Intra-abdominal infection	46	7.5
Skin soft tissue infection	42	9.9
Gastrointestinal infection	16	11.0
Pyelonephritis	16	6.7
Clinical sepsis	12	6.7
Ear, nose, throat	9	9.6
Bacteraemia	8	5.7
Obstetric or gynaecological infections	7	7.4
Undefined	7	24.1
Asymptomatic bacteriuria	4	57.1
Febrile neutropenia	4	4.8
Bone or joint infection	3	1.7
Prostatitis/epididymo-orchitis	3	14.3
Tuberculosis	2	15.4
Cystic fibrosis	1	3.7
Cardiovascular system	1	3.4
Endophthalmitis	1	25.0
Total	369	9.7

Table A2.15: Number and proportion of therapies classified not compliant with local guidelines or not microbiologist/infectious diseases physician-approved relative to all therapies, by antimicrobial.

Antimicrobial	Total (n)	Proportion (%)
Amoxicillin/clavulanic acid	227	24.6
Piperacillin/tazobactam	148	16.8
Metronidazole	54	19.4

Antimicrobial	Total (n)	Proportion (%)
Cefuroxime	42	11.9
Ceftriaxone	32	16.8
Clarithromycin	30	19.9
Ciprofloxacin	20	21.7
Doxycycline	18	18.6
Gentamicin	17	14.2
Clindamycin	16	21.6
Flucloxacillin	15	7.3
Meropenem	14	9.2
Azithromycin	10	9.0
Amoxicillin	8	8.3
Cefalexin	7	11.7
Cefotaxime	7	10.9
Nitrofurantoin	6	9.0
Trimethoprim	6	15.8
Levofloxacin	5	15.6
Vancomycin	5	2.8
Fluconazole	4	6.1
Aztreonam	3	6.2
Benzympenicillin	3	5.9
Sulfamethoxazole and trimethoprim	3	1.6
Amphotericin B	2	8.3
Ceftazidime	2	9.1
Erythromycin	2	8.3
Linezolid	2	4.9
Cefaclor	1	12.5
Colistin	1	8.3
Fidaxomicin	1	5.0
Isavuconazole	1	33.3

Antimicrobial	Total (n)	Proportion (%)
Lymecycline	1	50.0
Teicoplanin	1	4.5
Total	714	15.2

Table A2.16: Number and proportion of therapies classified not compliant with local guidelines or not microbiologist/infectious diseases physician-approved relative to all therapies, by indication.

Indication	Total (n)	Proportion (%)
Community-acquired	442	16.9
Hospital-acquired	111	10.1
Long-term care-acquired	23	17.2
Medical prophylaxis	13	3.0
Other indication	2	4.3
Surgical prophylaxis	86	16.1
>1 day	90	64.7
One day	32	15.8
Single dose	7	3.6
Unknown indication/reason	33	64.7
Unknown or missing information	4	22.2
Total	714	14.5

Table A2.17: Number and proportion of therapies classified not compliant with local guidelines or not microbiologist/infectious diseases physician-approved relative to all therapies, by diagnostic site.

Diagnostic site	Total (n)	Proportion (%)
Pneumonia	164	17.0
Bronchitis	99	30.1
Intra-abdominal infection	77	12.6
Skin soft tissue infection	66	15.5
Cystitis	59	29.1
Pyelonephritis	31	12.9
Gastrointestinal infection	23	15.8
Undefined	12	41.4
Ear, nose, throat	10	10.6
Clinical sepsis	7	3.9
Obstetric or gynaecological infections	7	7.4
Bacteraemia	6	4.3
Bone or joint infection	6	3.4
Asymptomatic bacteriuria	4	57.1
Febrile neutropenia	3	3.6
Prostatitis/epididymoorchitis	3	14.3
Central nervous system	2	2.9
Endophthalmitis	2	50.0
Total	581	15.2

A2.5. Surgical antibiotic prophylaxis

Table A2.18: Surgical prophylaxis prescriptions, by hospital model.

Hospital model	>1 day		One day		Single dose		Total
	(n)	(%)	(n)	(%)	(n)	(%)	(n)
Model 2	10	25.6	19	48.7	10	25.6	39
Model 3	28	31.5	28	31.5	33	37.1	89
Model 4	38	39.6	30	31.2	28	29.2	96
Private	46	22.3	86	41.7	74	35.9	206
Specialty (Specialist)	17	16.3	39	37.5	48	46.2	104
Total	139	26.0	202	37.8	193	36.1	534

Table A2.19: Reasons for extending surgical prophylaxis.

Reason	2022		2024	
	(n)	(%)	(n)	(%)
Reason given	55	30.9	48	34.5
<i>Drain in place</i>	10	5.6	12	8.6
<i>In line with locally approved guidelines</i>	18	10.1	12	8.6
<i>Other</i>	27	15.2	24	17.3
No reason given	123	69.1	91	65.5
Total	178	100.0	139	100.0

Table A2.20: Number and relative proportions of surgical categories with antimicrobial prophylaxis.

Surgical category	>1 day		One day		Single dose		Total (n)
	(n)	(%)	(n)	(%)	(n)	(%)	
Cardiac	6	4.3	12	5.9	2	1.0	20
ENT & Maxillofacial	20	14.4	5	2.5	5	2.6	30
General	42	30.2	19	9.4	40	20.7	101
Neurosurgery	0	0.0	3	1.5	0	0.0	3
Exploratory Laparotomy	0	0.0	0	0.0	2	1.0	2
Not provided	3	2.2	2	1.0	11	5.7	16
Obstetrics & Gynaecology	14	10.1	16	7.9	81	42.0	111
Orthopaedics	44	31.7	137	67.8	21	10.9	202
Thoracic	1	0.7	1	0.5	0	0.0	2
Urology	7	5.0	4	2.0	29	15.0	40
Vascular	2	1.4	3	1.5	2	1.0	7
Total	139	100.0	202	100.0	193	100.0	534

Table A2.21: Surgical antibiotic prophylaxis duration greater than 1 day, by surgical category and operative procedure.

Reason	Surgical category	Operative procedure	Total (n)
Drain in place	ENT & Maxillofacial	Neck surgery	3
		Breast surgery	2
		Herniorrhaphy	2
	General	Appendix surgery	1
		Colon surgery	1
		Ovarian surgery	1
	Orthopaedics	Spinal fusion	2
In line with locally approved guidelines	General	Liver transplant	3
		Appendix surgery	1
		Bile duct, liver or pancreatic surgery	1

Reason	Surgical category	Operative procedure	Total (n)
No reason given	Obstetrics & Gynaecology	Minimally invasive or non-NHSN procedure	1
	Orthopaedics	Open reduction of fracture	3
		Hip prosthesis	2
		Ortho-Upper limb surgery excl. open reduction # long bones	1
	Cardiac	Pacemaker surgery	4
	ENT & Maxillofacial	Neck surgery	9
		Minimally invasive or non-NHSN procedure	2
	General	Colon surgery	7
		General-Abdominal Surgery	6
		Appendix surgery	3
		Breast surgery	3
		Bile duct, liver or pancreatic surgery	2
		Gastric surgery	1
		Herniorrhaphy	1
		Small bowel surgery	1
		Spleen surgery	1
		Minimally invasive or non-NHSN procedure	1
	Not provided		3
	Obstetrics & Gynaecology	Minimally invasive or non-NHSN procedure	6
		Abdominal hysterectomy	4
		Vaginal hysterectomy	1
	Orthopaedics	Hip prosthesis	8
		Knee prosthesis	7
		Open reduction of fracture	6
		Spinal fusion	4

Reason	Surgical category	Operative procedure	Total (n)
Other		Ortho-Upper limb surgery excl. open reduction # long bones	3
		Minimally invasive or non- NHSN procedure	1
	Thoracic	Thoracic surgery	1
	Urology	Kidney surgery	3
		Prostate surgery	1
	Vascular	Abdominal aortic aneurysm repair	1
		Carotid endarterectomy	1
	Cardiac	Pacemaker surgery	2
	ENT & Maxillofacial	Neck surgery	5
		Minimally invasive or non- NHSN procedure	1
	General	Minimally invasive or non- NHSN procedure	2
		Colon surgery	1
		Herniorrhaphy	1
		Liver transplant	1
	Obstetrics & Gynaecology	Minimally invasive or non- NHSN procedure	1
	Orthopaedics	Hip prosthesis	2
		Knee prosthesis	2
		Ortho-Upper limb surgery excl. open reduction # long bones	2
		Minimally invasive or non- NHSN procedure	1
	Urology	Minimally invasive or non- NHSN procedure	3

Table A2.22: “Other” reasons (provided for 23 patients) for continuing the antimicrobials beyond 24 hours. (Note: Responses were free text. Where possible responses have been grouped, otherwise responses quoted directly.)

Reason
48 hours post pyeloplasty and stent
Benzympenicillin gentamicin started in Maternity hospital, Patient transferred awaiting surgery and used as SP. Metronidazole stat dose added. Pragmatic approach but not in guideline.
Cover for infection
Patient unwell after OT went to ICU. Antibiotics continue as per microbiology advice.
High risk of infection (3 patients)
Awaiting theatre (3 patients)
Complicated history of talus septic arthritis
No clear reason
Complicated fracture (2 patients)
As per consultant usual protocol
May get temps during initial healing days
Intra-op findings
Extended prophylaxis until cultures available (2 patients)
Open laparotomy post elective c-section. Post partum haemorrhage following cervical suture removal. Bakri Balloon inserted. Open laparotomy to complete suturing, blood loss 2.6L

A2.6. Parenteral and oral route

Table A2.23: Antimicrobials used, by route of administration

Route of administration	Total (n)	Proportion (%)
Parenteral	3,357	68.0
Oral	1,570	31.8
Inhalation	8	0.2
Rectal	0	0.0

Table A2.24: IV therapies eligible for conversion to oral therapy and those administered to patients already on oral medications.

Metric	Statistic
Total therapies	4,935
Total IV therapies	3,357
<i>Proportion of therapies that are IV (%)</i>	<i>68.0</i>
Total IV therapies suitable for oral switch	558
<i>Proportion of IV therapies that are suitable for oral switch (%)</i>	<i>16.6</i>
Total IV therapies for patients on oral meds	2,512
<i>Proportion of IV therapies for patients on oral meds (%)</i>	<i>74.8</i>

A2.7. In-depth analyses – selected antimicrobials

Table A2.25: Number and relative proportion of specific antimicrobials, by indication.

Indication	Piperacillin/tazobactam		Meropenem		Metronidazole	
	(n)	(%)	(n)	(%)	(n)	(%)
Surgical prophylaxis	5	0.6	0	0.0	19	6.8
Medical prophylaxis	0	0.0	0	0.0	1	0.4
Community-acquired	474	53.9	85	55.9	179	64.2
Healthcare-associated	335	38.1	62	40.8	71	25.4
Longterm care-acquired	52	5.9	4	2.6	3	1.1
Unknown or other	5	0.6	1	0.7	1	0.4
Unknown indication	9	1.0	0	0.0	5	1.8
Total	880	100.0	152	100.0	279	100.0

Table A 2.26: Number and relative proportion of specific antimicrobials, by diagnostic site.

Diagnostic site	Piperacillin/tazobactam		Meropenem		Metronidazole	
	(n)	(%)	(n)	(%)	(n)	(%)
Asymptomatic bacteriuria	0	0.0	0	0.0	0	0.0
Bacteraemia	27	3.1	15	9.9	4	1.5
Bone or joint infection	26	3.0	5	3.3	11	4.2
Bronchitis	78	9.1	5	3.3	2	0.8
Cardiovascular system	0	0.0	0	0.0	1	0.4
Central nervous system	1	0.1	4	2.6	2	0.8
Clinical sepsis	61	7.1	9	6.0	7	2.7
Cystic fibrosis	1	0.1	3	2.0	0	0.0
Cystitis	14	1.6	2	1.3	0	0.0
Ear, nose, throat	4	0.5	1	0.7	12	4.6
Endophthalmitis	0	0.0	0	0.0	0	0.0
Febrile neutropenia	44	5.1	8	5.3	1	0.4
Gastrointestinal infection	11	1.3	2	1.3	36	13.9
Intra-abdominal infection	164	19.0	28	18.5	111	42.9

Diagnostic site	Piperacillin/tazobactam		Meropenem		Metronidazole	
	(n)	(%)	(n)	(%)	(n)	(%)
Obstetric or gynaecological infections	7	0.8	3	2.0	14	5.4
Perinatal infection	0	0.0	0	0.0	0	0.0
Pneumonia	309	35.9	35	23.2	30	11.6
Prostatitis/epididymo-orchitis	3	0.3	1	0.7	0	0.0
Pyelonephritis	65	7.5	22	14.6	2	0.8
Sexually transmitted infection	0	0.0	0	0.0	1	0.4
Skin soft tissue infection	38	4.4	8	5.3	25	9.7
Tuberculosis	0	0.0	0	0.0	0	0.0
Undefined	8	0.9	0	0.0	0	0.0
Total	861	100.0	151	100.0	259	100.0

Table A 2.27: Number and relative proportion of specific antimicrobials, by compliance with local guidelines or microbiologist/infectious diseases physician-approved.

Appropriateness of antimicrobial choice	Piperacillin/tazobactam		Meropenem		Metronidazole	
	(n)	(%)	(n)	(%)	(n)	(%)
Overall compliance		82.5		90.7		79.5
Compliant	699	79.4	137	90.1	210	75.3
Not compliant	148	16.8	14	9.2	54	19.4
No guidelines in place	19	2.2	0	0.0	14	5.0
Cannot be determined	11	1.2	1	0.7	1	0.4
Unknown	3	0.3	0	0.0	0	0.0
Total	880	100.0	152	100.0	279	100.0

**Overall compliance is calculated as a percentage of duration appropriate out of the total of duration appropriate and duration not appropriate.*

Table A2.28: Number and relative proportion of specific antimicrobials not compliant with local guidelines nor microbiologist/infectious diseases physician-approved, by indication.

Indication	Piperacillin/tazobactam		Meropenem		Metronidazole	
	(n)	(%)	(n)	(%)	(n)	(%)
Surgical prophylaxis	2	1.4	0	0.0	4	7.4
Medical prophylaxis	0	0.0	0	0.0	0	0.0
Community-acquired	109	73.6	7	50.0	36	66.7
Healthcare-associated	21	14.2	6	42.9	10	18.5
Longterm care-acquired	9	6.1	0	0.0	0	0.0
Unknown or other	2	1.4	1	7.1	0	0.0
Unknown indication	5	3.4	0	0.0	4	7.4
Total	148	100.0	14	100.0	54	100.0

Table A2.29: Number and relative proportion of specific antimicrobials not compliant with local guidelines nor microbiologist/infectious diseases physician-approved, by diagnostic site.

Diagnostic site	Piperacillin/tazobactam		Meropenem		Metronidazole	
	(n)	(%)	(n)	(%)	(n)	(%)
Asymptomatic bacteriuria	0	0.0	0	0.0	0	0.0
Bacteraemia	2	1.4	1	7.7	0	0.0
Bone or joint infection	1	0.7	0	0.0	0	0.0
Bronchitis	31	22.3	1	7.7	0	0.0
Cardiovascular system	0	0.0	0	0.0	0	0.0
Central nervous system	0	0.0	0	0.0	0	0.0
Clinical sepsis	2	1.4	0	0.0	1	2.1
Cystic fibrosis	0	0.0	0	0.0	0	0.0
Cystitis	4	2.9	0	0.0	0	0.0
Ear, nose, throat	0	0.0	0	0.0	2	4.2
Endophthalmitis	0	0.0	0	0.0	0	0.0
Febrile neutropenia	0	0.0	1	7.7	0	0.0
Gastrointestinal infection	3	2.2	0	0.0	10	20.8
Intra-abdominal infection	24	17.3	1	7.7	21	43.8

Diagnostic site	Piperacillin/tazobactam		Meropenem		Metronidazole	
	(n)	(%)	(n)	(%)	(n)	(%)
Obstetric or gynaecological infections	2	1.4	0	0.0	2	4.2
Perinatal infection	0	0.0	0	0.0	0	0.0
Pneumonia	54	38.8	6	46.2	3	6.2
Prostatitis/epididymoorchitis	1	0.7	0	0.0	0	0.0
Pyelonephritis	5	3.6	1	7.7	1	2.1
Sexually transmitted infection	0	0.0	0	0.0	0	0.0
Skin soft tissue infection	6	4.3	2	15.4	8	16.7
Tuberculosis	0	0.0	0	0.0	0	0.0
Undefined	4	2.9	0	0.0	0	0.0
Total	139	100.0	13	100.0	48	100.0

Table A2.30: Number and relative proportion of specific antimicrobials, by reason for antimicrobial changed.

Reason	Piperacillin/tazobactam		Meropenem		Metronidazole	
	(n)	(%)	(n)	(%)	(n)	(%)
Antimicrobial not changed	625	71.1	41	27.5	200	72.2
Antimicrobials changed	254	28.9	108	72.5	77	27.8
<i>Escalation</i>	227	25.8	106	71.1	36	13.0
<i>De-escalation</i>	21	2.4	2	1.3	16	5.8
<i>Switched</i>	1	0.1	0	0.0	21	7.6
<i>Changed for other or unknown reason</i>	5	0.6	0	0.0	4	1.4
Unknown	0	0.0	0	0.0	0	0.0
Total	1,133	100.0	257	100.0	354	100.0

Table A2.31: Number and relative proportion of metronidazole therapies not compliant with local guidelines nor microbiologist / infectious diseases-physician approved, by administration route.

Route of administration	Total (n)	Proportion (%)
Parenteral	43	79.6
Oral	11	20.4
Total	54	100.0

Table A2.32: Metronidazole prescriptions combined with a second antibiotic with anaerobic activity.

Antimicrobial	Total (n)	Proportion (%)
Amoxicillin/clavulanic acid	28	10.0
Clindamycin	3	1.1
Meropenem	6	2.2
Piperacillin/tazobactam	40	14.3
Total	77	27.6

A2.8. General details about participating hospitals

Table A2.33: Hospital participation over time.

Hospital type	Hospitals (n)					
	2019	2020	2021	2022	2023	2024
All hospitals	45	47	52	53	65	43
Model 2	7	7	8	8	10	5
Model 3	13	13	13	13	17	14
Model 4	6	8	8	8	9	5
Private	6	8	9	11	15	9
Specialty (Specialist)	13	12	14	13	14	10

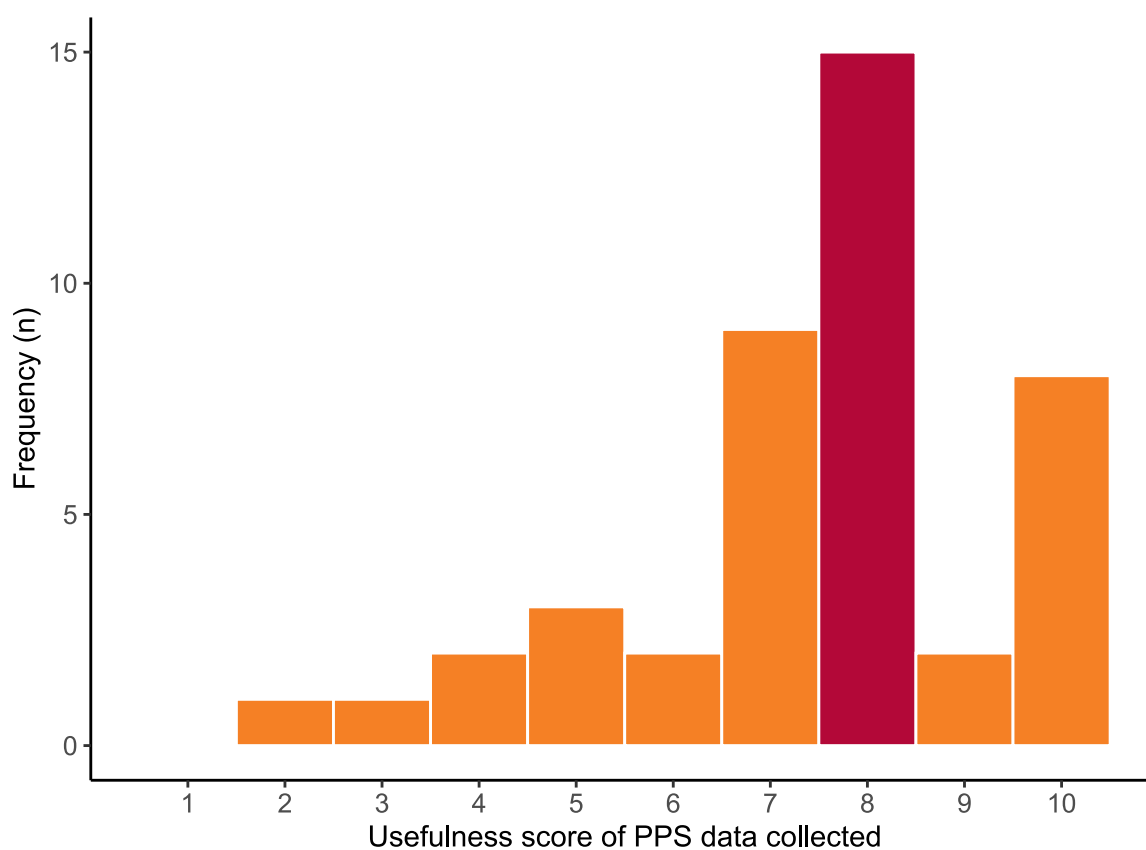


Figure A2.1: Usefulness of the PPS data. From not at all useful (1) to highly useful (10). The bar highlighted in red represents the median.

Table A 2.34: Hospital survey statistics.

Metric	Category	Total (n)	Proportion (%)
Guidelines in place in this hospital	Yes	43	100.0
	No	0	0.0
Antimicrobial guideline app available	Yes	42	97.7
	No	1	2.3
Hospital has a restricted antimicrobial policy	Yes	42	97.7
	No	1	2.3
Antimicrobial policy last approved/updated (if in place)	2015	1	2.3
	2018	1	2.3
	2019	1	2.3
	2020	3	7.0
	2021	1	2.3
	2022	1	2.3
	2023	10	23.3
	2024	21	48.8
	Unknown	4	9.3
Antimicrobial policy implementation method	Other	7	16.3
	Pre-authorisation	20	46.5
	Retrospective review	15	34.9
	Unknown	1	2.3
Local Surgical Antibiotic Guidelines align with national SAP Duration Position Paper	Yes	43	100.0
	No	0	0.0