Supplemental Material for
Equations to predict antimicrobial minimum inhibitory concentrations in *Neisseria gonorrhoeae* using molecular antimicrobial resistance determinants

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Regression Statistics Summary Output for Minimum Inhibitory Concentration

Azithromycin:

SUMMARY OUTPUT								
Regression Statistics								
Multiple R	0.912571074							
R Square	0.832785966							
Adjusted R Square	0.831468282							
Standard Error	0.904006021							
Observations	1280							
ANOVA								
	df	*SS*	*MS*	*F*	*Significance F*			
Regression	10	5164.935956	516.4935956	632.007591	0			
Residual	1269	1037.060919	0.817226886					
Total	1279	6201.996875						
	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	-2.890086354	0.072154294	-40.05425288	1.8877E-227	-3.031641184	-2.748531524	-3.031641184	-2.748531524
A2059G	2.331226536	0.130836023	17.81792566	1.47584E-63	2.074547828	2.587905245	2.074547828	2.587905245
C2611T	1.27220139	0.018446871	68.96569958	0	1.23601167	1.308391111	1.23601167	1.308391111
mtrRp_MEN	3.471268969	0.12556345	27.64553679	4.5488E-132	3.224934181	3.717603757	3.224934181	3.717603757
mtrRp_WHO-P	4.890086354	0.906880989	5.39220296	8.2928E-08	3.110935361	6.669237347	3.110935361	6.669237347
mtrRp-35Adel	0.800905933	0.111706116	7.169759015	1.27211E-12	0.581756949	1.020054917	0.581756949	1.020054917
ermB	2.377380977	0.523120193	4.5446171	6.02824E-06	1.351105398	3.403656555	1.351105398	3.403656555
ermC	2.999993045	0.407562028	7.360825682	3.27466E-13	2.200423536	3.799562555	2.200423536	3.799562555
A39T	0.407755716	0.091639867	4.449545044	9.35958E-06	0.227973405	0.587538027	0.227973405	0.587538027
G120	0.515960534	0.090180374	5.721428193	1.31642E-08	0.339041507	0.69287956	0.339041507	0.69287956
PonA	0.248313741	0.131083082	1.894323335	0.058409301	-0.008849656	0.505477138	-0.008849656	0.505477138

Ceftriaxone:

SUMMARY OUTPUT								
Regression Statistics								
Multiple R	0.850114165							
R Square	0.722694093							
Adjusted R Square	0.720508861							
Standard Error	0.874808164							
Observations	1280							
ANOVA								
	df	*SS*	*MS*	*F*	*Significance F*			
Regression	10	2530.944724	253.0944724	330.7173702	0			
Residual	1269	971.152151	0.765289323					
Total	1279	3502.096875						
	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	-7.724745216	0.134676559	-57.35775584	0	-7.988958423	-7.460532009	-7.988958423	-7.460532009
mtrRp	0.542682422	0.111445641	4.869480912	1.25971E-06	0.324044447	0.761320396	0.324044447	0.761320396
G120	1.382201381	0.091623779	15.08561855	2.01127E-47	1.202450632	1.561952131	1.202450632	1.561952131
PonA	0.66860446	0.1033138	6.471589107	1.38198E-10	0.465919818	0.871289103	0.465919818	0.871289103
A311V	3.897943187	0.439658734	8.865838168	2.51852E-18	3.035405232	4.760481142	3.035405232	4.760481142
A501P	5.147943187	0.620179114	8.300736144	2.61983E-16	3.931254008	6.364632367	3.931254008	6.364632367
A501T	1.510010557	0.10561549	14.29724513	4.18578E-43	1.302810376	1.717210737	1.302810376	1.717210737
A501V	1.919370464	0.145339094	13.20615401	2.09724E-37	1.634239122	2.204501807	1.634239122	2.204501807
N513Y	1.525996187	0.157950078	9.661256334	2.34409E-21	1.216124175	1.8358682	1.216124175	1.8358682
A517G	0.431053201	0.140721237	3.063170916	0.00223617	0.154981333	0.707125069	0.154981333	0.707125069
G543S	0.48482054	0.120385949	4.027218672	5.97871E-05	0.248643156	0.720997925	0.248643156	0.720997925

Cefixime:

SUMMARY OUTPUT								
Regression Statistics								
Multiple R	0.885873957							
R Square	0.784772667							
Adjusted R Square	0.783247434							
Standard Error	0.843085111							
Observations	1280							
ANOVA								
	df	*SS*	*MS*	*F*	*Significance F*			
Regression	9	3291.49352	365.7215022	514.5263913	0			
Residual	1270	902.7064805	0.710792504					
Total	1279	4194.2						
	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	-7.206527476	0.129646504	-55.58597621	0	-7.460872352	-6.952182601	-7.460872352	-6.952182601
mtrRp	0.471042012	0.106313355	4.430694657	1.0202E-05	0.262472894	0.679611131	0.262472894	0.679611131
G120	0.746248259	0.086810231	8.596316932	2.38327E-17	0.575941025	0.916555493	0.575941025	0.916555493
PonA	0.626881856	0.0934459	6.708500399	2.95335E-11	0.443556544	0.810207169	0.443556544	0.810207169
A311V	4.165679716	0.423715402	9.831315296	4.92955E-22	3.334420575	4.996938857	3.334420575	4.996938857
A501P	4.915679716	0.597689609	8.224469097	4.80149E-16	3.74311212	6.088247312	3.74311212	6.088247312
A501T	1.668616209	0.101779675	16.39439521	6.11213E-55	1.468941417	1.868291001	1.468941417	1.868291001
A501V	1.715947477	0.138857039	12.35765569	3.29548E-33	1.443533063	1.98836189	1.443533063	1.98836189
N513Y	2.917717645	0.151559022	19.25136228	1.14278E-72	2.620384053	3.215051237	2.620384053	3.215051237
A517G	0.468354066	0.135363329	3.459977445	0.000558128	0.202793729	0.733914402	0.202793729	0.733914402

SUMMARY OUTPUT	with PenA G543S							
Regression Statistics								
Multiple R	0.877050576							
R Square	0.769217713							
Adjusted R Square	0.767399097							
Standard Error	0.87807236							
Observations	1280							
ANOVA								
	df	*SS*	*MS*	*F*	*Significance F*			
Regression	10	3261.136954	326.1136954	422.9688894	0			
Residual	1269	978.4130461	0.771011069					
Total	1279	4239.55						
	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	-7.197072591	0.135179082	-53.24102289	0	-7.462271664	-6.931873518	-7.462271664	-6.931873518
mtrRp	0.437118519	0.111861481	3.907676839	9.81053E-05	0.217664735	0.656572304	0.217664735	0.656572304
G120	0.752337077	0.091965657	8.180630665	6.79384E-16	0.571915619	0.932758535	0.571915619	0.932758535
PonA	0.579678911	0.103699297	5.589998448	2.77698E-08	0.376237985	0.783119836	0.376237985	0.783119836
A311V	4.166221344	0.441299245	9.440807775	1.70687E-20	3.300464978	5.031977711	3.300464978	5.031977711
A501P	4.916221344	0.622493205	7.89763053	6.11481E-15	3.694992299	6.13745039	3.694992299	6.13745039
A501T	1.666653611	0.106009576	15.72172691	5.05391E-51	1.458680298	1.874626923	1.458680298	1.874626923
A501V	1.726996669	0.145881402	11.83836077	9.59264E-31	1.440801408	2.013191931	1.440801408	2.013191931
N513Y	2.948835259	0.158539441	18.60001044	1.78294E-68	2.637807012	3.259863506	2.637807012	3.259863506
A517G	0.485867603	0.141246314	3.439860402	0.000600903	0.208765621	0.762969586	0.208765621	0.762969586
G543S	0.078856846	0.120835148	0.652598578	0.5141333	-0.158201794	0.315915486	-0.158201794	0.315915486

Penicillin:

SUMMARY OUTPUT								
Regression Statistics								
Multiple R	0.849371619							
R Square	0.721432147							
Adjusted R Square	0.719899147							
Standard Error	0.925191894							
Observations	1280							
ANOVA								
	df	*SS*	*MS*	*F*	*Significance F*			
Regression	7	2819.780107	402.8257295	470.6017783	0			
Residual	1272	1088.806612	0.855980041					
Total	1279	3908.586719						
	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	-3.209433456	0.142203918	-22.56923367	3.93324E-95	-3.488413472	-2.930453441	-3.488413472	-2.930453441
BLA	6.418951823	0.221493268	28.98034724	3.2813E-142	5.984419524	6.853484121	5.984419524	6.853484121
mtrRp	0.555074097	0.116567359	4.761831274	2.13843E-06	0.32638867	0.783759524	0.32638867	0.783759524
G120	1.344048816	0.095451395	14.08097614	5.90251E-42	1.156789336	1.531308295	1.156789336	1.531308295
PonA	1.552610243	0.103631731	14.98199655	7.44755E-47	1.349302328	1.755918157	1.349302328	1.755918157
N513Y	1.251924894	0.162426392	7.707644526	2.56908E-14	0.933271807	1.570577981	0.933271807	1.570577981
A517G	1.281946706	0.148595614	8.627083093	1.84637E-17	0.990427266	1.573466146	0.990427266	1.573466146
G543S	0.423741809	0.126216471	3.357262387	0.000810444	0.176126459	0.671357159	0.176126459	0.671357159

Tetracycline:

SUMMARY OUTPUT								
Regression Statistics								
Multiple R	0.901716464							
R Square	0.813092581							
Adjusted R Square	0.812211635							
Standard Error	0.631487689							
Observations	1280							
ANOVA								
	df	*SS*	*MS*	*F*	*Significance F*			
Regression	6	2208.368978	368.0614964	922.9764312	0			
Residual	1273	507.6427405	0.398776701					
Total	1279	2716.011719						
	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	-1.833248054	0.099078415	-18.50300146	6.99436E-68	-2.027622986	-1.638873121	-2.027622986	-1.638873121
mtrRp_any	0.621336661	0.062148679	9.997584377	1.04676E-22	0.499411565	0.743261757	0.499411565	0.743261757
A39T	0.259050797	0.067096569	3.86086506	0.00011866	0.127418786	0.390682809	0.127418786	0.390682809
G120	0.791012164	0.070867662	11.16182114	1.15019E-27	0.651981912	0.930042416	0.651981912	0.930042416
A121	0.215288647	0.068146387	3.159208528	0.001619211	0.081597071	0.348980222	0.081597071	0.348980222
rpsJ	2.105844696	0.105474898	19.96536359	2.27288E-77	1.898920955	2.312768437	1.898920955	2.312768437
tetM	4.145844561	0.076445116	54.23295554	0	3.995872296	4.295816825	3.995872296	4.295816825

Ciprofloxacin:

SUMMARY OUTPUT								
Regression Statistics								
Multiple R	0.989617131							
R Square	0.979342065							
Adjusted R Square	0.979212039							
Standard Error	0.771396358							
Observations	1280							
ANOVA								
	df	*SS*	*MS*	*F*	*Significance F*			
Regression	8	35854.87597	4481.859497	7531.874409	0			
Residual	1271	756.311525	0.595052341					
Total	1279	36611.1875						
	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	-7.62037037	0.037113825	-205.3243087	0	-7.693181466	-7.547559275	-7.693181466	-7.547559275
gyrA_S91	5.672781223	0.163127483	34.7751411	9.5789E-187	5.352752476	5.99280997	5.352752476	5.99280997
parC_D86	5.053736657	0.166034613	30.43785003	2.693E-153	4.728004607	5.379468706	4.728004607	5.379468706
parC_S87R	5.670663624	0.162921984	34.8060065	5.5239E-187	5.351038031	5.990289216	5.351038031	5.990289216
parC_S87I	4.184154983	0.403908729	10.3591596	3.38283E-24	3.391753836	4.97655613	3.391753836	4.97655613
parC_S87C	5.947589147	0.787582047	7.551707371	8.17121E-14	4.402485333	7.492692962	4.402485333	7.492692962
parC_S87N	1.785524064	0.292332664	6.107850019	1.33988E-09	1.212016434	2.359031695	1.212016434	2.359031695
parC_S88	1.446590318	0.128468186	11.26030003	4.19652E-28	1.194557295	1.69862334	1.194557295	1.69862334
parC_E91	5.432173554	0.176082982	30.85007697	1.87E-156	5.086728291	5.777618817	5.086728291	5.777618817

SUMMARY OUTPUT	with GyrA D95							
Regression Statistics								
Multiple R	0.989617789							
R Square	0.979343368							
Adjusted R Square	0.979196982							
Standard Error	0.771675665							
Observations	1280							
ANOVA								
	df	*SS*	*MS*	*F*	*Significance F*			
Regression	9	35854.92367	3983.880408	6690.162751	0			
Residual	1270	756.2638318	0.595483332					
Total	1279	36611.1875						
	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	-7.62037037	0.037127263	-205.2499917	0	-7.693207884	-7.547532856	-7.693207884	-7.547532856
gyrA_S91	5.62037037	0.24683348	22.76988669	1.61383E-96	5.136124139	6.104616601	5.136124139	6.104616601
parC_D86	5.015269925	0.214621544	23.36797058	9.4948E-101	4.594218155	5.436321695	4.594218155	5.436321695
parC_S87R	5.63207592	0.212495013	26.50450868	1.4277E-123	5.215196049	6.04895579	5.215196049	6.04895579
parC_S87I	4.155183702	0.41682143	9.968738181	1.3766E-22	3.337449388	4.972918015	3.337449388	4.972918015
parC_S87C	5.909001183	0.799578846	7.390141963	2.6505E-13	4.340360484	7.477641882	4.340360484	7.477641882
parC_S87N	1.761094274	0.304912983	5.775727408	9.62529E-09	1.162905718	2.35928283	1.162905718	2.35928283
parC_S88	1.446586956	0.128514702	11.25619817	4.38767E-28	1.194462486	1.698711425	1.194462486	1.698711425
parC_E91	5.394418424	0.220964709	24.41303162	3.0487E-108	4.960922419	5.827914428	4.960922419	5.827914428
gyrA_D95	0.090998817	0.321545226	0.283004722	0.777219338	-0.539819432	0.721817066	-0.539819432	0.721817066

Table S1. Ciprofloxacin predicted and phenotypic MIC correlation on Canadian validation dataset

Predicted MIC	Phenotypic MIC (mg/L)															
	Susceptible					Intermediate			Resistant							
(mg/L)	0.002	0.004	0.008	0.016	0.032	0.125	0.25	0.5	1	2	4	8	16	32	64	Total
≤0.004	8	166	11	18	2											205
0.25		3		1		10	26	3		1						44
1									1	3						4
8								1		15	196	303	161	1		677
16										5	55	81	9	2		152
32											3		2	7	1	13
Total	8	169	11	19	2	10	26	4	1	24	254	384	172	10	1	1095

Dark green highlight indicates matching MIC values; light green highlight indicates matching MIC values within +/- 1 dilution; yellow highlight indicates matching MIC values within 2 dilutions.

Table S2. Ceftriaxone predicted and phenotypic MIC correlation on Canadian validation dataset

Predicted MIC	Phenotypic MIC (mg/L)								
(mg/L)	0.001	0.002	0.004	0.008	0.016	0.032	0.063	0.125	Total
≤0.004	17	5	3	4					29
0.008		5	85	103	22	3			218
0.016			8	103	39	11	4		165
0.031				28	377	210	22		637
0.063					7	23	6	6	42
0.125							2	2	4
Total	17	10	96	238	445	247	34	8	1095

Dark green highlight indicates matching MIC values; light green highlight indicates matching MIC values within +/- 1 dilution; yellow highlight indicates matching MIC values within 2 dilutions. CLSI resistance breakpoint ≥0.5 mg/L.

Table S3. Cefixime predicted and phenotypic MIC correlation on Canadian validation dataset

Predicted MIC	Phenotypic MIC (mg/L)									
(mg/L)	0.002	0.004	0.008	0.016	0.032	0.063	0.125	0.25	0.5	Total
<=0.008	14	22	92	26	3	3				160
0.016		6	143	492	167	15				823
0.031			5	3	1					9
0.063				7	6	20	28	1		62
0.125					5	16	10	7	3	41
Total	14	28	240	528	182	54	38	8	3	1095

Dark green highlight indicates matching MIC values; light green highlight indicates matching MIC values within +/- 1 dilution; yellow highlight indicates matching MIC values within 2 dilutions. CLSI resistance breakpoint ≥1 mg/L.

Table S4. Tetracycline predicted and phenotypic MIC correlation on Canadian validation dataset

Predicted MIC	Phenotypic MIC (mg/L)										
	Susceptible		Intermediate		Resistant						
(mg/L)	0.125	0.25	0.5	1	2	4	8	16	32	64	Total
≤0.25	1	19	9								29
0.5		5	14	1							20
1		1	6	56	27						90
2			17	85	73	10					185
4				2	279	384	6				671
16									2		2
32								10	85	3	98
Total	1	25	46	144	379	394	6	10	87	3	1095

Dark green highlight indicates matching MIC values; light green highlight indicates matching MIC values within +/- 1 dilution; yellow highlight indicates matching MIC values within 2 dilutions.

Table S5. Penicillin predicted and phenotypic MIC correlation on Canadian validation dataset

Predicted MIC	Phenotypic MIC (mg/L)													
	Susceptible		Intermediate				Resistant							
(mg/L)	0.032	0.063	0.125	0.25	0.5	1	2	4	8	16	32	64	128	Total
≤0.125	16	7	5	1										29
0.25		1	54	62	15	2								134
0.5			2	39	25	2								68
1		2	3	36	291	377	77	1						787
2				6	27	15	18	4						70
32								1				1	1	3
64									1	1	1		1	4
Total	16	10	64	144	358	396	95	6	1	1	1	1	2	1095

Dark green highlight indicates matching MIC values; light green highlight indicates matching MIC values within +/- 1 dilution; yellow highlight indicates matching MIC values within 2 dilutions.

Table S6. Azithromycin predicted and phenotypic MIC correlation on Canadian validation dataset

	Phenotypic MIC (mg/L)																
Predicted MIC	Susceptible							Resistant									
(mg/L)	0.016	0.032	0.063	0.125	0.25	0.5	1	2	4	8	16	32	64	128	256	>=512	Total
≤0.125		6	21	72	17	1	2										119
0.25	1	11	55	74	81	21		1									244
1								1									1
2		2				13	69	585	21	1							690
4								5	3								9
8									2	8							10
16								2	4	3	1						10
32											2	3					5
64											1	5					6
>=512																1	1
Total	1	19	76	146	98	34	71	595	30	12	4	8	0	0	0	1	1095

Dark green highlight indicates matching MIC values; light green highlight indicates matching MIC values within +/- 1 dilution; yellow highlight indicates matching MIC values within 2 dilutions.

Table S7. Ciprofloxacin predicted and phenotypic MIC correlation on International UK/USA validation dataset

	Phenotypic MIC (mg/L)														
Predicted MIC	Susceptible					Intermediate			Resistant						
(mg/L)	0.004	0.008	0.015	0.03	0.063	0.125	0.25	0.5	1	2	4	8	16	32	Total
≤0.016			136	23											159
0.25						1				5	3				9
1									4	4	3	1			12
4													1	1	2
8										1	2	11	9	1	24
16			2					1	2	2	9	28	106	70	220
32												4		1	5
Total	0	0	138	23	0	1	0	1	6	12	17	44	116	73	431

Dark green highlight indicates matching MIC values; light green highlight indicates matching MIC values within +/- 1 dilution; yellow highlight indicates matching MIC values within 2 dilutions.

Table S8. Ceftriaxone predicted and phenotypic MIC correlation on International UK/USA validation dataset

Predicted MIC	Phenotypic MIC (mg/L)							
(mg/L)	<=0.004	0.008	0.015	0.03	0.06	0.125	0.25	Total
<=0.004	29							29
0.008	77	36	5	3	2			123
0.016	28	12	7	12	4			63
0.031	13	16	16	16	13			74
0.063		5	16	46	45	21	2	135
0.125				1	6			7
Total	147	69	44	78	70	21	2	431

Dark green highlight indicates matching MIC values; light green highlight indicates matching MIC values within +/- 1 dilution; yellow highlight indicates matching MIC values within 2 dilutions.

Table S9. Cefixime predicted and phenotypic MIC correlation on International UK/USA validation dataset

Predicted MIC	Phenotypic MIC (mg/L)									
(mg/L)	0.002	0.004	0.008	0.015	0.03	0.06	0.125	0.25	0.5	Total
≤0.008	17	37	24	22	8	1				109
0.016	1	6	29	36	11	3		2		88
0.031	4		12	24	18	12				70
0.063	1		2	1	4	12	1	14		35
0.125				2	1	8	36	71	11	129
Total	23	43	67	85	42	36	37	87	11	431

Dark green highlight indicates matching MIC values; light green highlight indicates matching MIC values within +/- 1 dilution; yellow highlight indicates matching MIC values within 2 dilutions. CLSI resistance breakpoint ≥1 mg/L.

Table S10. Penicillin predicted and phenotypic MIC correlation on International UK/USA validation dataset

	Phenotypic MIC (mg/L)											
Predicted MIC	Susceptible		Intermediate				Resistant					
(mg/L)	0.016	0.063	0.125	0.25	0.5	1	2	4	8	16	32	Total
≤0.125	13	11	4		1							29
0.25	5	10	24	25	16	9						89
0.5	1	1	2	11	8		2					25
1		2	5	14	12	11	6	1				51
2		1	3	9	27	51	57	49	2			199
32						2	3		3	1	1	10
64						1	2	2	10			15
256						2	2	2	4	3		13
Total	19	25	38	59	64	76	72	54	19	4	1	431

Dark green highlight indicates matching MIC values; light green highlight indicates matching MIC values within +/- 1 dilution; yellow highlight indicates matching MIC values within 2 dilutions.

Table S11. Azithromycin predicted and phenotypic MIC correlation on International UK/USA validation dataset

	Phenotypic MIC (mg/L)												
Predicted MIC	Susceptible							Resistant					
(mg/L)	0.015	0.03	0.06	0.125	0.25	0.5	1	2	4	8	16	32	Total
≤0.125		6	16	31	20	24	3	2		1			103
0.25	1	11	10	49	79	104	53						307
1							1	1		1			3
2							1						1
4								1		3			4
8								1		2	6		9
64										3	1		4
Total	1	17	26	80	99	128	58	5		10	7		431

Dark green highlight indicates matching MIC values; light green highlight indicates matching MIC values within +/- 1 dilution; yellow highlight indicates matching MIC values within 2 dilutions.

Table S12. Tetracycline predicted and phenotypic MIC correlation on International UK/USA validation dataset

	Phenotypic MIC (mg/L)									
Predicted MIC	Suseptible	Intermediate		Resistant						
(mg/L)	<=0.25	0.5	1	2	4	8	16	32	64	Total
<=0.25	22	8	4	1						35
1		6	12	19	13	1				51
2	1	7	22	15	24	2				71
4	2	3	5	65	91	63	1			230
8							1	1	4	6
16							1		1	2
32					2		5	7	12	26
64							3	3	4	10
Total	25	24	43	100	130	66	11	11	21	431

Dark green highlight indicates matching MIC values; light green highlight indicates matching MIC values within +/- 1 dilution; yellow highlight indicates matching MIC values within 2 dilutions.

Table S13: Correlation between MICs determined by linear regression of molecular antimicrobial resistance determinants and phenotypically determined MICs

		No. isolates matching MIC dilutions[b]										MIC interpretive errors[c]		
Antimicrobial	Dataset[a]	> -2	-2	-1	0	+1	+2	>2	% ± 1	Sensitivity	Specificity	MI	MA	VMA
Ceftriaxone	Canada	0	48	612	363	65	7	0	95.0%	NA[d]	100%	NA[e]	0	0
	USA	2	4	33	88	49	8	2	91.4%	NA	100%	NA	0	0
	UK	16	57	124	45	2	1	0	69.8%	NA	100%	NA	0	0
	UK/USA	18	61	157	133	51	9	2	79.1%	NA	100%	NA	0	0
	Eyre et al.	NA[f]	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cefixime	Canada	0	23	204	615	228	22	3	95.6%	NA	100%	NA	0	0
	USA	1	0	15	36	96	35	3	79.0%	NA	100%	NA	0	0
	UK	9	20	104	90	21	1	0	87.8%	NA	100%	NA	0	0
	UK/USA	10	20	119	126	117	36	3	84.0%	NA	100%	NA	0	0
	Eyre et al.	5	17	87	233	76	10	3	91.9%	NA	100%	NA	0	0
Azithromycin	Canada	16	73	187	754	60	2	3	91.4%	99.7%	81.2%	NA	7.7%	0.2%
	USA	3	6	5	27	71	68	6	55.4%	78.9%	100%	NA	0	2.2%
	UK	9	8	68	87	63	9	1	89.9	66.7%	99.6%	NA	0.4%	0.4%
	UK/USA	12	14	73	114	134	77	7	74.5%	77.3%	99.8%	NA	0.2%	1.2%
	Eyre et al.	10	12	72	183	142	11	1	92.1%	90.9%	100%	NA	0	0.5%
Ciprofloxacin	Canada	13	70	297	512	181	19	3	90.4%	100%	100%	0.5%	0	0
	USA	4	9	17	130	23	1	2	91.4%	100%	95.6%	0.5%	1.1%	0
	UK	3	5	14	128	83	4	8	91.8%	100%	100%	3.3%	0.8%	0
	UK/USA	7	14	31	258	106	5	10	91.7%	100%	98.8%	1.9%	0.5%	0
	Eyre et al.	15	14	44	250	106	2	0	92.8%	100%	98.8%	0	0.5%	0
Tetracycline	Canada	0	20	386	631	58	0	0	98.2%	100%	100%	13.3%	0	0
	USA	6	15	86	77	2	0	0	88.7%	100%	40%	19.4%	1.6%	0
	UK	2	0	15	75	126	21	6	88.2%	99.4%	100%	18.8%	0%	0.4%
	UK/USA	8	15	101	152	127	22	6	88.2%	99.7%	88.0%	19.0%	0.7%	0.2%
	Eyre et al.	4	11	78	213	121	3	1	95.6%	100%	60%	7.9%	0.5%	0
Penicillin	Canada	13	67	423	487	101	4	0	92.3%	100%	NA[d]	13.9%	0	0
	USA	14	5	16	72	65	14	0	82.3%	100%	NA	13.4%	0	0
	UK	46	48	109	34	7	1	0	61.2%	100%	NA	49.8%	0.4%	0
	UK/USA	60	53	125	106	72	15	0	70.3%	100%	NA	34.1%	0.2%	0
	Eyre et al.	9	19	69	204	114	14	2	89.8%	100%	NA	13.0%	0	0
Overall	Canada	42	301	2109	3362	693	54	9	93.8%	99.9%	97.1%	4.6%	1.3%	0.03%
	USA	30	39	172	430	306	126	13	81.4%	99.0%	99.2%	5.6%	0.5%	0.4%
	UK	85	138	434	459	302	37	15	81.3%	99.4%	99.8%	12.0%	0.3%	0.1%
	UK/USA	115	117	606	889	607	164	28	81.3%	99.2%	99.5%	9.2%	0.3%	0.2%
	Eyre et al.	43	73	350	1083	559	40	7	92.4%	99.7%	99.5%	4.2%	0.2%	0.1%

[a] Canadian validation dataset (n = 1095) ; international dataset (n=431) with USA (n=186) and UK (n=245) isolates from Eyre et al. 2017; Eyre et al. summarizes predicted MIC values by Eyre et al. 2017.

[b] The number of isolates with MIC_{pred} and MIC_{pheno} that differ by the number of 2-fold dilutions.

[c] The percentage of isolates with minor (MI), major (ME) and very major (VME) interpretative errors for susceptibilities.

[d] To few isolates available with resistant or susceptible interpretative breakpoints were available to provide meaningful specificity or sensitivity values, respectively.

[e] No CLSI intermediate resistance interpretative breakpoints for these antimicrobials.

[f] Ceftriaxone MIC_{pred} not done for the UK/USA international dataset by Eyre et al 2017.

Table S14: Summary of the contributions of each antimicrobial resistance determinant in the linear regression models.

Antimicrobial	Molecular Determinant	% Contribution	% Error
Ceftriaxone	mtrRp	3.1%	0.6%
	G120	7.9%	0.5%
	PonA	3.8%	0.6%
	A311V	22.3%	2.5%
	A501P	29.4%	3.5%
	A501T	8.6%	0.6%
	A501V	11.0%	0.8%
	N513Y	8.7%	0.9%
	A517G	2.5%	0.8%
	G543S	2.8%	0.7%
Cefixime	mtrRp	4.5%	1.0%
	G120	7.1%	0.8%
	PonA	6.0%	0.9%
	A311V	39.7%	4.0%
	A501P	46.9%	5.7%
	A501T	15.9%	1.0%
	A501V	16.4%	1.3%
	N513Y	27.8%	1.4%
	A517G	4.5%	1.3%
Azithromycin	A2059G	12.1%	0.7%
	C2611T	6.6%	0.1%
	mtrRp_MEN	18.0%	0.7%
	mtrRp_WHO-P	25.3%	4.7%
	mtrRp-35Adel	4.1%	0.6%
	ermB	12.3%	2.7%
	ermC	15.5%	2.1%
	A39T	2.1%	0.5%
	G120	2.7%	0.5%
	PonA	1.3%	0.7%
Ciprofloxacin	gyrA_S91	16.1%	0.5%
	parC_D86	14.4%	0.5%
	parC_S87R	16.1%	0.5%
	parC_S87I	11.9%	1.1%
	parC_S87C	16.9%	2.2%
	parC_S87N	5.1%	0.8%
	parC_S88	4.1%	0.4%
	parC_E91	15.4%	0.5%
Penicillin	BLA	50.0%	1.7%
	mtrRp	4.3%	0.9%
	G120	10.5%	0.7%
	PonA	12.1%	0.8%
	N513Y	9.8%	1.3%
	A517G	10.0%	1.2%
	G543S	3.3%	1.0%
Tetracycline	mtrRp_any	7.6%	0.8%
	A39T	3.2%	0.8%
	G120	9.7%	0.9%
	A121	2.6%	0.8%
	rpsJ	25.9%	1.3%
	tetM	50.9%	0.9%