Table 1: Characteristics and outcomes of the cephalosporin cohort pre- and post-change in antimicrobial guidelines.

	Pre-change		Post-change		p-value
	N	%	N	%	
Total patients	8,342		5,107		
Received cefuroxime	7,150	85.7%	296	5.8%	
Received ceftriaxone	1,192	14.3%	4,811	94.2%	
Age (years), median, IQR	60.3	(39.3, 75.5)	64.9	(47.1, 76.9)	<0.01
Female	4,616	55.3%	2,675	52.5%	<0.01
Ethnicity					0.01
Other or unknown	1,486	17.8%	830	16.3%	
NZ Māori	1,099	13.2%	679	13.3%	
Pacific peoples	778	9.3%	569	11.1%	
NZ European	4,335	52.0%	2,643	51.8%	
Asian	644	7.7%	386	7.6%	
Specialty grouped					<0.01
General medicine	2,273	27.2%	1,700	33.3%	
Subspecialty medicine	429	5.1%	330	6.5%	
Haematology/Oncology	669	8.0%	471	9.2%	
Intensive care	181	2.2%	191	3.7%	
General surgery	2,591	31.1%	1,270	24.9%	
Subspecialty surgery	891	10.7%	596	11.7%	
Older persons' health	70	0.8%	42	0.8%	
Women's health	1,023	12.3%	383	7.5%	
Emergency department[a]	202	2.4%	119	2.3%	

Table 1 (continued): Characteristics and outcomes of the cephalosporin cohort pre- and post-change in antimicrobial guidelines.

Other	13	0.2%	4	0.1%	
Hospitalised in the last 365 days	4,139	49.6%	2,588	50.7%	0.21
CDI in prior 365 days	39	0.5%	43	0.8%	<0.01
Cefuroxime/ceftriaxone DOT within 30 days, mean, standard deviation	4.1	2.9	4.0	2.7	0.01
Incident CDI within 30 days	54	0.6%	52	1.0%	0.02
ESBL/3GCR-E culture within 30 days	289	3.5%	159	3.1%	0.31

Inter quartile range = IQR; *Clostridioides difficile* infection = CDI; days of therapy = DOT; extended-spectrum beta-lactamase or third generation cephalosporin-resistant Enterobacterales = ESBL/3GCRE-E.
[a]Although emergency department Pyxis data were unavailable, some patients were still coded as being under emergency once they had been admitted to a ward and received their first antibiotic dose.

Table 2: Characteristics and outcomes of the comparator cohort pre- and post-change in antimicrobial guidelines.

	Pre-change		Post-change		p-value
	N	%	N	%	
Total patients	16,547		7,237		
Age (years), median, IQR	62.2	(39.7, 76.2)	65.2	(47.2, 77.8)	<0.01
Female	9,232	55.8%	3,847	53.2%	<0.01
Ethnicity					<0.01
Other or unknown	2,566	15.5%	1,005	13.9%	
NZ Māori	2,349	14.2%	1,052	14.5%	
Pacific peoples	1,466	8.9%	682	9.4%	
NZ European	9,197	55.6%	4,110	56.8%	
Asian	969	5.9%	388	5.4%	
Specialty grouped					<0.01
General medicine	3,391	20.5%	1,551	21.4%	
Subspecialty medicine	1,974	11.9%	749	10.3%	
Haematology/Oncology	625	3.8%	267	3.7%	
Intensive care	141	0.9%	85	1.2%	
General surgery	1,086	6.6%	369	5.1%	
Subspecialty surgery	6,583	39.8%	3,368	46.5%	
Older persons' health	399	2.4%	191	2.6%	

Table 2 (continued): Characteristics and outcomes of the comparator cohort pre- and post-change in antimicrobial guidelines.

Women's health	1,942	11.7%	483	6.7%	
Emergency department	340	2.1%	141	1.9%	
Other	66	0.4%	30	0.4%	
Hospitalised in the last 365 days	7,647	46.2%	3,377	46.7%	0.53
CDI in prior 365 days	80	0.5%	49	0.7%	0.06
Total antibiotic LOT within 30 days, mean, standard deviation	3.4	3.4	4.1	3.5	<0.01
Incident CDI within 30 days	34	0.2%	13	0.2%	0.68
ESBL/3GCR-E positive culture within 30 days	234	1.4%	121	1.7%	0.13

Inter quartile range = IQR; *Clostridioides difficile* infection = CDI; length of therapy = LOT; extended-spectrum beta-lactamase or third generation cephalosporin-resistant Enterobacterales = ESBL/3GCRE-E.

Figure 1: 30-day incidence of *Clostridioides difficile* infection by quarter in the cephalosporin and comparator cohorts.
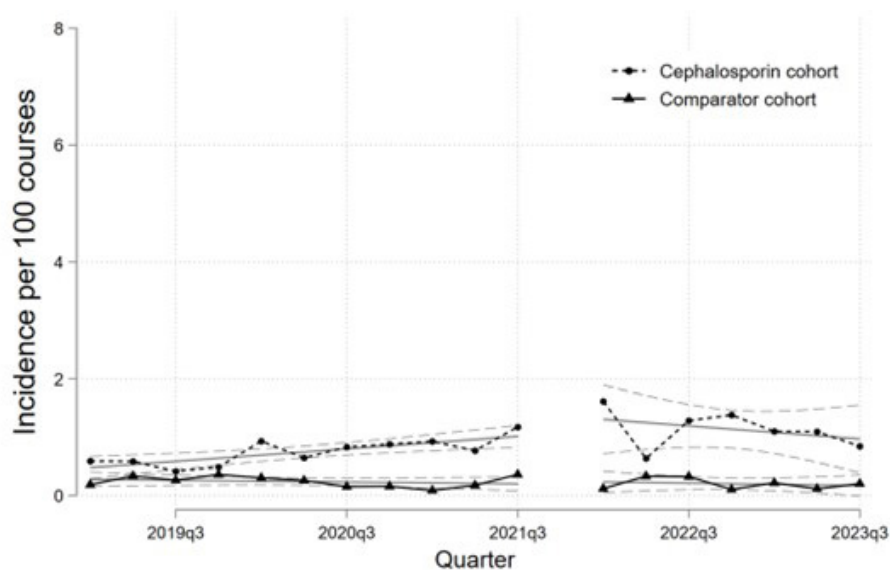
Table 3: Multiple logistic regression model for odds of incident CDI in the cephalosporin cohort, by different patient characteristics.

	aOR	95% CI	p-value
Age	1.02[a]	(1.00, 1.03)	0.01
Female	1.68	(1.12, 2.50)	0.01
Ethnicity			
Other or unknown	1.00		
NZ Māori	1.40	(0.71, 2.76)	0.34
Pacific peoples	0.32	(0.09, 1.09)	0.07
NZ European	1.04	(0.61, 1.77)	0.89
Asian	0.64	(0.21, 1.90)	0.42
Specialty grouped			
General medicine	1.00		
Subspecialty medicine	1.74	(0.76, 3.96)	0.19
Haematology/Oncology	2.19	(1.15, 4.16)	0.02
Intensive care	2.52	(0.94, 6.77)	0.07
General surgery	1.12	(0.62, 2.01)	0.72
Subspecialty surgery	2.40	(1.32, 4.37)	<0.01
Older persons' health	2.68	(0.77, 9.25)	0.12
Women's health	0.41	(0.09, 1.90)	0.26
Emergency department	–[b]		
Other	–[b]		
Hospitalised in the last 365 days	1.41	(0.92, 2.15)	0.12
CDI in prior 365 days	11.30	(5.25, 24.33)	<0.01
Cefuroxime/ceftriaxone DOT within 30 days	1.07[a]	(1.02, 1.13)	0.01
Post-change period patient	1.44	(0.97, 2.12)	0.07

Adjusted odds ratio = aOR; *Clostridioides difficile* infection = CDI; days of therapy = DOT.
[a]Odds ratio here represents increased odds per unit increase in the variable.
[b]Insufficient outcomes in these groups to generate an odds ratio.

Table 4: Mean usage and resource consumption for cefuroxime and ceftriaxone per quarter pre- and post-change in guidelines.

	Mean per quarter		
	Pre	Post	Difference
Occupied bed days	36,535	39,022	2,487
Days of therapy			
Cefuroxime	2,067	105	-1,962
Ceftriaxone	528	2,494	1,966
Total	2,595	2,599	4
Dosing events and estimated resource usage			
Cefuroxime dosing events	4,958	237	-4,721
Nursing hours consumption[a]	1,818	87	-1,731
Waste generated[b] (kg)	970	46	-923
Overnight doses[c]	1,691	82	-1,609
Ceftriaxone dosing events	675	2,935	2,260
Nursing hours consumption[a]	248	1,076	828
Waste generated[b] (kg)	161	701	540
Overnight doses[c]	86	507	421
Total dosing events	5,633	3,172	-2,461
Nursing hours consumption[a]	2,065	1,163	-902
Waste generated[b] (kg)	1,131	748	-383
Overnight doses[c]	1,777	588	-1,189

[a]Based on an assumed 22-minute delivery time.
[b]Based on assumed infusion delivery.
[c]Overnight dose defined as between 10 pm and 6 am.