Antimicrobial Stewardship (AMS)

It's time for collective action

Dr Sharon Gardiner
AMS Pharmacist, Te Whatu Ora Waitaha Canterbury
& Co-lead, NZ AMS & Infection Pharmacist Expert Group

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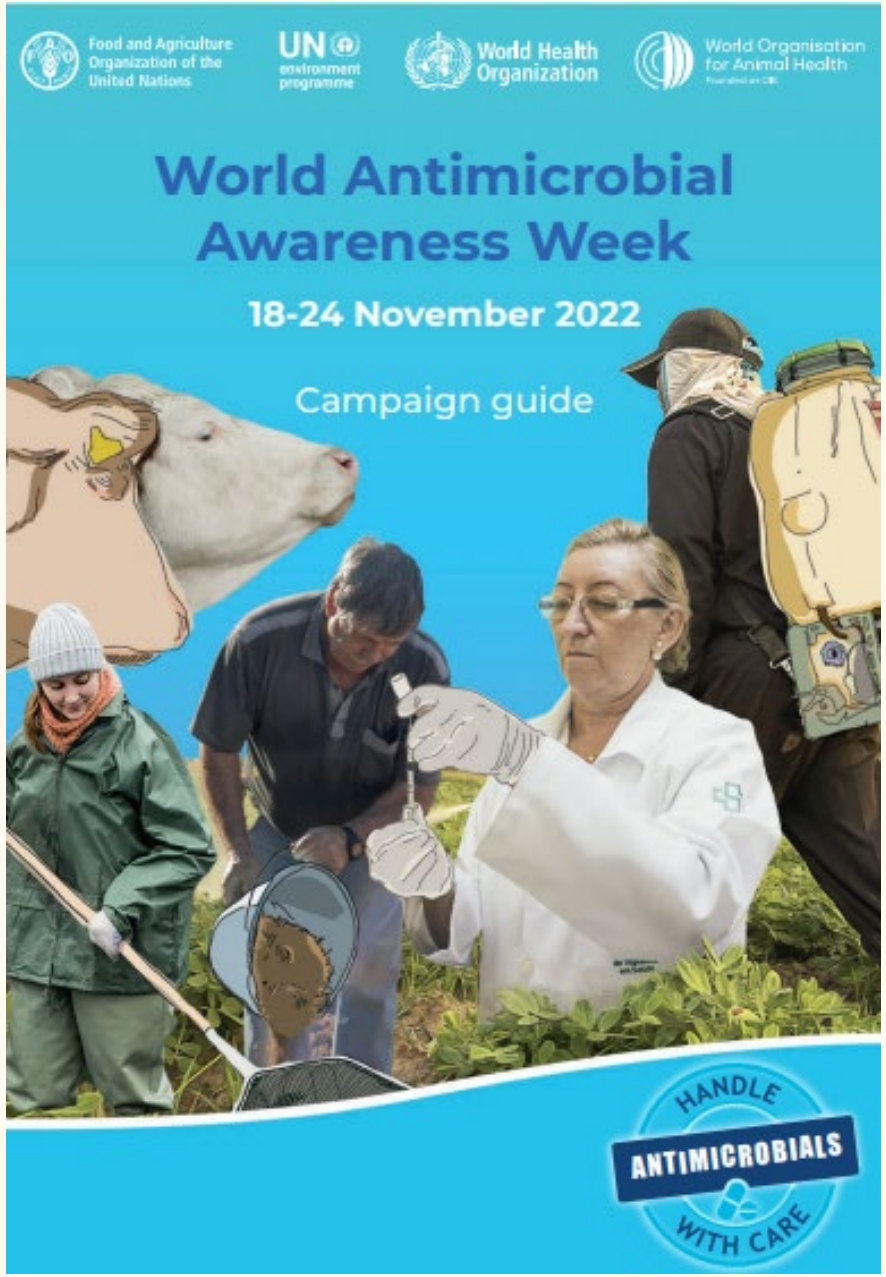

WORLD ANTIMICROBIAL AWARENESS WEEK

18-24 NOVEMBER

Preventing antimicrobial resistance together

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“If people realised how many deaths were caused by drug-resistant infections across the world they would act as quickly as they have for COVID-19”

Professor Laura Piddock
Global Antibiotic Research and Development Partnership

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Mortality from antimicrobial-resistant infections

- Over 1 million deaths from bacterial-resistant infections annually[1]
- Predicted to swell to 10 million deaths by 2050 if we do not act now[2]

Compare with:

- 6 million deaths from COVID-19 over 2020 – 2021[3]

1. Antimicrobial Resistance Collaborators. Lancet 2022; 399: 629–55.
2. O'Neill J (2016). Tackling drug-resistant infections globally: Final report and recommendations. UK: HM Government and Wellcome Trust.
3. Covid-19 Excess Mortality Collaborators. Lancet 2022; 399; 1513-6.

AMR – morbidity and framing

Table: Differences in framing of sepsis and AMR[1]

Problem aspect	Sepsis	AMR
Geographical scope	National/local	Global
Problem definition	Individual patient safety	Public health issue
Immediacy of threat	Immediate	Future
Concreteness of threat	Concrete	Vague
Emotive nature	Emotional	Abstract
Complexity	Straight forward	Complicated
Responsibility	Individuals	Government
Solution	Behavioural	Biological/ technical

[1] Fitzpatrick F, et al. *BMJ Qual Saf* 2019;28:758–61.

- Infections due to resistant organisms
  - ↑ morbidity
  - ↑ hospital stays
  - ↑ mortality
  - ↑ cost

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Antimicrobial resistance (AMR)

- Resistance of a microorganism to an antimicrobial agent that it was originally sensitive to

- A natural phenomenon, accelerated by human actions:
  - antimicrobial use (appropriate and inappropriate)
  - inadequate infection prevention and control

- Aotearoa NZ has been relatively insulated from AMR, but this is changing swiftly

- Example – multi-resistant Enterobacterales e.g. *Escherichia coli, Klebsiella pneumoniae* with varying degrees of resistance to beta-lactam antibiotics

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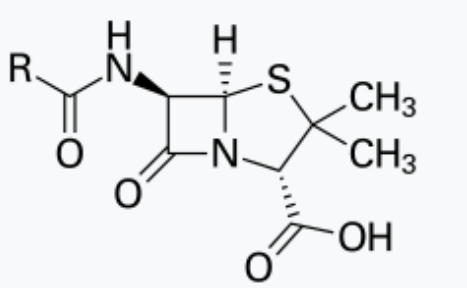
β-lactam antibiotics



PENICILLINS	CEPHALOSPORINS	CARBAPENEMS
Amoxicillin		Ertapenem
Amoxicillin+clavulanic acid		Imipenem (+cilastatin)
Flucloxacillin		Meropenem
Penicillin V and G		
Piperacillin+tazobactam		
Pivmecillinam		

First generation	Second generation	Third generation	Later generation
Cefalexin	Cefaclor	Cefotaxime	Cefepime (4th)
Cefazolin	Cefuroxime	Cefotaxime	Ceftaroline (5th)
		Ceftriaxone	

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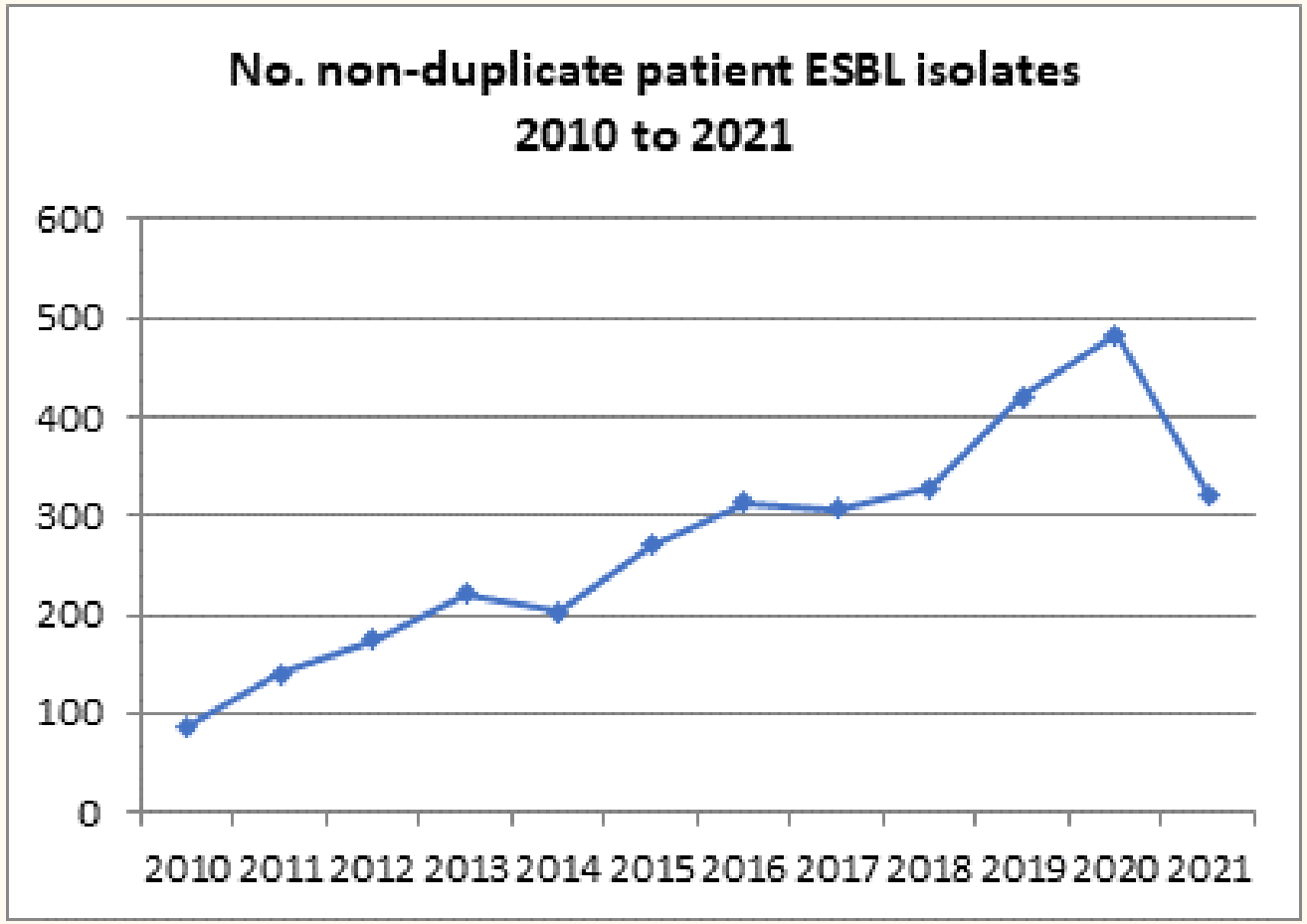
Extended spectrum beta-lactamase (ESBL)-producing Enterobacterales



- Resistant to most penicillins and cephalosporins
- Also often resistant to unrelated agents e.g. trimethoprim, ciprofloxacin
- Increasingly unable to treat ‘simple’ infections, like cystitis, with standard funded oral agents in the community

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Figure from Julie Creighton, Senior Scientist, Canterbury Health Laboratories

URINE

MICROSCOPY
Leucocytes: 51-100 x10 ^6/L Red Cells: <10 x10 ^6/L

CULTURE
>100 x 10 ^6/L growth of Klebsiella pneumoniae

Further report to follow.

This organism has been sent to Canterbury Health Laboratories for Fosfomycin susceptibily testing.

In the absence of unequivocal signs and symptoms of urinary tract infection, bacteriuria, with or without pyuria, is not an indication for antimicrobial treatment.

SUSCEPTIBILITIES

Trimethoprim	R
Amoxycillin	R
Cefaclor	R
Nitrofurantoin	R
Ceftriaxone	R
Ciprofloxacin	R
Gentamicin	R
Mecillinam	R
Meropenem	S

Antibiotic susceptibilities have been read from the direct plate and are not standardised.

This organism produces an extended spectrum beta-lactamase (ESBL) enzyme, which confers cephalosporin resistance. Treatment of deep seated ESBL infection should be discussed with ID/micro.

Carbapenemase-producing Enterobacterales (CPE)

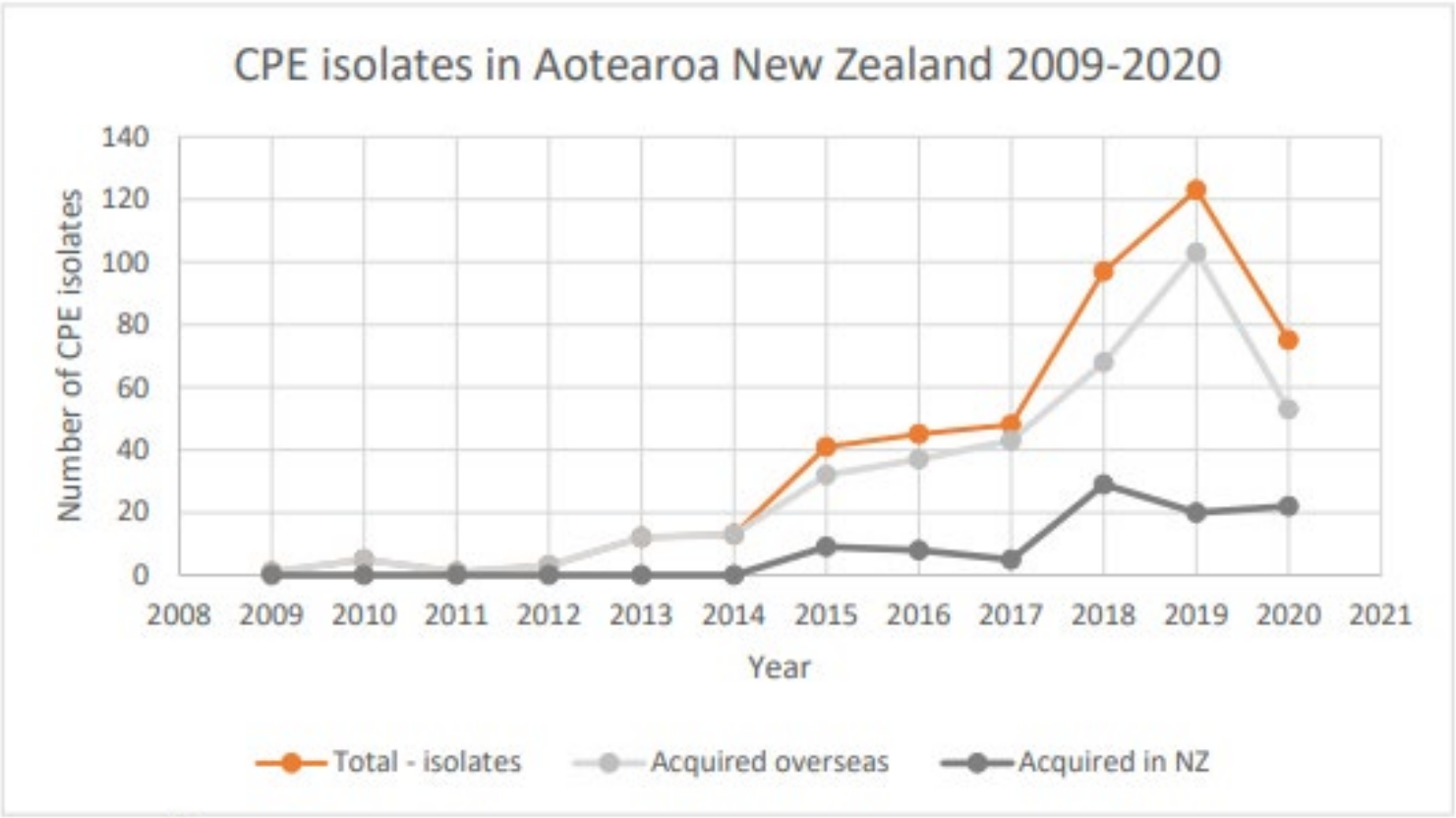

Figure 30: CPE isolates, 2009-2020. The decrease in 2020 is likely due to decreased international travel in the wake of the COVID-19 pandemic. Data from ESR.

- CPEs are resistant to most β-lactams including 'ultra' broad-spectrum carbapenems
- 30 – 50% mortality rate if the cause of an invasive infection

Figure from Kotahitanga – Uniting Aotearoa against infectious disease and antimicrobial resistance. A report from the Prime Minister's Chief Science Advisor (2021)

Antimicrobials can harm individual patients

- AMR, e.g. repeated treatment for UTIs or asymptomatic bacteriuria increases risk of resistant UTIs
- Disrupted microbiome, e.g. 7–10 times greater likelihood of *C. difficile* infection while taking antibiotics and for one month after discontinuation

  (amox+clav shortage! Opportunity to review prescribing practice)
- Adverse effects, e.g. antimicrobials implicated in around 20% of ED visits in the US for drug-related adverse events

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“The risk of antimicrobial resistance is a global crisis, recognised as one of the greatest threats to health today.

We are losing our first-line antibiotics. This makes a broad range of common infections more difficult to treat. Second- and third-choice antibiotics are more costly, more toxic, need much longer durations of treatment…

…this may even bring the end of modern medicine as we know it. We need to act now to make sure this does not happen”

Dr Margaret Chan OBE
Former Director-General, WHO

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How is AMR tackled in human health in Aotearoa?

1. NZ AMR Action Plan (2017)

2. Ngā Paerewa Health and Disability Services Standard (2022)

3. Kotahitanga report – Office of the Chief Science Advisor to the Prime Minister (2021)

NZ AMR Action Plan (2017 – 2022)

PRIME MINISTER'S CHIEF SCIENCE ADVISOR'S KOTAHITANGA REPORT SCORECARD (2021)[1]

ACTION: 1 of 18 priority areas ✓

SOME ACTION: 11 of 18 priority areas ×

NO ACTION: 6 of 18 priority areas ×

PLUS: NO EQUITY ACTION

:hemes:

nvestment

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Ngā Paerewa Health & Disability Services Standard

- Certification standards for facilities such as hospitals, and aged care facilities
- Health & Disability Services (Safety) Act 2001
- Facilities must have an AMS programme
- AMS programmes shall be *"appropriate for the size, scope, and complexity of the service"*
- Associated guidance: *"Service providers should adequately resource their IP and AMS programme activities"*

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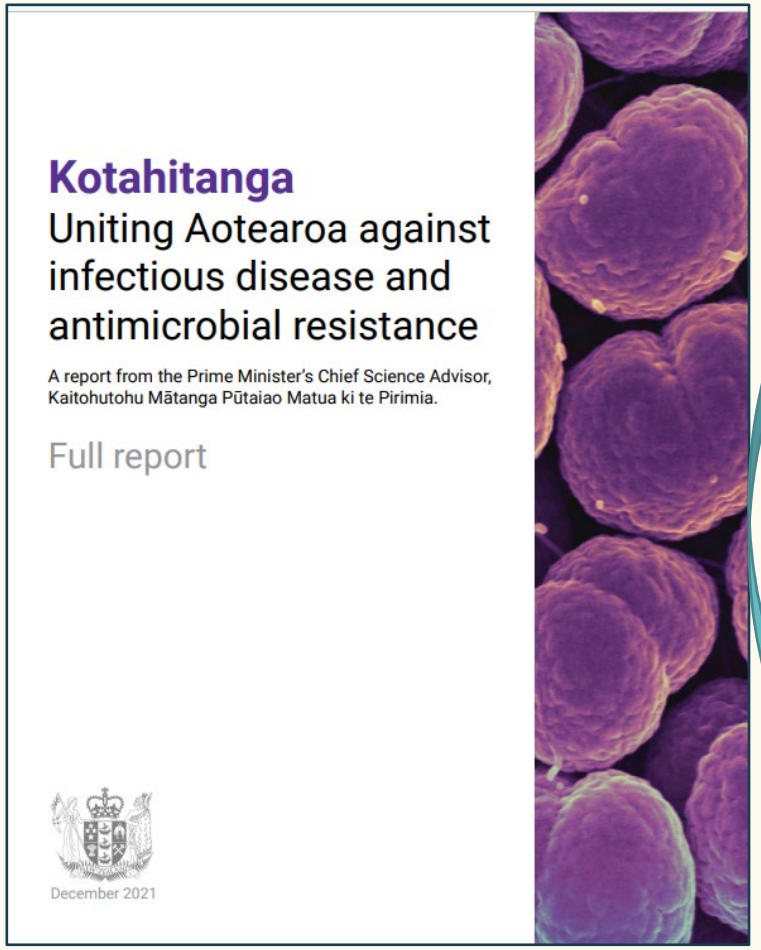
PM's Chief Science Advisor's *Kotahitanga* report



102 recommendations to mitigate the risk of infectious disease and AMR:

1. **Elevate and expand AMS**
2. Develop an integrated surveillance & response system
3. Strengthen infection prevention & control
4. Grow NZ's infectious diseases capability and engage internationally
5. Enhance health literacy
6. Reimagine primary care

30 AMS recommendations, 83% for immediate action

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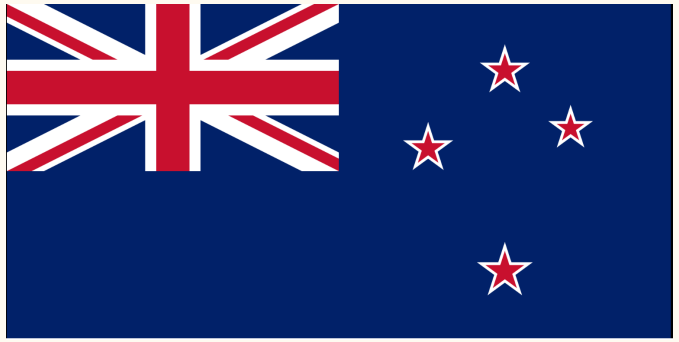
Figure from Kotahitanga Uniting Aotearoa against infectious disease and antimicrobial resistance. A report from the Prime Minister's Chief Science Advisor (2021)

What is antimicrobial stewardship (AMS)?

Co-ordinated actions to optimise antimicrobial use in the prevention and treatment of infections, and minimise harms from their use including antimicrobial resistance, altered microbiome, adverse drug reactions, excessive costs



Antimicrobial use in human health

- 4th highest in OECD countries
- 30 – 50% is likely inappropriate

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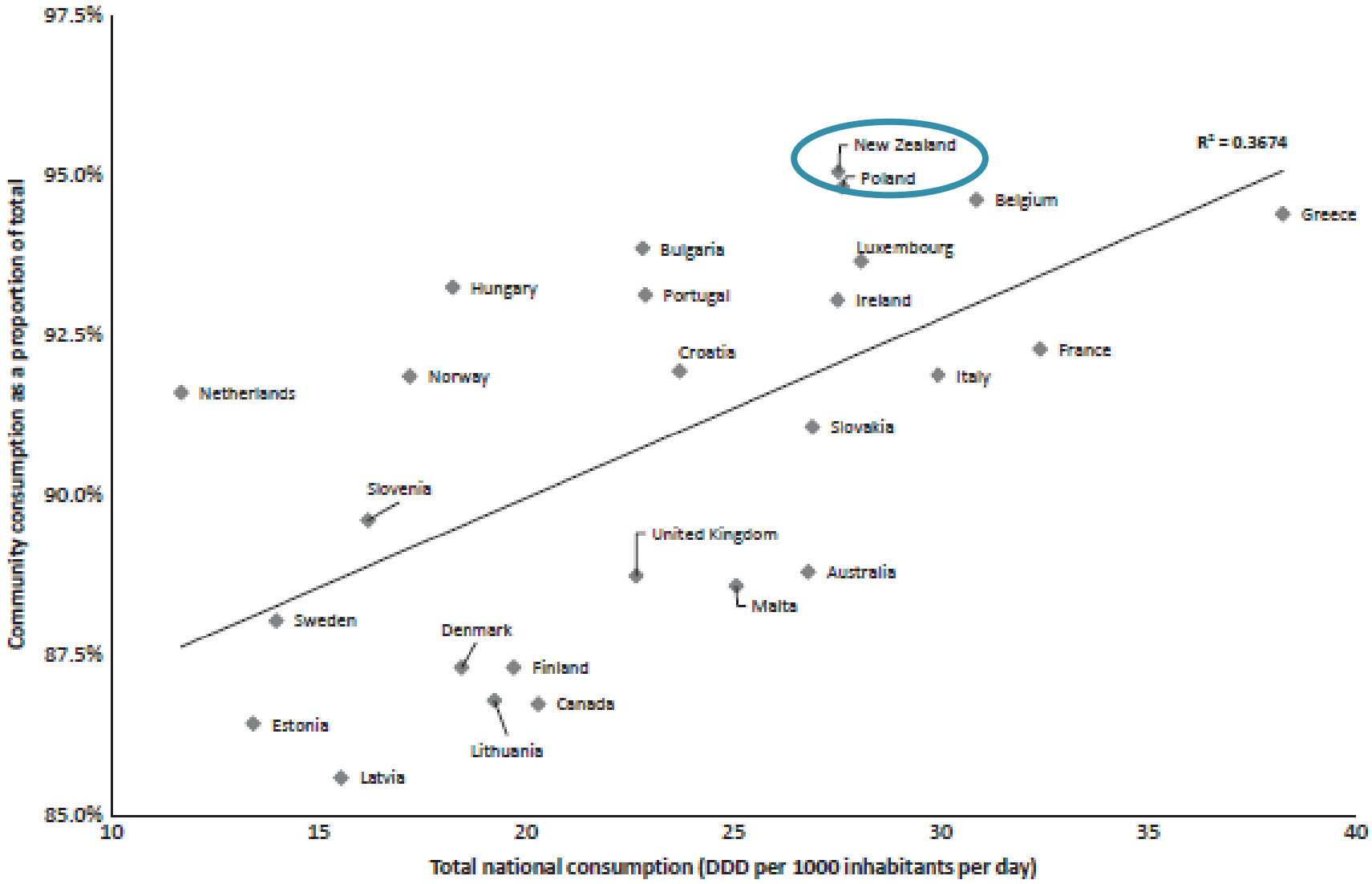


FIGURE 1 Scatterplot of the proportion of total antibacterial consumption comprised by community consumption, in relation to total antibacterial consumption (DDDs/1000 population/d), for New Zealand and other nations for which recent published data were available[19-21]

Received: 26 April 2017 | Accepted: 20 July 2017
DOI: 10.1111/jcpt.12610

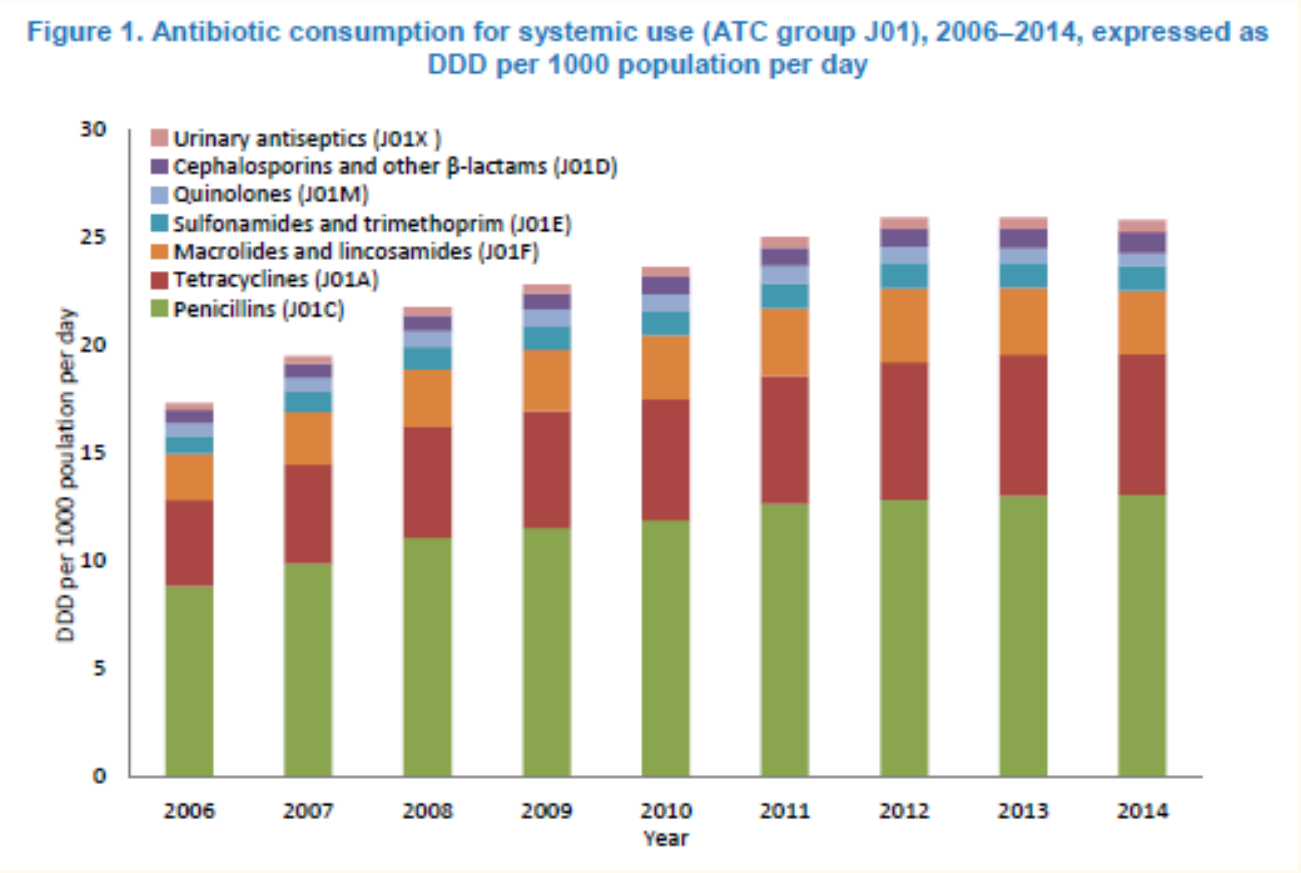
ORIGINAL ARTICLE

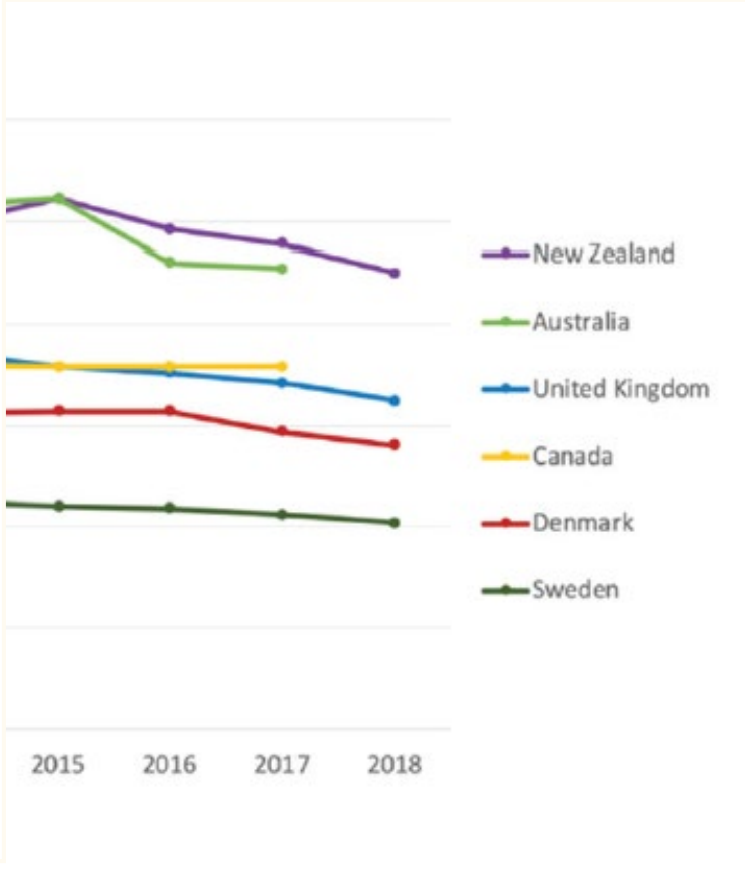
WILEY

Antibacterials dispensed in the community comprise 85%-95% of total human antibacterial consumption

E. Duffy BPharm (Hons)[1,2] | S. Ritchie MBChB, PhD[1,3] | S. Metcalfe MBChB, DComH[4] | B. Van Bakel BSc[4] | M. G. Thomas MBChB, MD[1,3]

Community antibiotic use





↑ 49% over 2006 - 2014[1]

↓ 14% over 2015 - 2018[2]

1. Williamson DA et al., ESR, 2016 2. Thomas M et al., NZMJ 2020; 133: 33

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Research paper

The impacts of New Zealand's COVID-19 epidemic response on community antibiotic use and hospitalisation for pneumonia, peritonsillar abscess and rheumatic fever ☆

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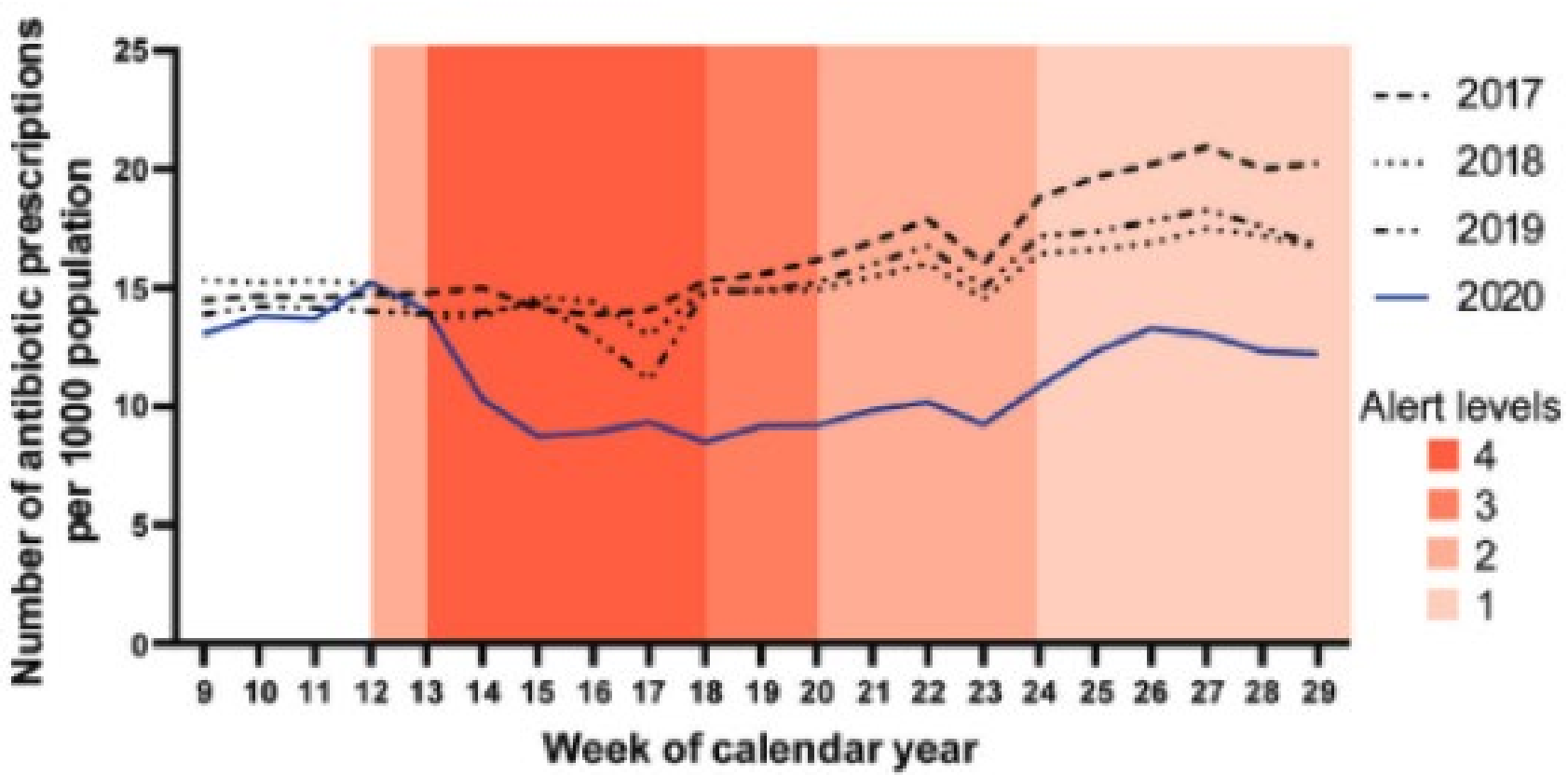


Fig. 1. Number of antibiotic prescriptions dispensed per 1000 population by week of calendar year; weeks 9 to 29 of 2017 to 2020.

Public hospital inpatient antibiotic use

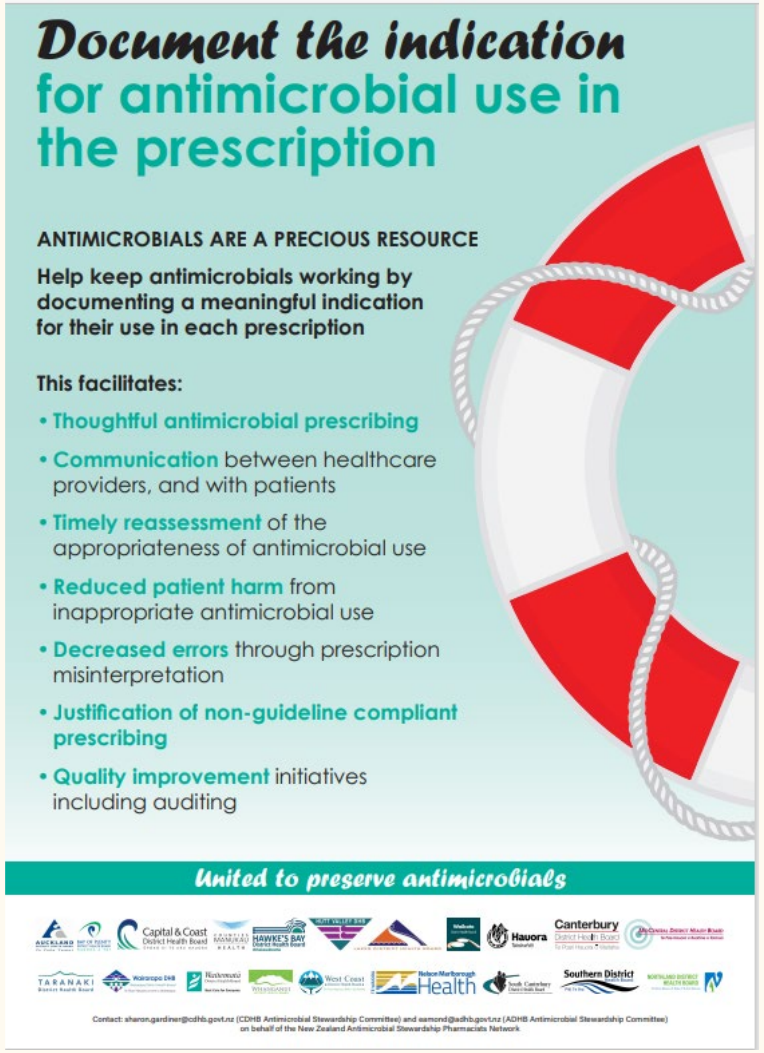
2012–2013 Antibacterial use (DDD/1,000 occupied bed days)	New Zealand					Australia[4]	England[3]
	ADHB[a]	CDHB[b]	CCDHB[c]	CMDHB[d]	WDHB[e]	NAUSP mean	NHS mean
Total antibacterials	735	707	798	704	727	942	1,297
Quinolones	20	48	28	35	32	43	~50
Cephalosporins	125	120	197	99	178	183	~50
Carbapenems	21	14	20	15	10	21	~30
Piperacillin-tazobactam	1.6	8	19	1.1	2.5	42.7	~43

Comprised Auckland City Hospital[a], Christchurch, Christchurch Women's, Burwood and The Princess Margaret Hospitals[b], Wellington and Kenepuru Hospital[c], Middlemore Hospital[d], and North Shore and Waitakere Hospitals[e].

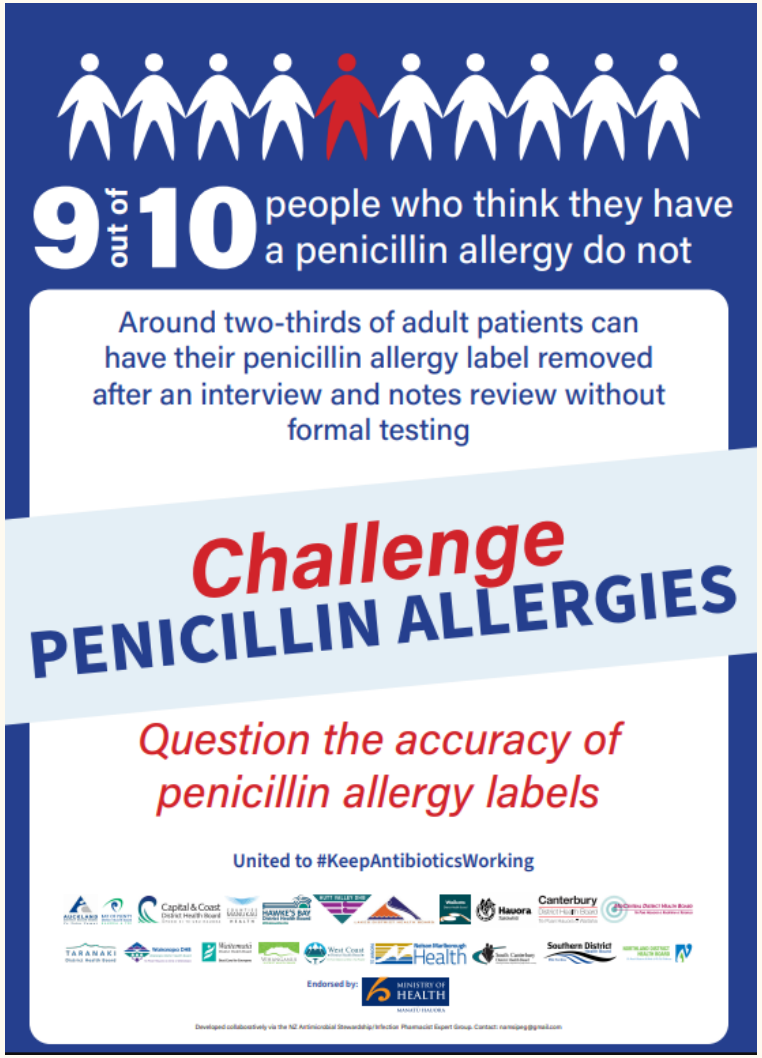
- Shared work across 5 DHBs showed 1.4- to 2.5-fold higher quinolone use at CDHB
- A bundle of interventions resulted in a 67% decrease within 5-years

Duffy E et al., NZMJ 2015;128

World Antimicrobial Awareness Week (18 – 24 November 2022)



2020



2021

2022

www.psnz.org.nz/practicesupport/antimicrobial

Misuse of life-saving medicines is helping lower their effectiveness

Siouxsie Wiles . 05:00, Nov 21 2022

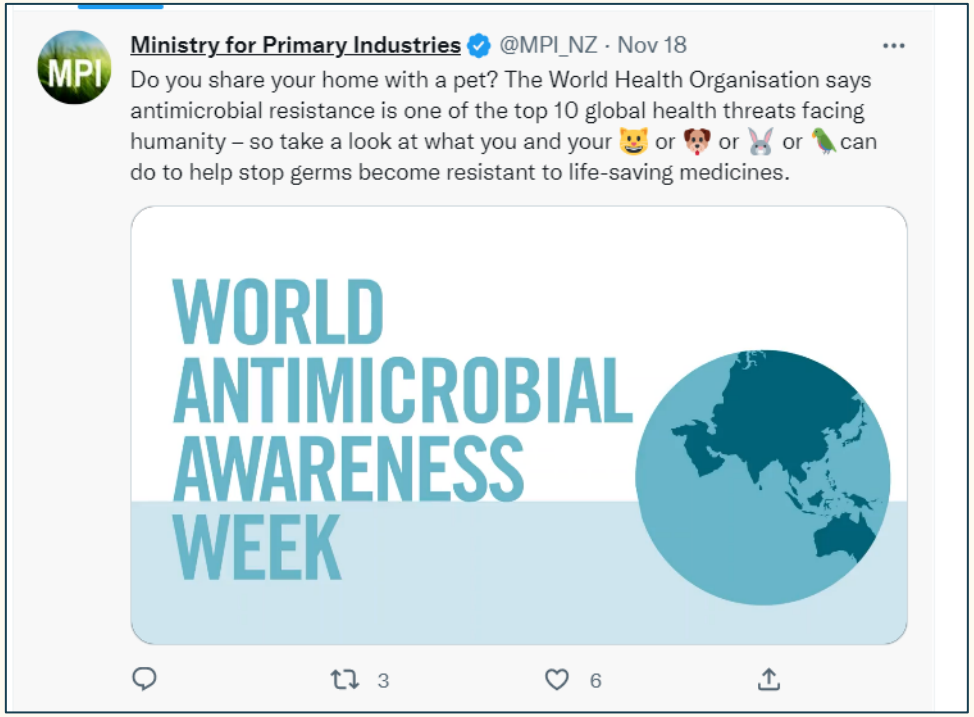
SUPPLIED

It's World Antimicrobial Awareness Week, raising awareness of the medicines used to treat infections caused by bacteria, viruses, fungi and parasites.

Dr Siouxsie Wiles MNZM is an award-winning microbiologist and science communicator based in Auckland.

OPINION: Last month the UK government's then health secretary Thérèse Coffey admitted she'd given antibiotics prescribed to her, to one of her friends who was unwell. It's an admission that had medical professionals and scientists around the world yelling at their devices in despair, me included.

Sharing antibiotics with a friend may not sound like such a big deal, but it is. First, it's dangerous. Your friend could be allergic, or it could interact or interfere with other medicines they are taking.



Our latest content

Antimicrobial stewardship: Primary care can build on recent gains

11 minutes to Read

Antimicrobial resistance presents an imminent threat to the future of New Zealanders' wellbeing and access to effective, safe healthcare. This article describes initiatives for improving antimicrobial stewardship, the New Zealand antimicrobial prescribing landscape as it stands, and actions that can be taken immediately in primary care.

Contributor He Ako Hiringa, reviewed by Dr Sharon Gardiner
15 November 2022

Antimicrobials | Clinical article

NZ Antimicrobial Stewardship/Infection Pharmacist Expert Group

PHARMACEUTICAL SOCIETY of New Zealand Incorporated

ANTIBIOTIC AMNESTY

Video Competition

Make a video that shows how antibiotics are disposed of safely.

There will be Prezzy card prizes ($350 total prize pool) for the best overall video ($150), and for the most creative and most viewed videos ($100 each).

Anyone in Aotearoa New Zealand can enter.

www.psnz.org.nz/practicesupport/antimicrobial

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Summary

- Aotearoa NZ has embarrassingly high antimicrobial use in human health
- AMS is essential to slow AMR, and to equitably improve outcomes
- Model must be collective, collaborative, efficient, evidence-based, innovative

“Antimicrobial resistance is the third leading underlying cause of death globally.

If we work together across countries and sectors we can save lives and save modern medicine for our future generations”

Professor Dame Sally Davies
UK Special Envoy on Antimicrobial Resistance (AMR)
Former Chief Medical Officer for England

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