Antimicrobial stewardship in Canterbury and beyond

"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"

Laura Piddock, Global Antibiotic Research and Development Partnership

Sharon Gardiner

Antimicrobial Stewardship Pharmacist

Canterbury District Health Board

MINISTRY OF HEALTH
MANATŪ HAUORA

Ministry for Primary Industries
Manatū Ahu Matua

Objectives and priority areas for action

There are five objectives that address priority areas for action on AMR.

1. **Awareness and understanding**: Improve awareness and understanding of antimicrobial resistance through effective communication, education and training.
2. **Surveillance and research:** Strengthen the knowledge and evidence base about antimicrobial resistance through surveillance and research.
3. **Infection prevention and control:** Improve infection prevention and control measures across human health and animal care settings to prevent infection and the transmission of micro-organisms.
4. **Antimicrobial stewardship:** Optimise the use of antimicrobial medicines in human health, animal health and agriculture, including by maintaining and enhancing the regulation of animal and agriculture antimicrobials.
5. **Governance, collaboration and investment:** Establish and support clear governance, collaboration and investment arrangements for a sustainable approach to countering antimicrobial resistance.

Released 2017

New Zealand Government

Objective 4
Antimicrobial stewardship – Optimise the use of antimicrobial medicines in human health, animal health and agriculture, including by maintaining and enhancing the regulation of animal and agriculture antimicrobials

Antimicrobial stewardship (AMS) involves taking coordinated actions to promote the appropriate use of antimicrobials that will help to conserve their effectiveness. AMS programmes help to optimise the prevention and treatment of infections while minimising the adverse events associated with antimicrobial use such as: the emergence and spread of antimicrobial resistance, disruption of the ecology of the normal microbiome (which may have various adverse consequences, including *Clostridium difficile* infection), adverse drug reactions and monetary cost.

International guidelines recommend some core components of effective AMS programmes in human health (Duguid and Cruickshank 2011; Barlam et al 2016). While many hospitals in New Zealand and elsewhere have had AMS programmes for some time, there is less experience with community AMS programmes (for example, in primary care or aged residential care). However, it can be expected that coordinated community AMS efforts would produce a similar pattern of benefits to that achieved in hospitals.

AMS programmes covering antibiotic use in animals and food production may also have significant public health value in preventing the emergence of resistant strains and their spread to humans.

Having the appropriate level of regulatory oversight of antibiotics for animals and plants is important to manage and minimise antimicrobial resistance. For this reason, the Ministry for Primary Industry's regulatory oversight of antimicrobials used for animals and plants draws on the most up-to-date policies, information requirements and standards based on current science,

AMS is not just about antimicrobial resistance (AMR)

Collaborative partners in the healthcare system should include:

- Infection Prevention
- Quality
- Medication Safety
- Medicine & Therapeutics

Quantity of antibacterial use in NZ

- High volume of antibacterial use – 95% in the community[1-3]

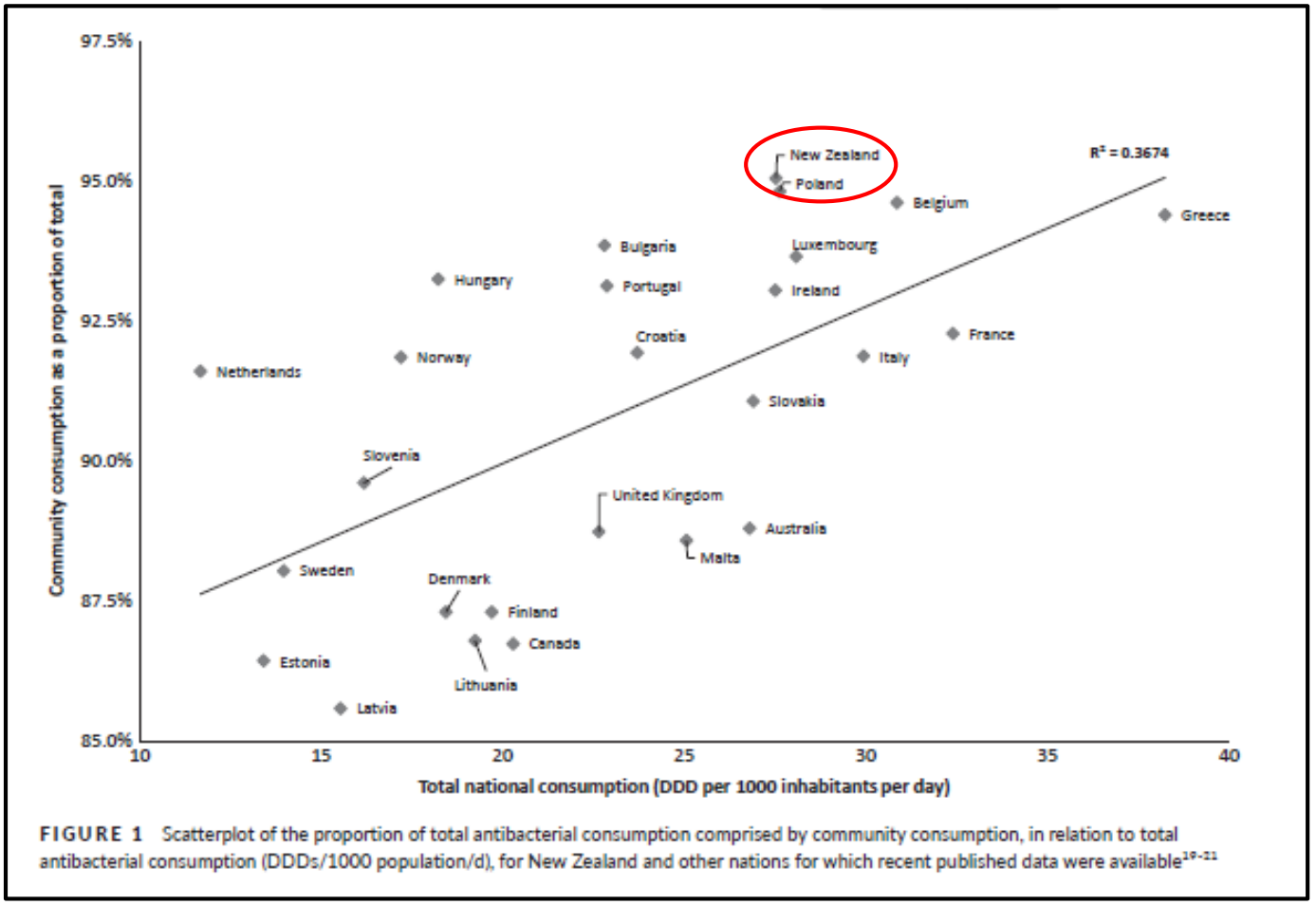
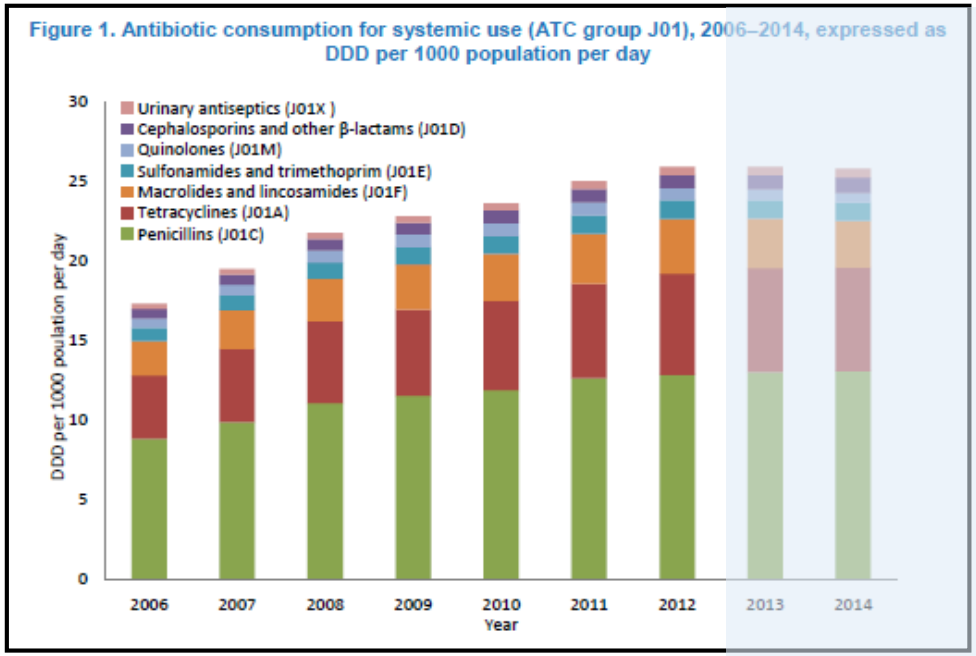
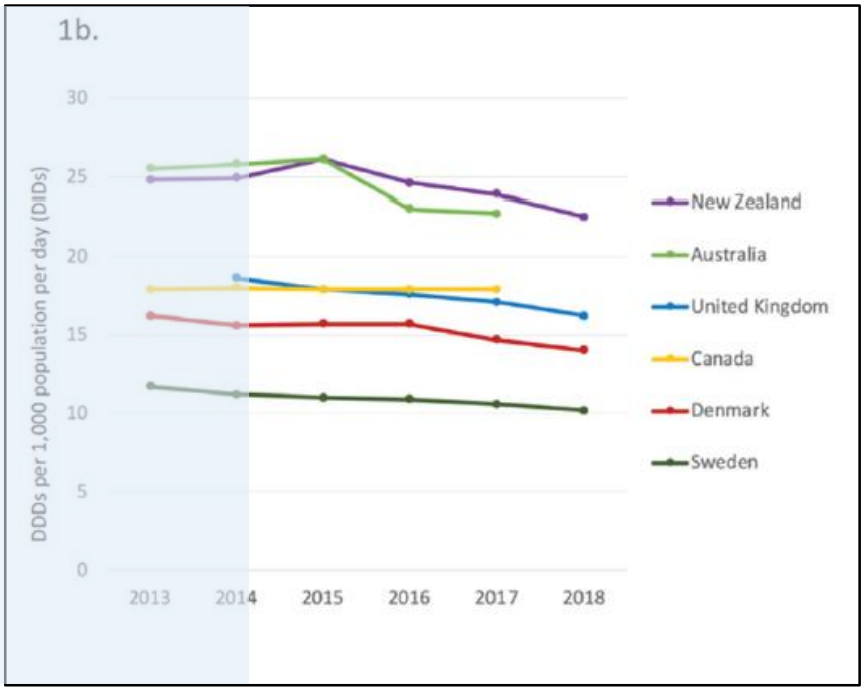


FIGURE 1 Scatterplot of the proportion of total antibacterial consumption comprised by community consumption, in relation to total antibacterial consumption (DDDs/1000 population/d), for New Zealand and other nations for which recent published data were available[19-21]

1. Van Boeckel TP et al., *Lancet Infect Dis* 2014:14:742-50 2. Williamson DA et al., ESR, 2016 3. Duffy E et al., *J Clin Pharm Ther* 2018;43:59-64

Quantity of community antibacterial use





↑ 49% over 2006 - 2014[2]

↓ 14% over 2015 - 2018[2]

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

Quantity of DHB hospital antibacterial use[1]

Table 1: Antibacterial use (DDDs/1000 occupied bed days) in New Zealand, Australia and England (2012–2013)

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].

1. Duffy E et al., NZMJ 2015;128

Quinolone use in CDHB inpatients

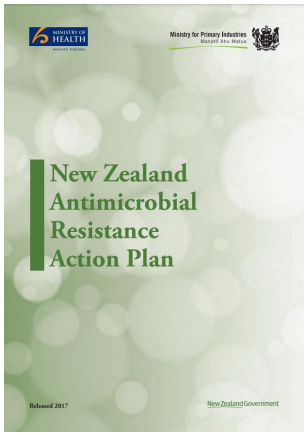
DDDs per 1000 occupied bed days	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
ciprofloxacin	28.8	32.9	33.0	34.6	28.8	24.6	22.1	17.9	14.9	16.9
norfloxacin	10.1	10.4	14.7	10.1	9.8	8.2	4.0	1.1	0.2	0.1
moxifloxacin	2.9	2.9	2.9	1.4	1.5	2.1	1.6	1.6	0.1	0.2
TOTAL	**41.8**	**46.2**	**50.6**	**46.1**	**40.0**	**34.9**	**27.7**	**20.6**	**15.1**	**17.1**

~67% decrease in quinolone use

Multipronged approach

- **Change in laboratory reporting:** ceased quinolone susceptibility on urinary *E. coli* isolates
- **Guideline changes:** removed norfloxacin from cystitis guidelines, lowered role of ciprofloxacin in our pyelonephritis guidelines
- **Ward imprest changes:** removed norfloxacin
- **Education:** bulletins on quinolone safety
- **Audits and service engagement:** moxifloxacin
- **PHARMAC restrictions**

PHARMAC



Replace with *"Prioritise"*

1. ~~Continue to consider~~ antimicrobial stewardship under PHARMAC's *Factors for Consideration*[12] in antimicrobial funding decisions and continue to consult with relevant stakeholders when considering funding of antimicrobial agents.

- PHARMAC has a central role to play in AMS

- Should have indication-based restrictions for some antimicrobials in the community (analogous to the Australian system), e.g. ciprofloxacin
  - **Australia:** only funded if specific patient, infection and/or organism criteria are met
  - **NZ DHB Hospitals:** funded with Infectious Diseases/Microbiology approval
  - **NZ community:** no restrictions (!!!)

Quality of antimicrobial use

Point prevalence surveys of antimicrobial use in adult inpatients at Canterbury District Health Board Hospitals

Sharon J Gardiner, Ari B Basevi, Niall L Hamilton, Sarah CL Metcalf, Stephen T Chambers, Stephen G Withington, Paul K Chin, Joshua T Freeman, Simon C Dalton, on behalf of the Canterbury District Health Board Antimicrobial Stewardship Committee

ABSTRACT

AIMS: To determine the nature and appropriateness of antimicrobial prescribing in adult inpatients at Canterbury District Health Board (CDHB).

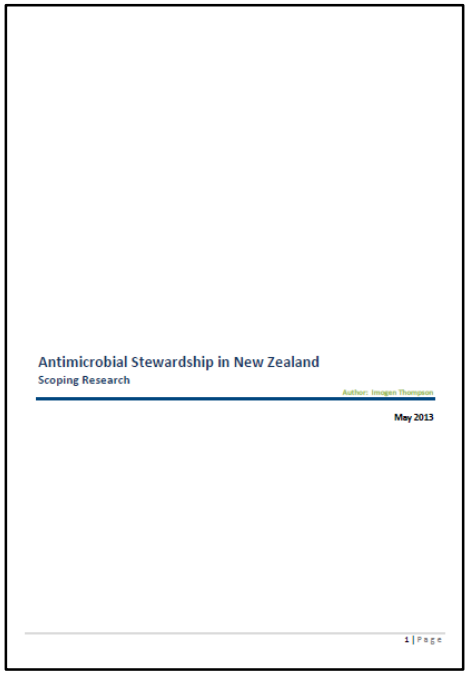
METHODS: Multidisciplinary teams collected clinical details for all adult inpatients on antimicrobial therapy at three CDHB facilities (~1,100 beds) and made standardised assessments based on the Australian National Antimicrobial Prescribing Survey (http://naps.org.au) against local guidelines and national funding criteria.

RESULTS: Antimicrobial therapy was prescribed to 42% of inpatients (322/760), usually to treat infections [377/480 prescriptions (79%)], with amoxicillin+clavulanic acid the agent most commonly prescribed [72/480 prescriptions (15%)]. Of assessable prescriptions, 74% (205/278) were guideline compliant, 98% (469/480) were funding criteria compliant, and 83% (375/451) were appropriate clinically. Prescriptions for the most common indications—surgical prophylaxis [66/480 (14%)] and community-acquired pneumonia [56/480 (12%)]—were often non-compliant with guidelines (32% and 41%, respectively) and inappropriate (18% and 21%, respectively). Overall, the indication was documented in 353/480 (74%) prescriptions, the review/stop date documented in 145/480 (30%) prescriptions, and surgical prophylaxis stopped within 24 hours in 53/66 (80%) prescriptions.

CONCLUSIONS: Most antimicrobial prescriptions were appropriate and complied with guidelines. Compliance with key quality indicators (indication documented, review/stop date documented, and surgical prophylaxis ceased within 24 hours) were well below target (> 95%) and needs improvement.

- "Snapshot" audits can be used to evaluate the quality of antimicrobial prescribing
- ≥ 10 NZ DHBs use the Australian National Antimicrobial Prescribing Survey method
- Baseline quality markers for CDHB inpatients (2017 – 2018):
  - 74% guideline compliant
  - 83% appropriate clinically
  - 74% indication documented
  - 30% review/stop date documented
  - 80% surgical prophylaxis stopped < 24 h
  - 98% PHARMAC compliant
- We need national centralised approach with establishment of key quality markers and transparency in results

2013 NZ expert recommendations for AMS


Antimicrobial Stewardship in New Zealand
Scoping Research
Author: Imogen Thompson
May 2013
1 | Page

RECOMMENDATIONS

There was strongest consensus from interview participants for the following actions to take place:

1. National leadership and coordination of AMS activities should occur
   - Central management of AMS is required, involving HQSC and /or MOH as leaders, in conjunction with system-wide partnerships and clinician buy-in
2. National Antimicrobial Guidelines should be developed as a necessary part of AMS
   - To be facilitated via the MOH, PHARMAC, BPAC, ASID and clinicians
3. Quality improvement tools and measures in relation to appropriate antibiotic use should be established.

Little progress has been made since these recommendations were made in 2013

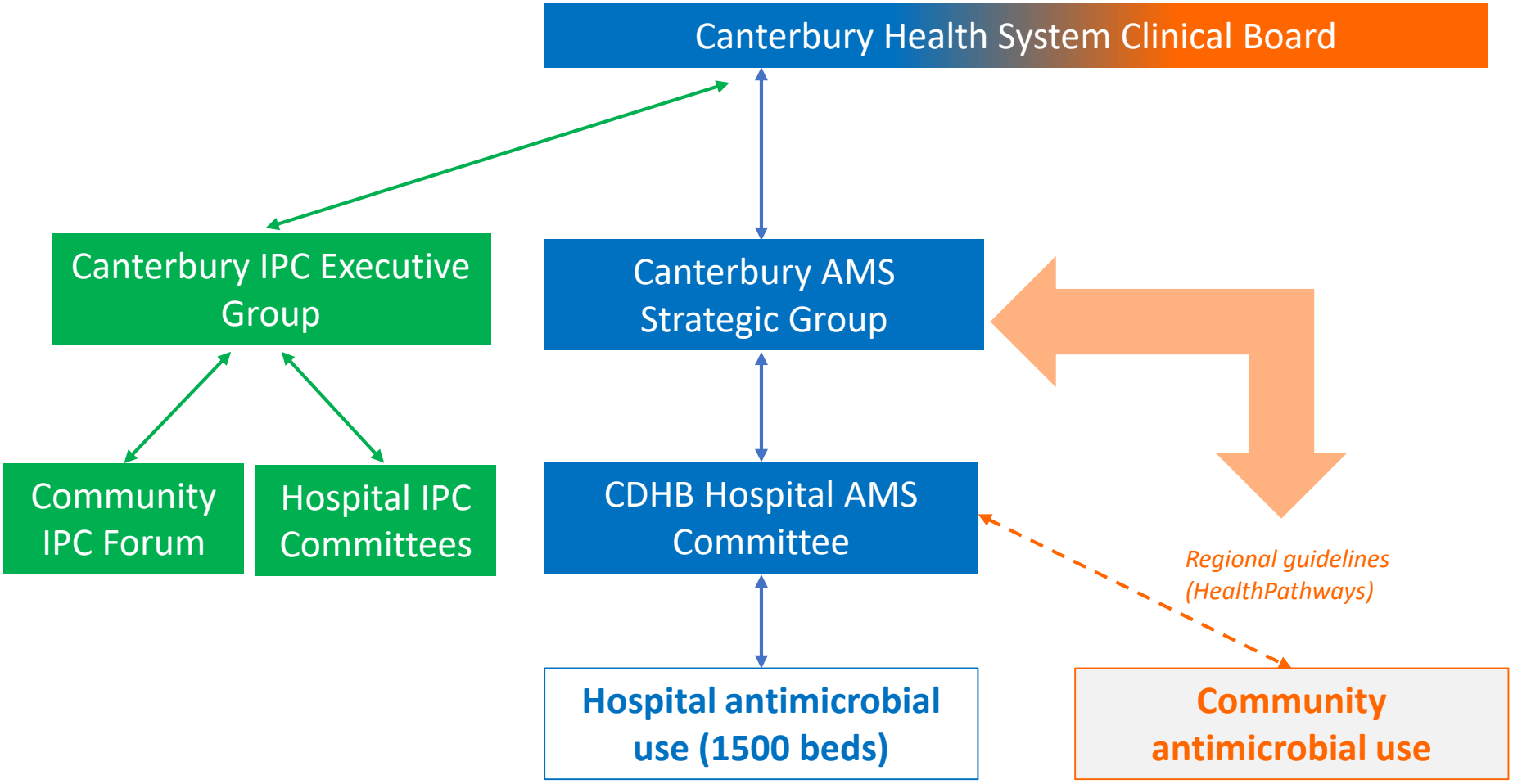
Ministry of Health

- Increasing expectation for DHBs to work to slow AMR

> *"identify activities that advance progress towards managing the threat of AMR, including alignment with the New Zealand AMR Action Plan (2017 –2022)*....***across primary care, community (in particular age-related residential care services) and hospital services"***

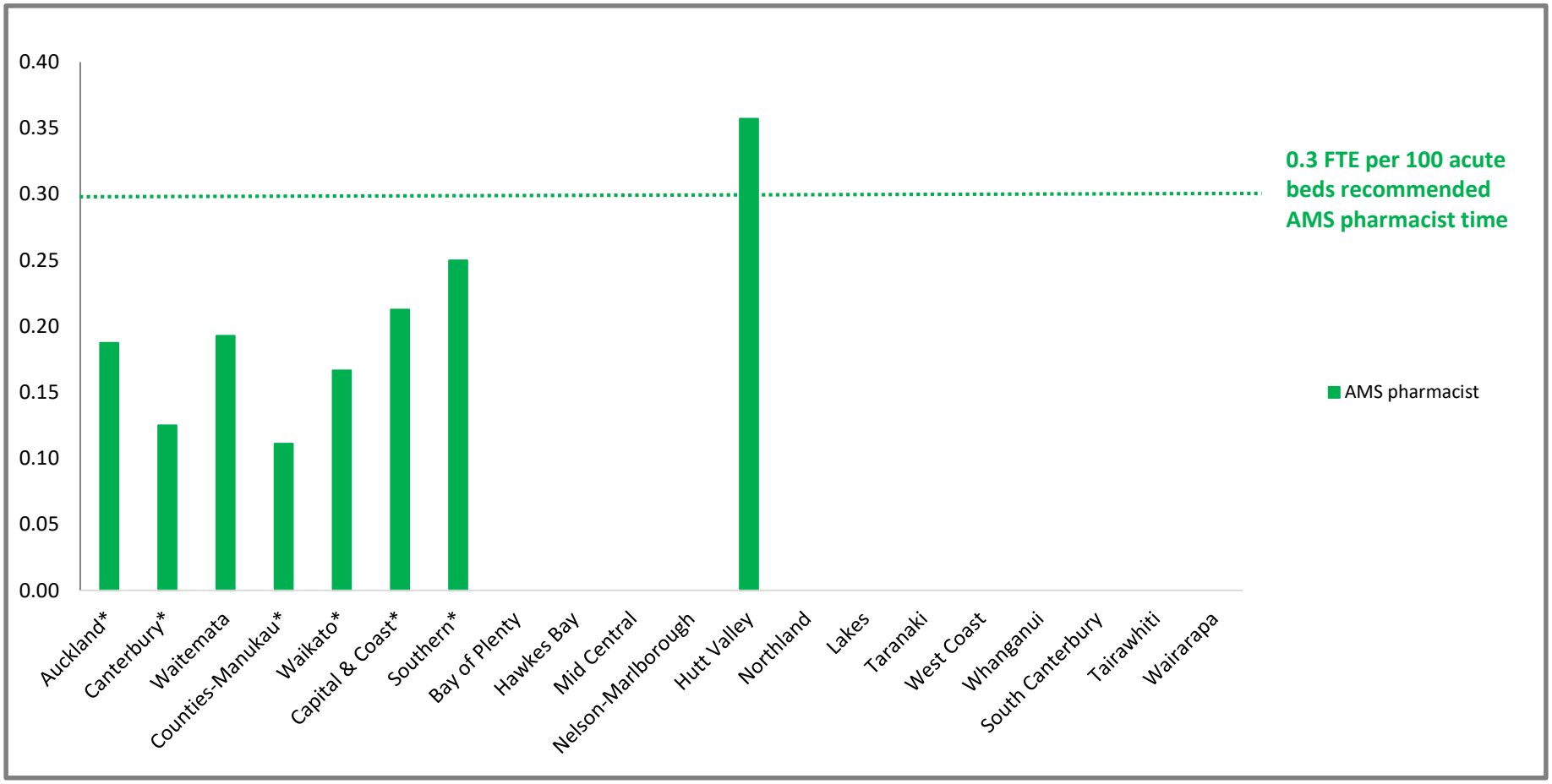
[DHB Annual Plan requirements 2020/2021]

Canterbury regional AMS approach



NZ AMS resourcing is all in DHB hospitals, and almost solely pharmacists

- Dedicated AMS pharmacists in 8 DHBs
- Very limited AMS physician resource
- No community resource



Ability to get DHB resource seems contingent on saving money

Metronidazole stewardship initiative at Christchurch hospitals—achievable with immediate benefits

Sharon J Gardiner, Sarah CL Metcalf, Paul KL Chin, Matthew P Doogue, Simon C Dalton, Stephen T Chambers

ABSTRACT

AIMS: To evaluate an antimicrobial stewardship (AMS) initiative to change hospital prescribing practice for metronidazole.

METHODS: In October 2015, the Canterbury District Health Board (CDHB) AMS committee changed advice for metronidazole to promote two times daily dosing for most indications, prioritisation of the oral route and avoidance of double anaerobic cover. Adoption of the initiative was facilitated via change in prescribing guidelines, education and ongoing pharmacy support. Usage and expenditure on metronidazole for adult inpatients were compared for the five years pre- and two years post-change. Other district health boards (DHBs) were surveyed to determine their dosing recommendation for metronidazole IV.

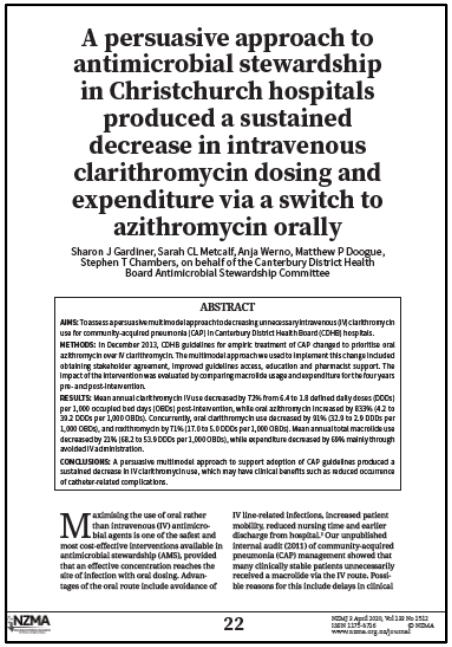
RESULTS: Mean annual metronidazole IV use, as defined daily doses per 1,000 occupied bed days, decreased by 43% post-initiative. Use of non-IV (oral or rectal) formulations increased by 104%. Total savings associated with the initiative were approximately $33,400 in drug costs plus $78,200 per annum in IV giving sets and post-dose flushes. Twelve of 20 (60%) DHBs (including CDHB) endorse twice daily IV dosing.

CONCLUSIONS: In addition to financial savings, reduction in IV dosage has potential benefits, including avoidance of IV catheter-associated complications such as bloodstream infections. Approaches to metronidazole dosing vary across DHBs and could benefit from national coordination.

Metronidazole is a synthetic nitroimidazole developed in the 1950s to treat urogenital infections caused by the parasite, *Trichomonas vaginalis*.[1] Its activity against anaerobic bacteria was later discovered serendipitously in 1962[2] and now forms the basis for most of its use in hospitalised patients.

Metronidazole has a unique pharmacological profile that includes rapid concentration-dependent bactericidal action against susceptible anaerobic bacteria[3,4] and low resistance rates within these organisms.[5] It also has an excellent oral bioavailability (>90%), favourable penetration to the site of infection and a long half-life (by antimicrobial standards) of eight hours.[6] However, despite more than 50 years of use and an established role in the treatment of anaerobic infections, there is no consensus on the ideal dosing strategy for metronidazole administered intravenously (IV). Indeed, international guidelines on the treatment of intra-abdominal infections in adults endorse a two-fold variation in daily dose (1,000–2,000mg) administered at four different dose intervals (6-, 8-, 12- or 24-hourly) (Table 1).[7-10] An antimicrobial stewardship (AMS) perspective is needed to rationalise these regimens, which are not equivalent in terms of cost or administration complexity, and may differ in both efficacy and adverse effects.

Canterbury District Health Board (CDHB) had a long history of dosing metronidazole IV as 500mg every eight hours, and orally (PO) as 400mg three times daily, for treatment of anaerobic bacterial infections.



A persuasive approach to antimicrobial stewardship in Christchurch hospitals produced a sustained decrease in intravenous clarithromycin dosing and expenditure via a switch to azithromycin orally

Sharon J Gardiner, Sarah CL Metcalf, Anja Werno, Matthew P Doogue, Stephen T Chambers, on behalf of the Canterbury District Health Board Antimicrobial Stewardship Committee

ABSTRACT

AIMS: To assess a persuasive multimodal approach to decreasing unnecessary intravenous (IV) clarithromycin use for community-acquired pneumonia (CAP) in Canterbury District Health Board (CDHB) hospitals.

METHODS: In December 2013, CDHB guidelines for empiric treatment of CAP changed to prioritise oral azithromycin over IV clarithromycin. The multimodal approach we used to implement this change included obtaining stakeholder agreement, improved guidelines access, education and pharmacist support. The impact of the intervention was evaluated by comparing macrolide usage and expenditure for the four years pre- and post-intervention.

RESULTS: Mean annual clarithromycin IV use decreased by 72% from 6.4 to 1.8 defined daily doses (DDDs) per 1,000 occupied bed days (OBDs) post-intervention, while oral azithromycin increased by 833% (4.2 to 39.2 DDDs per 1,000 OBDs). Concurrently, oral clarithromycin use decreased by 91% (32.9 to 2.9 DDDs per 1,000 OBDs, and roxithromycin by 71% (17.0 to 5.0 DDDs per 1,000 OBDs). Mean annual total macrolide use decreased by 21% (68.2 to 53.9 DDDs per 1,000 OBDs), while expenditure decreased by 69% mainly through avoided IV administration.

CONCLUSIONS: A persuasive multimodal approach to support adoption of CAP guidelines produced a sustained decrease in IV clarithromycin use, which may have clinical benefits such as reduced occurrence of catheter-related complications.

Maximising the use of oral rather than intravenous (IV) antimicrobial agents is one of the safest and most cost-effective interventions available in antimicrobial stewardship (AMS), provided that an effective concentration reaches the site of infection with oral dosing. Advantages of the oral route include avoidance of IV line-related infections, increased patient mobility, reduced nursing time and earlier discharge from hospital.[1] Our unpublished internal audit (2011) of community-acquired pneumonia (CAP) management showed that many clinically stable patients unnecessarily received a macrolide via the IV route. Possible reasons for this include delays in clinical

Multifaceted initiatives to decrease use of clarithromycin IV and metronidazole IV

Successful and sustained

Avoided IV doses:
~3,000 IV clarithromycin doses per year
~15,000 IV metronidazole doses per year

Dollars saved (drug + consumables):
~$230,000 saved annually

Health & Disability Services Standards
Public consultation (13.01.21 deadline)

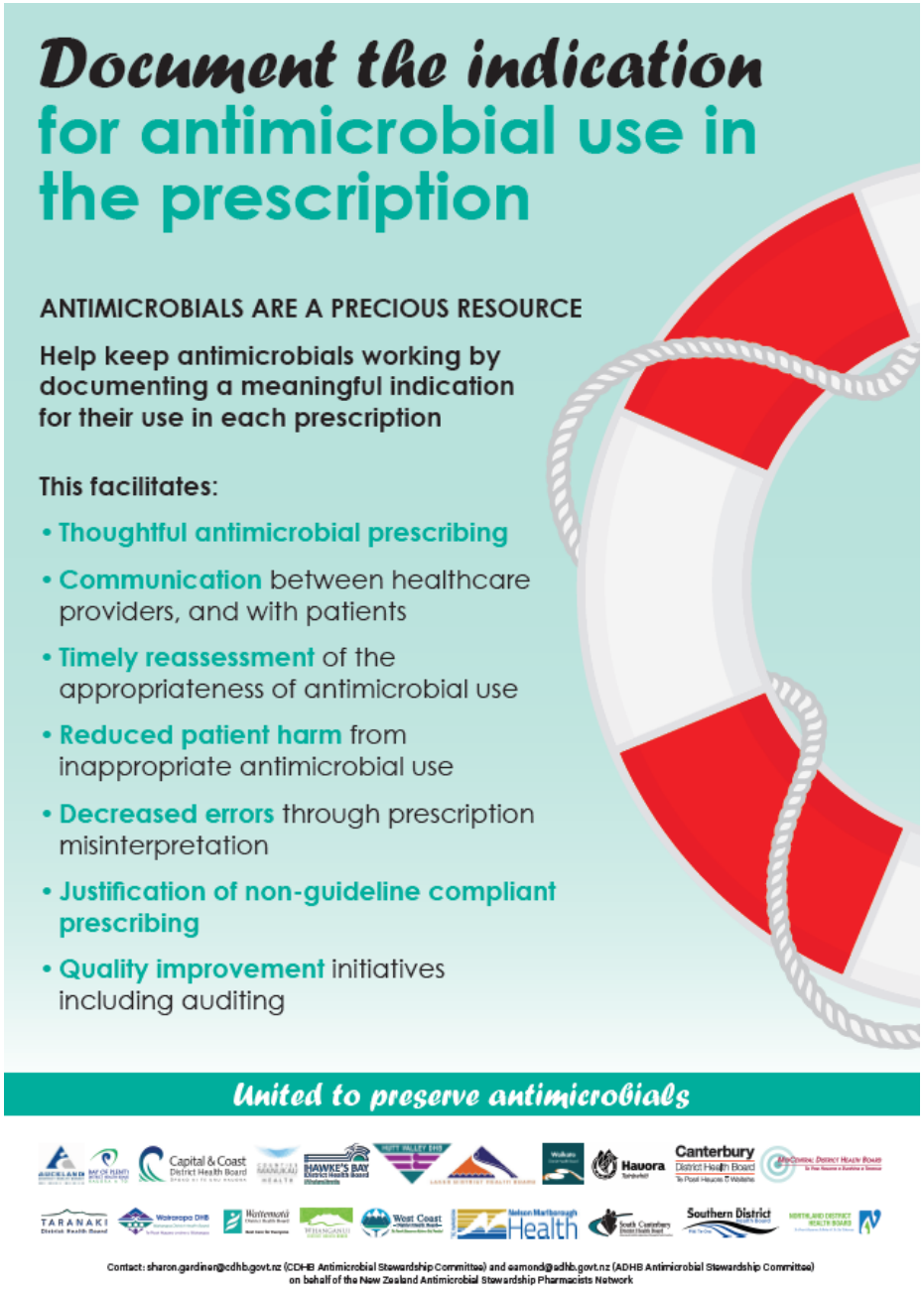
- The Standards set the minimum requirements for a wide range of health care services including aged residential care and hospitals for:

  (1) Our rights
  (2) Workforce and structure
  (3) Pathways to wellbeing
  (4) Person-centred and safe environment
  (5) Infection prevention and antimicrobial stewardship
  (6) Restraint and seclusion.

- **Positive –** AMS is elevated to sit alongside IPC

- **Negative –** no AMS experts formally involved in development

- These standards are important – they will shape our antimicrobial use for the foreseeable future



AMS quality marker: indication documentation on antimicrobial prescriptions

CDHB AMS Committee wanted to develop an initiative for November 2020 (work already being done @ ADHB and CCDHB)

NZ AMS/Infection Pharmacist Group all 20 DHBs agreed to participate

Developed resources: Posters, bulletin, screensaver, table talkers, e-mail banner

Supported by: MOH, HQSC, ACC, PHARMAC bpacnz, Pharmaceutical Society of NZ, NZ Hospital Pharmacists Association, Pharmacy Guide of NZ

"Friendly" collaborative model that hopefully extends to a "cheeky" leaderboard

Conclusions

We need to pull up our socks –
our current model for AMS in human health is inadequate and outdated (thigh high waders urgently needed!)

The model for AMS must be collaborative, cross-sector, informed by experts, and transparent

Nationally, we need:

- leadership and co-ordination
- quality improvement tools & measures
- antimicrobial guidance

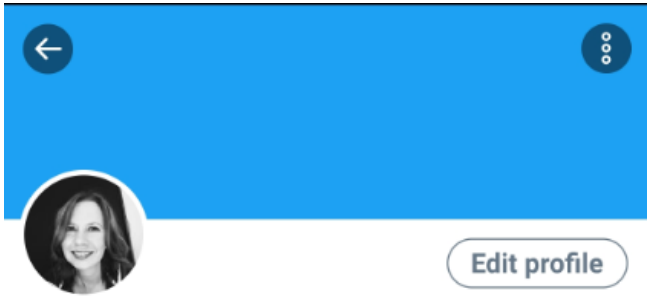
Regionally, DHBs could lead regional AMS activities if adequately resourced

Tweet

Sharon Gardiner
@SGardinerNZ

Whanganui DHB pharmacy staff and CEO Russell Simpson supporting #WAAW2020 with 2 leaders in public health/ infections @AshBloomfield, @BalmMichelle. Highlights the breadth and depth of support, expertise and skills needed to slow #AntimicrobialResistance & #KeepAntibioticsWorking

Whanganui DHB and Ministry of Health - Manatū Hauora



Edit profile

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