

The
**New Zealand
Medical Journal**

Journal of the New Zealand Medical Association

Vol 132 | No 1488 | 18 January 2019



Cannabis law and cannabis-related harm

**The time has come for New Zealand to improve
outcomes after emergency laparotomy**

**Hot tub lung: take a
bathing history from
the breathless**

**Over and under? Ethnic
inequities in community
antibacterial prescribing**

**Reducing inappropriate urine testing
at Hutt Valley District Health Board
using Choosing Wisely principles**

The
**New Zealand
Medical Journal**
Publication Information
published by the New Zealand Medical Association

NZMJ Editor

Professor Frank Frizelle

NZMA Chair

Dr Kate Baddock

NZMJ Production Editor

Rory Stewart

NZMA Communications Manager

Diana Wolken

Other enquiries to:

NZMA
PO Box 156
The Terrace
Wellington 6140
Phone: (04) 472 4741

To contribute to the *NZMJ*, first read:
www.nzma.org.nz/journal/contribute

© NZMA 2019

To subscribe to the *NZMJ*, email
julie@nzma.org.nz

Subscription to the *New Zealand Medical Journal* is free and automatic to NZMA members. Private subscription is available to institutions, to people who are not medical practitioners, and to medical practitioners who live outside New Zealand. Subscription rates are below. All access to the *NZMJ* is by login and password, but IP access is available to some subscribers.

Read our Conditions of access for subscribers for further information
www.nzma.org.nz/journal/subscribe/conditions-of-access

If you are a member or a subscriber and have not yet received your login and password, or wish to receive email alerts, please email: julie@nzma.org.nz

The NZMA also publishes the *NZMJ Digest*. This online magazine is sent out to members and subscribers 10 times a year and contains selected material from the *NZMJ*, along with all obituaries, summaries of all articles, and other NZMA and health sector news and information.

Subscription rates for 2019

New Zealand subscription rates

Individuals*	\$317
Institutions	\$549
Individual article	\$30

Overseas subscription rates

Individual	\$442
Institutions	\$591
Individual article	\$30

*NZ individual subscribers must not be doctors (access is via NZMA Membership)

New Zealand rates include GST. No GST is included in international rates.

Note, subscription for part of a year is available at pro rata rates.

Please email julie@nzma.org.nz for more information.

Individual articles are available for purchase by emailing nzmj@nzma.org.nz

EDITORIAL

7

Cannabis law and cannabis-related harm

Joseph M Boden, David M Fergusson

ARTICLES

11

Reducing inappropriate urine testing at Hutt Valley District Health Board using Choosing Wisely principles

Aidan D Wilson, Matthew J Kelly, Emma Henderson, Lynn McBain, Sisira Jayathissa, Belinda Loring

21

Urinalysis orders and yield among General Medicine patients: a single-centre's experience in New Zealand

Khurram Shahid, Yassar Alamri, Hannah Scowcroft, Liane Dixon, Julie Creighton, Heather Isenman, Sarah Metcalf, Steve Chambers

28

Quality of electronic records documenting adverse drug reactions within a hospital setting: identification of discrepancies and information completeness

Rhiannon Braund, Courtney K Lawrence, Lindsay Baum, Brittany Kessler, Madison Vassart, Carolyn Coulter

38

A qualitative analysis of adolescents' opinions of proactive long-acting reversible contraceptive (LARC) provision

Rebecca Duncan, Helen Paterson, Lynley Anderson, Neil Pickering

49

Doctors, drugs of dependence and discipline: a retrospective review of disciplinary decisions in

New Zealand, 1997–2016

Katharine A Wallis, Susie Middleton

VIEWPOINT

55

The time has come for New Zealand to improve outcomes after emergency laparotomy

Katherine Broughton, Era Soukhin, Andrew R Moot, Ben Griffiths

CLINICAL CORRESPONDENCE

62

Hot tub lung: take a bathing history from the breathless

Dave A Duggan, Andrew G Stanley, Phil Shoemack

LETTER

65

Over and under? Ethnic inequities in community antibacterial prescribing

Scott Metcalfe, Sandhaya (Sandy) Bhawan, Meena Vallabh, Peter Murray, Catherine Proffitt, Greg Williams

BOOK REVIEWS

69

Fat Off; the Right Way—A clever and sustainable eating guide for weight loss and healthy living

Frank Frizelle

71

The Art of Recovery: six personal
journeys
Frank Frizelle

OBITUARIES

73

John Gwyther Richards
Felicity Goodyear-Smith, John Werry,
David Richards

75

Harold Bourne
Brian Barraclough

METHUSELAH

77

Effects of aspirin on risks of
vascular events and cancer
according to bodyweight and dose

100 YEARS AGO

78

The Intolerance of Quinine in
Influenza-Pneumonia Patients
By G. Metcalfe Sharpe, M.B.

Reducing inappropriate urine testing at Hutt Valley District Health Board using Choosing Wisely principles

Aidan D Wilson, Matthew J Kelly, Emma Henderson, Lynn McBain, Sisira Jayathissa, Belinda Loring

Urinary tract infections (UTI), which should be treated promptly with antibiotics to avoid complications, involve bacteria present in the urine along with common signs and symptoms, such as painful urination, blood in the urine, frequent urination, fever and pain. However, if there are bacteria present in the urine without the signs and symptoms of a UTI—which is called asymptomatic bacteriuria (ASB)—it should not be treated as it provides no benefit to the patient and may contribute to antibiotic resistance and cause drug side effects. In order to stop unnecessary treatment of ASB, urine culture tests should only be ordered in those patients who present with likely UTIs. Hutt Valley District Health Board sought to reduce clinically inappropriate urine culture requests through removal of urine dipsticks from wards and education of staff using Choosing Wisely principles. This intervention caused a 28% reduction in monthly urine culture requests for inpatients as well as annual savings of at least \$41,760.

Urinalysis orders and yield among General Medicine patients: a single-centre's experience in New Zealand

Khurram Shahid, Yassar Alamri, Hannah Scowcroft, Liane Dixon, Julie Creighton, Heather Isenman, Sarah Metcalf, Steve Chambers

We found a large number of urine tests is being ordered unnecessarily in patients without symptoms. A more useful approach is testing symptomatic patients only following careful clinical evaluation. Performing “routine” tests in patients presenting a wide variety of symptoms may lead to unnecessary costs and treatment of asymptomatic patients.

Quality of electronic records documenting adverse drug reactions within a hospital setting: identification of discrepancies and information completeness

Rhiannon Braund, Courtney K Lawrence, Lindsay Baum, Brittany Kessler, Madison Vassart, Carolyn Coulter

Electronic patient records are useful as they can hold all historical information, which can be accessed by prescribers each time a patient presents. However, if the information entered is not accurate and complete, then it is difficult for prescribers to use this information to make informed choices. Where multiple systems, information duplication and a lack of information completeness mean that the prescriber does not have ready access to this information, it is challenging for prescribers to use these records optimally.

A qualitative analysis of adolescents' opinions of proactive long-acting reversible contraceptive (LARC) provision

Rebecca Duncan, Helen Paterson, Lynley Anderson, Neil Pickering

Some New Zealand adolescents are sexually active, and of those adolescents who are having sex, some are using contraceptive methods with high typical use failure rates, and some are using no contraception at all. Long-acting reversible contraceptives (LARCs) are intrauterine devices (IUDs) and implants, a group of contraceptive methods that are 22 times as effective as the pill. We suggested a provision model where adolescents would be offered LARCs proactively, and consulted with four focus groups of female adolescents to assess whether they found this model to be acceptable. The adolescents were positive about this concept, and described a range of barriers that currently prevent them from accessing effective contraception.

Doctors, drugs of dependence and discipline: a retrospective review of disciplinary decisions in New Zealand, 1997–2016

Katharine A Wallis, Susie Middleton

We reviewed disciplinary decisions in New Zealand 1997–2016 to describe cases involving doctors and the inappropriate prescribing of drugs of dependence. Drug dependence is recognised as a disease, not a crime. We identified 25 disciplinary cases involving 24 doctors. Most doctors were male, older and working in general practice. Few cases came to light through reporting by colleagues. The penalties were severe, often spelling the end of a doctor's career.

The time has come for New Zealand to improve outcomes after emergency laparotomy

Katherine Broughton, Era Soukhin, Andrew R Moot, Ben Griffiths

Emergency laparotomies are a common operation undertaken for a patient who has a serious abdominal condition such as a perforated colon or ulcer and include procedures such as colectomy (removal of a section of colon). These patients are often elderly, very unwell on arrival to the hospital and have a high risk of dying as a result of their surgical condition. The risk of a patient dying within 30 days (30-day mortality) after such an operation in the UK is approximately 10%. We do not have similar data in New Zealand or Australia and need to collect such data. By data collection and subsequent changes in how we treat and manage such patients we are likely to be able to improve how our patients do after this risky operation. This project will involve surgeons, intensivists (doctors who manage patients in the intensive care unit (ICU)) and anaesthetists (doctor who anaesthetise patients for operations).

Cannabis law and cannabis-related harm

Joseph M Boden, David M Fergusson

ABSTRACT

At the present time there are continuing debates on the legal status of cannabis in New Zealand. Many of these debates have not given sufficient consideration to evidence concerning cannabis-related harm, much of which has been gathered here in New Zealand by the Christchurch Health and Development Study (CHDS) and the Dunedin Multidisciplinary Health and Development Study (DMHDS). We present a summary of this evidence, and recommendations for a cautious path forward for changing cannabis laws in New Zealand that aims at reducing cannabis-related harm.

It appears likely that New Zealanders will have a chance to participate in a referendum on possible changes to the law concerning recreational cannabis before the next election in 2020.¹ This has occurred in the context of ongoing advocacy for the legalisation of recreational cannabis use in New Zealand, with a recent survey suggesting that nearly two thirds of respondents are of the view that cannabis use should be either decriminalised or legalised.² In addition, the New Zealand Parliament has very recently passed a Medicinal Cannabis bill, and there has been a strong recommendation by the recent New Zealand Mental Health and Addictions Inquiry for the decriminalisation of drug use in general.³

An unfortunate feature of the debates on changes to cannabis law is that relatively few contributors have discussed either the harms of cannabis or potential risks of legalisation. Most contributions imply that cannabis is a relatively harmless drug, and that cannabis law change will only have beneficial consequences. We would argue that, on the basis of evidence generated by longitudinal studies based in New Zealand, both assumptions are incorrect.

New Zealand-based research on outcomes associated with cannabis use

New Zealand has some of the richest data on the adverse consequences of cannabis use coming from two major studies: the Christchurch Health and Development

Study (CHDS) and the Dunedin Multidisciplinary Health and Development Study (DMHDS). The CHDS is a study of a cohort of 1,265 children born in 1977 who have been studied to the age of 35. The study has now published 30 scientific papers on the issue of cannabis. This research shows resoundingly that cannabis use by cohort members was common, with over 75% reporting use, and in the region of 15% developing a pattern of heavy use and dependence at some point.⁴

The CHDS has also provided a wealth of cutting-edge research of the adverse health and psychosocial outcomes associated with cannabis use. Data from the CHDS has shown that cannabis use is associated with: educational delay; welfare dependence; increased risks of psychotic symptoms; major depression; increased risks of motor vehicle accidents; increased risks of tobacco use; increased risks of other illicit drug use; and respiratory impairment.⁵ These effects were most evident for young (<18 years) users, and in particular heavier users of cannabis, and could not be explained by social demographic and contextual factors associated with cannabis use. This research clearly establishes the facts that: a) cannabis use is not harmless; b) it has its greatest impacts on young users who are vulnerable to the neuro-psychological effects of cannabis.⁵

At the same time, evidence from the CHDS suggests that the prohibition of cannabis is also a cause of some harm. In an analysis of the CHDS cohort following the age 21

assessment, Fergusson et al⁶ showed that males and Māori cohort members reported disproportionately higher rates of arrest and conviction for cannabis-related offences. These findings indicated that the laws prohibiting cannabis were being applied in a biased manner. Furthermore, the analysis showed that cannabis use did not decrease following arrest/conviction, suggesting that prohibition generally failed to reduce cannabis use in the cohort.

Some of the literature and advocacy for legalisation of cannabis has attempted to show that cannabis is no more harmful, or even less harmful, than alcohol. As Hall⁷ points out however, it is clear that: a) the harms of cannabis and alcohol cover quite different domains of functioning; and b) because cannabis is an illegal drug, the harms associated with it may have been underestimated, as use has been suppressed to some degree by its legal status.

Benefits and risks of legalisation

There are varying views in the literature on the adverse effects of the legalisation of cannabis with many commentators expressing the view that legalisation is unlikely to have adverse effects, and may in fact have positive effects, including: reducing income for criminal cartels, increasing tax revenues for the state; and avoiding criminalising large numbers of users of the drug. In addition, it could be argued that the legalisation of cannabis could lead to increased funding for cannabis-related health and psychosocial problems (including cannabis dependence), funded via increased tax revenue. It should be noted that, in US states where cannabis has been legalised (such as Colorado), increased tax revenues have been reported.

The assumption that cannabis legalisation will have primarily positive effects has recently been challenged by an evaluation of the consequences of cannabis legalisation. In a recent review of the literature, Hasin⁸ reported that changes in both medical and recreational cannabis laws in the US have thus far resulted in mixed effects. Hasin found that there was little evidence that cannabis use among adolescents had increased, but this was not the case for adults, among whom both cannabis use and cannabis use disorders increased. Furthermore, there was evidence

of increases in cannabis-related emergency department visits, driving under the influence of cannabis, and accidental exposure to cannabis in children. This review makes it clear that cannabis legalisation can increase both the use of cannabis and cannabis-related harms.

A cautious way forward

The facts above are in sharp contrast to the current public debate about cannabis, which has failed to discuss extensive local evidence on the harms of cannabis and the negative consequences. At the same time it is clear that the current prohibition of cannabis use has adverse consequences of both criminalising otherwise law abiding citizens, and being used to apply cannabis laws to individuals coming to official attention with this resulting in males and Māori being at increased risks of arrest and conviction for the possession of cannabis.⁶

It is clear that any changes to the legal status of cannabis should be made with caution, and should not follow the model currently used to deal with alcohol in most Western countries. Hall⁷ has argued that, because of the likelihood that trade in legalised cannabis will be controlled by large business conglomerates, there is little reason to expect that legalised cannabis will be more heavily regulated than alcohol, which has been the subject of increasingly liberalised regulation over the past 50 years. Nonetheless, we would argue that it is critical for any change in the legal status of cannabis to be undertaken with caution, and to be fully evaluated at each stage to determine the extent to which these changes are leading to increased cannabis-related harm.

Given these considerations, what we would propose is the development of laws and policies that both discourage the use of cannabis and that also avoid criminalising recreational users of the drug. This proposal represents a progressive process of policy development which begins with the depenalisation of cannabis possession, the increased protection of young people and the treatment of cannabis-related harm as a health issue. The key elements of this policy are:

1. Simple possession of cannabis by those over 18 would be decriminalised, as would supply of small amounts to adults, as recommended by the recent Mental Health Inquiry.³

2. Penalties for the supply of cannabis to those under 18 would be increased.
3. Investments in mental health services for those with cannabis use disorder and cannabis-related conditions would be increased, again in line with the recent Mental Health Inquiry.³

The general aim of this policy is to an attempt to steer a middle course between the shortcomings of strict prohibition and the risks of legalisation, and represents the first step in a longer-term strategy to address the issues raised by cannabis. Specifically we would propose that the first-stage decriminalisation process is evaluated at regular intervals by assessing the prevalence of cannabis use and cannabis-related harms. If this evaluation shows that the decriminalisation process reduces harms, the next stage would be to move towards further liberalisation of cannabis laws. An advantage of this approach is that by the

time the evaluation of decriminalisation is complete, clearer evidence on the costs and benefits of cannabis legalisation in the US and elsewhere will be available.

The issue of cannabis legalisation has been a highly emotive area with strong opinions often being expressed. Among these have been that cannabis is a low-risk drug which is less harmful than alcohol and that the legalisation of cannabis is beneficial and does not have harmful consequences. Neither of these claims withstands critical inspection; cannabis has multiple harmful effects which are particularly evident for young users, and the extent to which legalisation is beneficial is by no means clear. Given this context, the most prudent course of action for New Zealand to follow is to develop policies which eliminate the adverse effects of prohibition while at the same time avoiding the possible adverse consequences of full legalisation.

Competing interests:

Nil.

Author information:

Joseph M Boden, PhD, Research Associate Professor, Department of Psychological Medicine, University of Otago, Christchurch; David M Fergusson (deceased), Emeritus Professor, Department of Psychological Medicine, University of Otago, Christchurch.

Corresponding author:

Joseph M Boden, PhD, Department of Psychological Medicine, University of Otago, Christchurch, PO Box 4345, Christchurch 8140.
joseph.boden@otago.ac.nz

URL:

<http://www.nzma.org.nz/journal/read-the-journal/all-issues/2010-2019/2019/vol-132-no-1488-18-january-2019/7780>

REFERENCES:

1. Collins B. NZ may vote on marijuana legalisation in 2019 Wellington: Radio New Zealand; 2018 [Available from: <http://www.radionz.co.nz/news/political/357982/nz-may-vote-on-marijuana-legalisation-in-2019>
2. New Zealand Drug Foundation. New survey results show legal cannabis a real possibility Wellington: New Zealand Drug Foundation; 2018 [Available from: <http://www.drugfoundation.org.nz/news-media-and-events/new-survey-results-show-legal-cannabis-a-real-possibility/>
3. Mental Health and Addiction Inquiry. He Ara Oranga: report of the Government Inquiry into Mental Health and Addiction. Wellington:

- Mental Health and Addiction Inquiry; 2018.
4. Boden JM, Fergusson DM, Horwood LJ. Illicit drug use and dependence in a New Zealand birth cohort. *Aust N Z J Psychiatry*. 2006; 40:156–63.
 5. Fergusson DM, Boden JM, Horwood LJ. Psychosocial sequelae of cannabis use and implications for policy: Findings from the Christchurch Health and Development Study. *Soc Psychiatry Psychiatr Epidemiol*. 2015; 50(9):1317–26.
 6. Fergusson DM, Swain-Campbell NR, Horwood LJ. Arrests and convictions for cannabis related offences in a New Zealand birth cohort. *Drug Alcohol Depend*. 2003; 70(1):53–63.
 7. Hall W. Alcohol and cannabis: Comparing their adverse health effects and regulatory regimes. *International Journal of Drug Policy*. 2017; 42(Supplement C):57–62.
 8. Hasin DS. US Epidemiology of Cannabis Use and Associated Problems. *Neuropsychopharmacology* : official publication of the American College of Neuropsychopharmacology. 2018; 43(1):195–212.

Reducing inappropriate urine testing at Hutt Valley District Health Board using Choosing Wisely principles

Aidan D Wilson, Matthew J Kelly, Emma Henderson, Lynn McBain, Sisira Jayathissa, Belinda Loring

ABSTRACT

AIM: Unnecessary treatment of asymptomatic bacteriuria is a concern. Hutt Valley District Health Board sought to reduce clinically inappropriate urine culture requests through removal of urine dipsticks from wards and education of staff using Choosing Wisely principles. The purpose of this research is to quantitatively evaluate the success of these initiatives.

METHODS: The numbers and results of urine cultures performed for Hutt Valley DHB were analysed, for the period from January 2015 to October 2017. Urinalyses were compared between those designated as 'inpatient' and those as 'outpatient', with the latter being the control of this study. The numbers of primary and secondary coded discharge diagnoses of UTIs were used as a measure of the negative impact of the interventions.

RESULTS: There was a 28% reduction in monthly urine culture requests for inpatients, after staff education and removal of urine dipsticks, with no change in those for outpatients (the negative control). After the intervention, a higher proportion of urine cultures were positive for urinary pathogens (25.2% compared to 23.0%) and the average number of diagnoses of UTI in hospital discharges decreased 17% (from 161 to 134).

CONCLUSION: The removal of urine dipsticks from wards and the education of staff significantly reduced the number of urine culture requests and is a useful strategy to reduce the overuse of antibiotics for asymptomatic bacteriuria without an increase in the number of UTIs. These simple interventions could be used at other hospitals as part of measures to reduce unnecessary care and overdiagnosis.

Choosing Wisely is an international campaign which aims to reduce unnecessary and low-value patient care by encouraging medical colleges and speciality societies to identify clinical practices which should be questioned or avoided. A common recommendation, according to the Australasian Society for Infectious Diseases,¹ the Australian & New Zealand Society for Geriatric Medicine² and the Royal College of Pathologists of Australasia³ is that patients should not be given antibiotics for asymptomatic bacteriuria (ASB) unless pregnant or undergoing a urological procedure.⁴⁻⁶ ASB describes a patient with no signs or symptoms of a urinary tract infection but from whom a quantitative count of bacteria ($>10^5$ cfu/mL)⁷ has been isolated from a urine

specimen.⁴ Signs and symptoms of a urinary tract infection (UTI) include increased frequency of urination, dysuria, suprapubic pain, fever and haematuria.⁵ The distinction between ASB and UTI is important because UTIs can lead to serious complications and are a common condition for which antibiotics are recommended.⁵ Antibiotic treatment of ASB is contraindicated, not only because it has no benefit to patients, but also because it is associated with harms, including *Clostridium difficile* infections, an increase in urinary infections,⁶ adverse drug reactions and an increase in antibiotic resistance.⁸⁻⁹

The Choosing Wisely campaign is especially concerned about unnecessary testing and treatment of ASB due to its high prevalence in hospitals. A study of over 4.4 million

patients admitted to hospitals in the US found that 47% were subject to urinalysis and 27% had their urine cultured.¹⁰ ASB is common, with the prevalence higher for females, the elderly and those with indwelling catheters.⁴ The over-testing of patients has led to more than half of urine cultures not being clinically indicated¹⁰ and a third of ASB cases being inappropriately treated with antibiotics against guidelines.⁷ A New Zealand study of over-65-year-olds in a secondary level care hospital found that only 22% of all bacteriuria cases were true UTIs and 43% of antibiotic courses prescribed were inappropriate.¹¹

At Hutt Valley District Health Board (HVDHB) the Antimicrobial Stewardship (AMS) Team aimed to reduce the number of inappropriate urinalyses for inpatients. The campaign began in March 2016 with the cessation of routine urine testing prior to orthopaedic implant surgery. Other interventions included removal of urine dipsticks from inpatient wards and education of staff about guidelines for diagnosis and treatment of UTIs. A timeline of these interventions is shown in Figure 1.

The aim of this study was to evaluate the progress of HVDHB's Choosing Wisely campaign to reduce the number of inappropriate urinalyses.

Methods

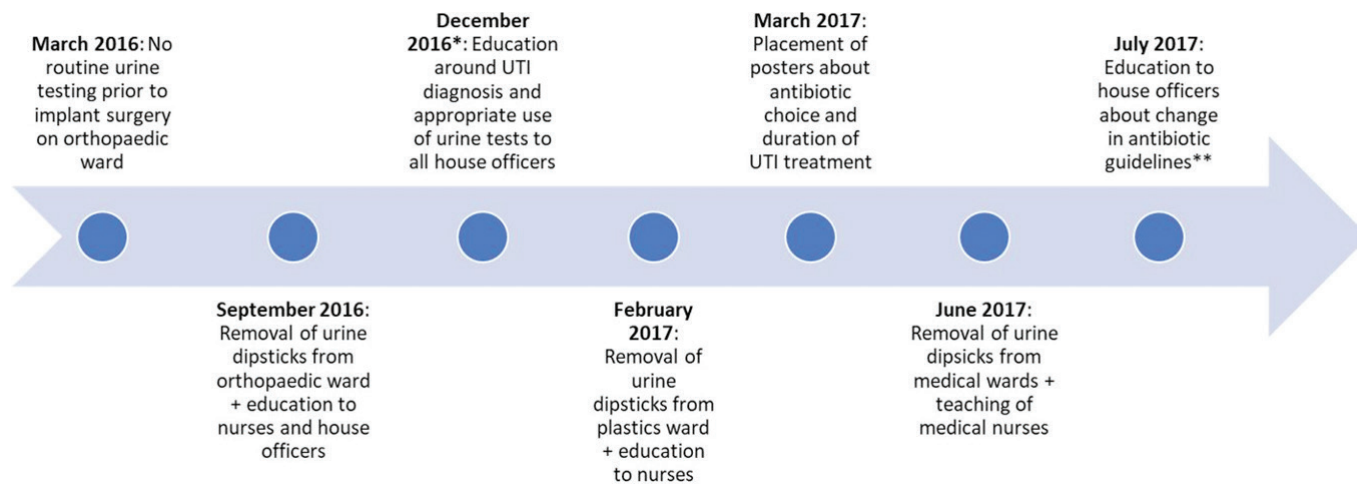
Quantitative data collection

Requests for urinalysis from HVDHB with corresponding urine culture results were obtained for the period January 2015 to October 2017 from the Wellington Southern Community Laboratory (WSCL) database. Urinalysis results from neonatal, paediatric (less than 15 years of age) and mental health services were excluded from the dataset. The setting from which urinalysis requests were made was designated as either 'inpatient' or 'outpatient'.

The interventions to reduce unnecessary urine testing and treatment only involved inpatient wards (orthopaedic, general surgery and gynaecology (GSG), plastics and medical wards) and Medical Assessment and Planning Unit (MAPU)). No specific interventions were done in the emergency department (ED). Intervention was done in MAPU; however, this was the last area targeted and occurred near the end of the study period. Outpatients were the negative control of this study as the outpatient clinics were considered unexposed as they received no formal education from the AMS Team and urine dipsticks were not removed.

Urine culture results were designated as either 'recognised uropathogen' or 'not

Figure 1: A timeline of interventions at HVDHB to reduce inappropriate urinalyses.



*This was repeated September 2017.

**Trimethoprim was removed as first-line treatment for urinary tract infections due to high resistant rates.

significant' based on findings from Blakiston and Zaman⁸ and input from infectious diseases physicians at Hutt and Wellington Hospital. In addition to those identified in Blakiston and Zaman,⁸ *Aerococcus urinae*, other *Proteus* species, *Raoultella planticola*, *Staphylococcus lugdunensis*, *Streptococcus agalactiae*, *Streptococcus dysgalactiae*, *Streptococcus pyogenes* and *Trueperella bernardiae* were also classified as 'recognised uropathogens'. All other culture results were classified as 'not significant'.

Additionally, the numbers of primary and secondary coded discharge diagnoses of UTIs were used to assess the negative impact or harm these interventions may have had on patient management. ICD codes used included N39.0—urinary tract infection, site not specified, N30.0—acute cystitis, N30.9—cystitis, unspecified, N30.8—other cystitis.

Statistical analysis

In these statistical analyses the 'intervention' is considered to begin in September 2016 with the first removal of urine dipsticks and education of staff and was applied across all departments due to potential for cross-talk and the fact that registered

medical officers (RMOs) can work in multiple wards or clinics.

Monthly and quarterly urine culture request data were analysed by taking the total count of urine culture requests in the period before the first removal of urine dipsticks and education of staff (January 2015 '2015-Q1' to September 2016 '2016-Q3') and using a two-tailed Student t-test to compare to the total count of urine culture requests in the period after the intervention (October 2016 '2016-Q3' to October 2017 '2017-Q3'). A Taylor series was applied for the calculation of 95% confidence intervals for each monthly rate, and the confidence interval for the rate ratio between the unexposed and exposed groups was calculated using the Byar method. Statistical significance is defined as no overlap in the confidence interval and a rate ratio confidence interval that does not include the null value, 1.

This study was approved under a Category B Application by the University of Otago Ethics committee (ref D17/431). All statistical analyses were performed using OpenEpi (www.openepi.com).

Figure 2: Monthly inpatient and outpatient urine culture requests from HVDHB from January 2015 to October 2017.

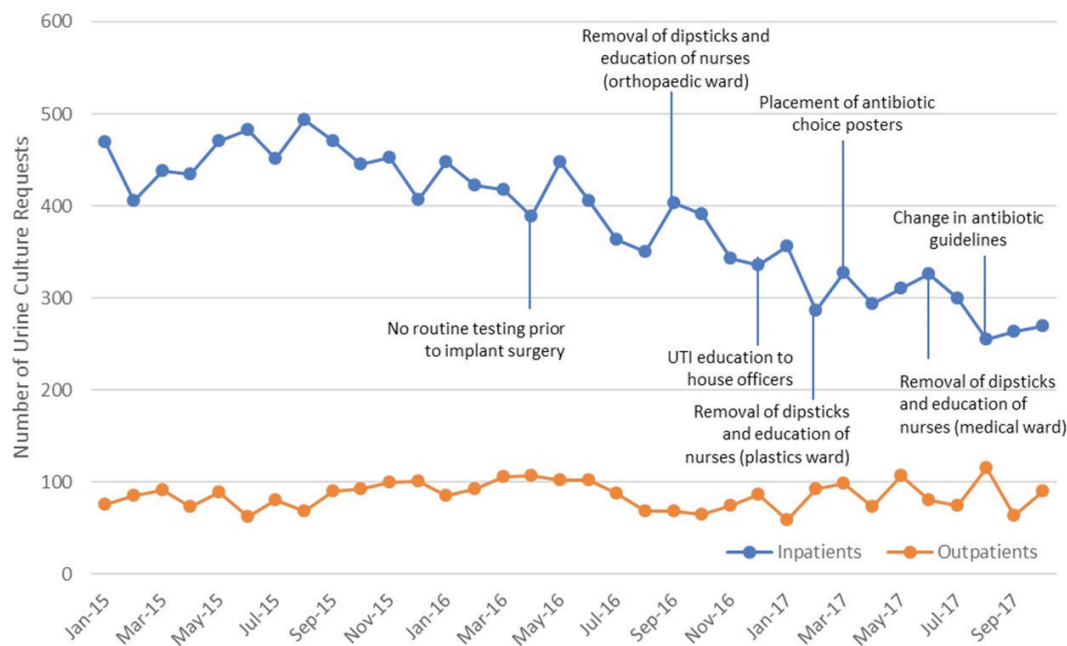


Table 1: Rates of urine culture requests per month for inpatients and outpatients, before and after the interventions at HVDHB.

Inpatients		
	Jan 2015 to Sept 2016 (before intervention)	Oct 2016 to Oct 2017 (after intervention)
Total number of urine culture requests	9,064	4,057
Rate of urine culture requests per month (95% CI in brackets)	432 (423–441)	312 (303–322)
Rate ratio (unexposed cf. exposed group)		0.72 (0.70–0.75)
Outpatients		
	Jan 2015 to Sept 2016 (before intervention)	Oct 2016 to Oct 2017 (after intervention)
Total number of urine culture requests	1,820	1,082
Rate of urine culture requests per month (95% CI in brackets)	87 (83–91)	97 (78–88)
Rate ratio (unexposed cf. exposed group)		0.96 (0.89–1.03)

Results

Wellington Southern Community Laboratory data

From January 2015 to October 2017, 18,992 urine culture requests were received by WSCL from HVDHB. After excluding results from patients aged under 15 years and results from mental health services, there were 16,658 urine culture requests.

Analysis of the monthly urine culture requests from HVDHB can be seen in Figure 2 and Table 1. Average monthly urine

culture requests for inpatients dropped 28% from 432 before interventions began to 312 after September 2016. For outpatients (negative control) there was no statistically significant change over the same period.

The laboratory listed price for a urine test is currently \$29 per test. When comparing pre- and post-intervention inpatient urine test requests, this equates to an annual savings of \$41,760. These savings do not include the additional savings made by reducing nursing workload or the costs of urine dipsticks or antibiotics.

Figure 3: Quarterly (Q) urine culture requests from HVDHB for emergency department and medical ward, from 2015-Q1 to 2017-Q3.

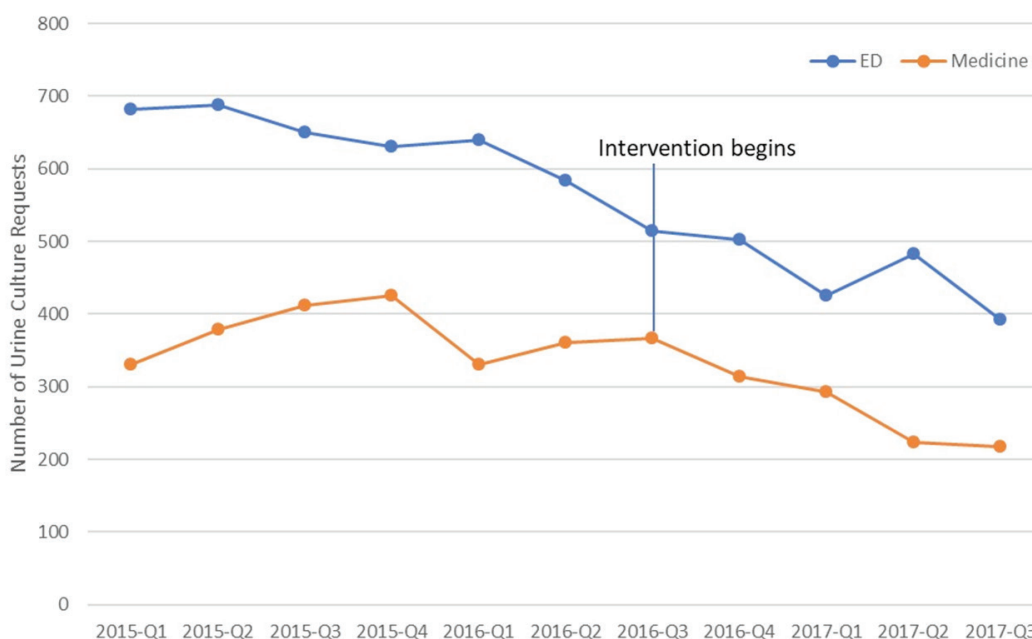
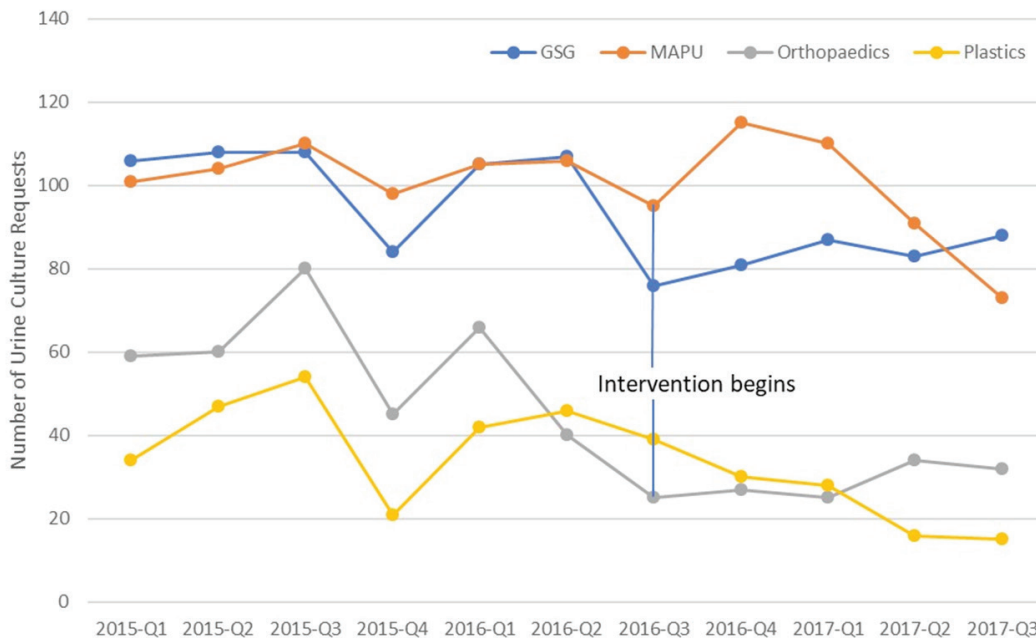


Figure 4: Quarterly urine culture requests from HVDHB separated by inpatient wards, general surgery and gynaecology (GSG), medical assessment and planning unit (MAPU), orthopaedics and plastics, from 2015-Q1 to 2017-Q3.



A comparison between the main areas at Hutt Valley Hospital—ED, medical ward, GSG, MAPU, orthopaedics ward and plastics ward—can be seen in Figures 3 and 4. All departments analysed at HVDHB except for MAPU showed statistically significant decreases in the average number of quarterly urine culture requests before and after

September 2016 when interventions began. These decreases in urine culture requests ranged from 15% to 45%. MAPU showed a late trend for decreasing requests (Figure 4). Data values can be found in Appendix 1.

The proportion of urine cultures which grew recognised uropathogens increased following the intervention (Figure 5). Data

Figure 5: Proportion of positive urine culture results from HVDHB each quarter from 2015-Q1 to 2017-Q3.

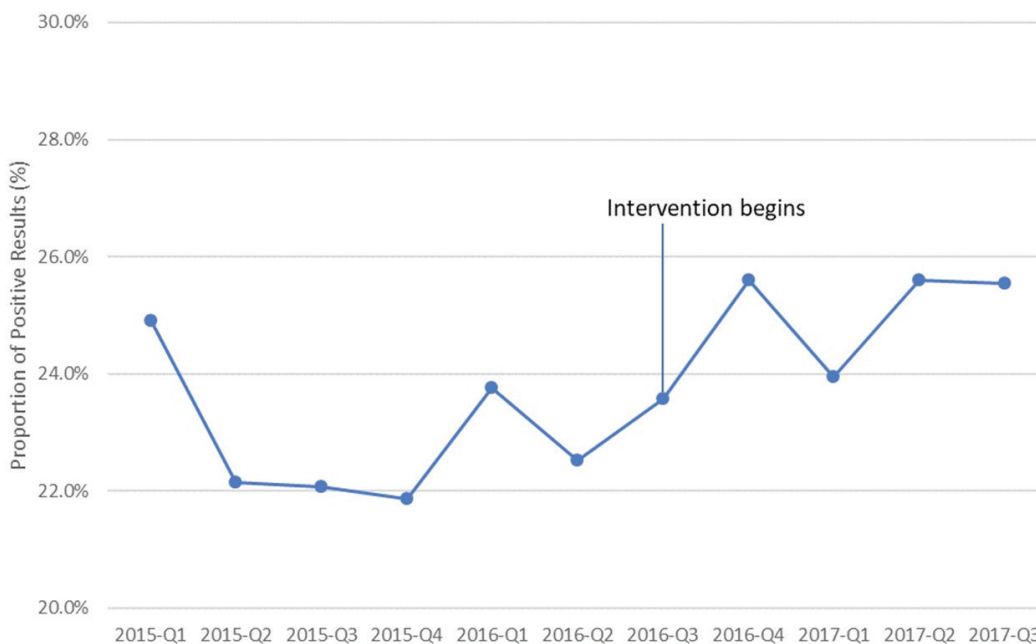


Table 2: Mean proportion of positive urine culture results before interventions began at HVDHB and after.

	2015-Q1 to 2016-Q3 (before intervention)	2016-Q4 to 2017-Q3 (after intervention)
Mean proportion of positive urine culture results (95% CI in brackets)	23.0% (21.9–24.1%)	25.2% (24.4–26.0%)
Mean difference	2.2 (0.8–3.6)	
P-value (two-sample independent T-test)	0.006	

shown in Table 2 shows a statistically significant increase with a mean difference of +2.2% before and after the intervention.

Primary and secondary coded discharge diagnoses of urinary tract infections

Figure 6 and Table 3 show that the average number of primary and secondary diagnoses of UTI fell from 161 to 134 before and after interventions began, representing a decrease of 17%.

Discussion

The 28% reduction in monthly urine culture requests for inpatients between January 2015 and October 2017 demonstrates significant progress towards reducing the number of unnecessary urine

tests and subsequent overtreatment. While not all inpatients wards have had urine dipsticks removed, they were all analysed together for two reasons: The AMS Team are only targeting inpatients with their ongoing interventions; and due to staff cross-talk and house officers working across multiple wards, all inpatient wards were likely to be affected by interventions. No significant change in the volume of monthly urine culture requests was seen for outpatients, which suggests that the reduction in urine testing in inpatients was due to the interventions implemented in the wards. However, which specific aspect of the intervention had the biggest effect is unknown.

The orthopaedics, plastics and medical wards (where urine dipsticks were removed, and nurses were educated further

Figure 6: Quarterly primary and secondary diagnoses of urinary tract infections at HVDHB between 2015-Q1 and 2017-Q3.

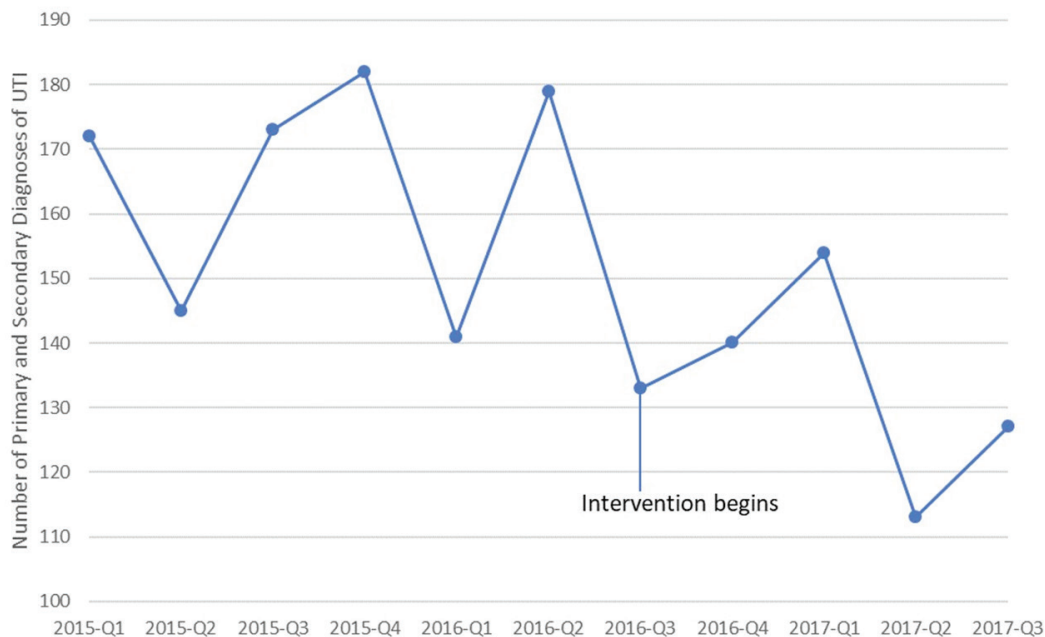


Table 3: Rates of primary and secondary urinary tract infection diagnoses per quarter before and after interventions begun at HVDHB.

	2015-Q1 to 2016-Q3 (before intervention)	2016-Q4 to 2017-Q3 (after intervention)
Total number of primary and secondary UTI diagnoses	1,125	534
Rate of UTI diagnoses per quarter (95% CI in brackets)	161 (152–170)	134 (122–145)
Rate ratio (unexposed cf. exposed group)		0.83 (0.75–0.92)

around urine testing) showed the greatest decrease in urine culture requests compared to areas where dipsticks were not removed. The emergency department—not specifically targeted by the intervention—also showed reductions, and this could be explained by: a flow of information between staff of different departments; the fact that house officers from all departments were educated as part of the intervention; the effect of educational posters around the hospital; and/or further factors not identified by this study. It is unclear why emergency department appeared to have been trending down prior to the intervention. Because we did not investigate this specifically, any explanation would be speculative, such as the possibility that practice was already changing due to the fact that avoiding treatment of asymptomatic bacteriuria was a Choosing Wisely message of several speciality groups. Rates of urine dipstick testing in MAPU did not change, but this area was only targeted at the end of the study period.

While a reduction in unnecessary urine testing is desired, it is important that patients with a legitimate indication for testing were still tested. The statistically significant increase of 2.2% in the proportion of urine culture with recognised uropathogens suggests that it is more likely that urine tests have been requested for patients presenting with signs and symptoms of UTIs.

Two possible conclusions could be drawn from the decrease in the number of primary and secondary coded diagnoses of UTIs. Either the decrease in urine culture requests has caused patients to not have their UTI diagnosed, or there is a decrease in inap-

propriate diagnoses of UTI. Given that the proportion of urine cultures with significant uropathogens increased over the two-year period, this suggests that there were fewer urine tests being performed on patients who had no urinary symptoms. It is possible that due to the improved education at HVDHB there is better understanding of ASB, which has led to fewer misdiagnoses of UTIs. The overall 28% reduction in urine tests is consistent with the expected proportion of inappropriate urine tests as demonstrated in other New Zealand and international research.^{7,10–11} The AMS team were not made aware of any cases of harm resulting from urine testing not being performed.

Policy implications

There is a worldwide tendency to over-test and over-treat UTIs, especially asymptomatic bacteriuria in the elderly despite evidence-based guidelines. Our study illustrates the effectiveness of a simple bundle of interventions on the number of urine culture requests. By removing urine dipsticks from hospital wards, along with education to staff around the reasons behind this intervention, significant reductions in urine culture requests can be achieved. This is an effective, inexpensive and straightforward intervention that could easily be implemented in other hospitals as a Choosing Wisely initiative. As urine dipsticks are one trigger for unnecessary urine culture testing and subsequent unnecessary antibiotic treatment, the removal of these dipsticks contributes to the goal of reducing overdiagnosis and unnecessary treatment. This is likely to reduce harm to patients, as some of those who are misdiagnosed with UTI and treated unnecessarily with antibiotics will go on to experience complications from this

treatment. In addition, there is a broader population benefit in terms of combatting antimicrobial resistance through reducing inappropriate use of antibiotics, as well as more efficient use of New Zealand’s public health resources by reducing wasteful testing and treatment.

Strengths and limitations

The major strength of this study was the ability to retrieve data for every urine culture requested by HVDHB from January 2015 to October 2017. This allowed for accurate reporting of trends over time. The main drawback was the inability to link urine culture data to patient details due to extensive labour that would have been required. This meant that it was only possible to categorise the culture results as ‘recognised uropathogen’ and ‘not significant’, where ‘recognised uropathogen’ will have included causes of both UTIs and ASB. We were unable to assess for any unintended negative implications of

the interventions, for example in terms of patients with a genuine UTI missing out or having delayed treatment. We did not investigate whether there were any differences in results for patients based on age, sex or ethnicity.

Future research is needed to better gauge staff opinions towards Choosing Wisely, and whether they believe these recommendations to reduce unnecessary care are improving patient management. This will require larger sample sizes and looking at focus groups or one-on-one interviews.

Conclusion

The results of this research indicate that HVDHB significantly reduced the number of urine tests, and likely the number of unnecessary urine tests, through the removal of urine dipsticks from hospital wards and the education of staff through a Choosing Wisely initiative.

Appendix

Appendix 1: Rates of urine culture requests per month for the emergency department (ED), medical ward general surgery and gynaecology (GSG), medical assessment and planning unit (MAPU), orthopaedics and plastics ward, with comparisons made between the periods before and after interventions started at HVDHB.

ED		
	2015-Q1 to 2016-Q3 (before intervention)	2016-Q4 to 2017-Q3 (after intervention)
Total number of urine culture requests	4,387	1,804
Rate of urine culture requests per quarter (95% CI in brackets)	627 (608–646)	451 (430–472)
Rate ratio (unexposed cf. exposed group)	0.72 (0.68–0.76)	
Medical ward		
	2015-Q1 to 2016-Q3 (before intervention)	2016-Q4 to 2017-Q3 (after intervention)
Total number of urine culture requests	2,606	1,048
Rate of urine culture requests per quarter (95% CI in brackets)	372 (358–387)	262 (246–278)
Rate ratio (unexposed cf. exposed group)	0.70 (0.66–0.76)	

Appendix 1: Rates of urine culture requests per month for the emergency department (ED), medical ward general surgery and gynaecology (GSG), medical assessment and planning unit (MAPU), orthopaedics and plastics ward, with comparisons made between the periods before and after interventions started at HVDHB (continued).

GSG		
	2015-Q1 to 2016-Q3 (before intervention)	2016-Q4 to 2017-Q3 (after intervention)
Total number of urine culture requests	694	339
Rate of urine culture requests per quarter (95% CI in brackets)	99 (92–107)	85 (76–94)
Rate ratio (unexposed cf. exposed group)	0.85 (0.75–0.97)	
MAPU		
	2015-Q1 to 2016-Q3 (before intervention)	2016-Q4 to 2017-Q3 (after intervention)
Total number of urine culture requests	719	389
Rate of urine culture requests per quarter (95% CI in brackets)	103 (95–111)	97 (88–107)
Rate ratio (unexposed cf. exposed group)	0.95 (0.84–1.07)	
Orthopaedics		
	2015-Q1 to 2016-Q3 (before intervention)	2016-Q4 to 2017-Q3 (after intervention)
Total number of urine culture requests	375	118
Rate of urine culture requests per quarter (95% CI in brackets)	54 (48–59)	30 (24–35)
Rate ratio (unexposed cf. exposed group)	0.55 (0.45–0.68)	
Plastics		
	2015-Q1 to 2016-Q3 (before intervention)	2016-Q4 to 2017-Q3 (after intervention)
Total number of urine culture requests	283	89
Rate of urine culture requests per quarter (95% CI in brackets)	40 (36–45)	22 (18–27)
Rate ratio (unexposed cf. exposed group)	0.55 (0.43–0.70)	

Competing interests:

Dr Matthew Kelly, whose interventions were being evaluated, assisted in data analysis. Dr McBain and Mr Wilson report grants from Council of Medical Colleges during the conduct of the study.

Acknowledgements:

This research was supported by an educational grant from the Choosing Wisely campaign which is facilitated by the Council of Medical Colleges, New Zealand. Additional thanks to the communications team at Hutt Valley DHB and Chris Kerr, the Director of Nursing, for enabling the advertising of surveys. Thank you to Dr Gregory Evans for his contributions to this study and for his facilitation of Choosing Wisely at Hutt Valley DHB as project manager. Finally, thank you to Professor Timothy Blackmore at Capital and Coast DHB for his input into survey design, culture categorisation, and for supplying laboratory data.

Author information:

Aidan D Wilson, University of Otago, Wellington; Matthew J Kelly, Infectious Disease Physician, Hutt Valley District Health Board, Lower Hutt; Emma Henderson, Infectious Disease Pharmacist, Hutt Valley District Health Board, Lower Hutt; Lynn McBain, Head of Department, Department of Primary Health Care and General Practice, University of Otago, Wellington; Sisira Jayathissa, Chief Medical Officer, Hutt Valley District Health Board, Lower Hutt; Belinda Loring, Consultant Public Health Physician, Choosing Wisely, Auckland.

Corresponding author:

Mr Aidan Wilson, University of Otago, Dunedin.
aidan.d.wilson@gmail.com

URL:

<http://www.nzma.org.nz/journal/read-the-journal/all-issues/2010-2019/2019/vol-132-no-1488-18-january-2019/7781>

REFERENCES:

1. Australasian Society for Infectious Diseases - Choose Wisely. (2018). Retrieved 16 January 2018, from <http://choosingwisely.org.nz/professional-resource/asid/>
2. Australian and New Zealand Society for Geriatric Medicine - Choose Wisely. (2018). Retrieved 19 June 2018, from <http://choosingwisely.org.nz/professional-resource/anzsgm/>
3. The Royal College of Pathologists of Australasia - Choose Wisely. (2018). Retrieved 19 June 2018, from <http://choosingwisely.org.nz/professional-resource/rcpa/>
4. Nicolle L, Bradley S, Colgan R, et al. Infectious Diseases Society of America Guidelines for the diagnosis and treatment of asymptomatic bacteriuria in adults. *Clin Infect Dis.* 2005; 40(5):643–54.
5. Beahm N, Nicolle L, Bursey A, et al. The assessment and management of urinary tract infections in adults: Guidelines for pharmacists. *Can Pharm J.* 2017; 150(5):298–305.
6. Cai T, Nesi G, Mazzoli S, et al. Asymptomatic bacteriuria treatment is associated with a higher prevalence of antibiotic resistant strains in women with urinary tract infections. *Clin Infect Dis.* 2015; 61(11):1655–61.
7. Lee M, Kim M, Kim N, et al. Why is asymptomatic bacteriuria overtreated: A tertiary care institutional survey of resident physicians? *BMC Infect Dis.* 2005; 15:289.
8. Blakiston M, Zaman S. Nosocomial bacteriuria in elderly inpatients may be leading to considerable antibiotic overuse: An audit of current management practice in a secondary level care hospital in New Zealand. *Infect Drug Resist.* 2014; 7:301–8.
9. Leis J, Rebeck G, Daneman N, et al. Reducing antimicrobial therapy for asymptomatic bacteriuria among noncatheterized inpatients: A proof-of-concept study. *Clin Infect Dis.* 2014; 58(7):980–3.
10. Horstman M, Spiegelman A, Naik A, Trautner B. National patterns of urine testing during inpatient admission. *Clin Infect Dis.* 2017; 65(7):1199–205.
11. Public Health Surveillance. (2015). Retrieved 17 January 2018, from http://surv.esr.cri.nz/antimicrobial/general_antimicrobial_susceptibility.php
12. Hutt Valley District Health Board Annual Report 2017. (2017). Retrieved 16 June 2018, from <http://www.huttvalleydhb.org.nz/about-us/reports-and-publications/annual-report/hutt-valley-dhb-annual-report-2017.pdf>

Urinalysis orders and yield among General Medicine patients: a single-centre's experience in New Zealand

Khurram Shahid, Yassar Alamri, Hannah Scowcroft, Liane Dixon, Julie Creighton, Heather Isenman, Sarah Metcalf, Steve Chambers

ABSTRACT

BACKGROUND: Urinalysis performed by dipstick testing is an aid to diagnosing urinary tract infections (UTI), and a tool in selecting patients who require urine culture and antibiotic treatment. Previous studies have demonstrated that UTI, especially in the elderly, are over-diagnosed and over-treated. We sought to study the pattern and yield of urinalysis and urine culture at our service in a tertiary institution.

METHODS: A convenience sampling method was utilised to prospectively collect clinical data, through a pre-designed pro forma, from patients admitted to the General Medicine service at Christchurch Hospital between March and June 2016.

RESULTS: The study included 395 patients, with a median age of 76 (range 15–100 years). The presence of urinary tract symptoms was documented in 94 patients (24%) and a non-specific syndrome of elevated temperature, confusion or subjective feverishness in 69 (17%). In symptomatic patients, 121 (74%) had a dipstick performed and 104 (86%) urine samples cultured. In the remaining patients, 181 (78%) had a dipstick performed and 81 (35%) had a urine sample sent for culture.

CONCLUSIONS: We found a large number of urine dipsticks is being ordered unnecessarily in asymptomatic patients. A more useful test is urine microscopy and culture that is done on symptomatic patients only following careful clinical evaluation. Performing 'routine' urinalysis in patients presenting a wide variety of symptoms may lead to unnecessary urine cultures and treatment of asymptomatic bacteriuria. Efforts to reduce unnecessary tests and antibiotic treatment are a vital component of diagnostic stewardship programmes.

The diagnosis of urinary tract infections (UTI) is based on clinical symptoms related to the urinary tract, and may be confirmed by urine microscopy and culture. Urinalysis may be an aid to the diagnosis, by helping to select which symptomatic patients should have urine microscopy and culture performed. Previously published studies have demonstrated that UTI, especially in the elderly, is over-diagnosed and over-treated.^{1,2} Performing laboratory tests on urine samples in the absence of symptoms may also lead to inappropriate treatment as asymptomatic bacteriuria does not require treatment except in pregnancy and in males undergoing urological procedures.^{3,4} In other circumstances, treatment of asymptomatic bacteriuria may cause

harm by contributing to increased rates of symptomatic UTI and emergence of drug resistance, causing drug-related adverse effects, adding costs and increasing the risk of *C. difficile* infections.⁵ These considerations have led to an increased focus on the effective management of communicable diseases by the World Health Organization; this is exemplified by its "Diagnostic Stewardship" campaign,⁶ which calls for avoiding diagnostic tests which are neither indicated nor likely to contribute to a change in patient management.

The protocol in our hospital is that patients who are admitted acutely to the General Medicine service are to have a dipstick urinalysis done routinely by nursing staff. If the dipstick is positive

for leucocytes or nitrites, patients with symptoms of a urinary tract infection should have a midstream urine sent for culture and susceptibility testing or if requested by the medical team. A pilot audit demonstrated that urine cultures were being inappropriately requested in many elderly patients with undifferentiated presentations.

The aim of the present study was to investigate the compliance with the protocol, frequency and diagnostic yield of urinalysis at our service in a tertiary institution, and determine whether this was contributing to inappropriate requests for urine culture and antimicrobial treatment.

Methods

Study setting

This prospective study included adult (age ≥ 15 years) patients admitted to the General Medicine service at Christchurch Hospital from 1 March to 10 May 2016. Christchurch Hospital is a tertiary referral centre in the South Island of New Zealand. It is the only acute care hospital for a population of approximately 510,000 people in the Christchurch region.

Ethical approval

Audit-based studies are assessed on the New Zealand National Ethics Committee website as to whether formal application and approval is required. This study met the criteria for predetermined approval (<http://ethics.health.govt.nz/>).

Definitions

A symptomatic patient was defined as having one or more of the following acute symptoms of the urinary tract: dysuria, new nocturia, abdominopelvic/back pain and/or altered urinary frequency; or in the absence of localising symptoms, a history of fevers, a temperature $\geq 38.0^\circ\text{C}$, confusion/delirium, lethargy, hypotension or a systemic inflammatory response syndrome if no other identifiable source is found. A urinalysis was considered negative if neither nitrites nor leucocytes were detected.

In non-catheterised patients, a definite UTI was defined as the presence of symptoms and a urine culture yielding $\geq 10^5$ colony-forming units (cfu) per millilitre (mL) of urine of a uro-pathogen. There is agreement that in symptomatic patients a colony count of $\geq 10^5$ cfu/ml is diagnostic of a definite UTI.

Symptomatic patients with lower counts of (ie, $\geq 10^2$ cfu/mL) were also included (as probable UTI). Such low counts in the diagnosis of UTI have only been validated in pre-menopausal woman.⁷ For transparency, we have elected to report both definite and probable cases as UTI cases. Cultures of the same uro-pathogenic organism in both urine (regardless of count) and blood isolates were considered diagnostic of UTI in symptomatic patients.

In a patient with a urinary catheter, a catheter-associated UTI was defined as the presence of symptoms, and a culture of a uro-pathogen from urine ($\geq 10^3$ cfu/ml) with $>1,000$ white blood cells/mL. Asymptomatic bacteriuria was defined as a pure growth of $\geq 10^5$ cfu/mL of a uro-pathogen in a patient without symptoms.

Data collection

The acute admitting team was asked to complete a study-specific pro forma on patients admitted to the acute general medical service. The pro forma included fields for demographic information, presenting symptoms including chief complaint, specific symptoms related to urinary tract and vital signs. If this was incomplete, the team was asked to interview the patient a second time. Further clinical details were sought from written notes in the patient's file. The number of cases included on any day was limited by the capacity and busyness of the admitting team over the 24-hour on-call period. Only patients for whom a pro forma was completed were analysed. All urine samples submitted to the diagnostic laboratory were cultured, and results were obtained electronically from Canterbury Health Laboratories[®] online interface.

Clinical management

Urine dipstick for purposes other than diagnosing UTI (eg, ketonuria) were excluded. Interpretation of urine dipsticks and/or decision to obtain urine culture and microscopy and initiation of antimicrobial therapy was done by the physician responsible for clinical care.

Statistical analysis

Descriptive statistics were used to analyse the majority of the data while independent samples Student t-test was utilised for the remainder. Statistical significance was

Table 1: The presence any symptom consistent with a urinary tract infection (dysuria, altered frequency of micturition, flank, back or lower abdominal pain), in 395 patients admitted to an acute general medical service after evaluation by medical team.

Triaging diagnosis	Examples	No UTI symptoms	UTI symptoms	Urinary catheter in-situ
Possible UTI	Dysuria, frequency, urinary incontinence	0	18 (21.7%)	6 (37.5%)
Fall	Collapse, syncope	49 (17%)	12 (14%)	2 (13%)
Respiratory	Dyspnoea, cough	54 (18%)	10 (12%)	2 (13%)
Non-specific	Febrile, delirium, sepsis	19 (6%)	12 (14%)	6 (38%)
Acute neurology	Limb weakness, seizure	63 (21%)	4 (5%)	4 (25%)
Gastrointestinal	Vomiting, diarrhoea	21 (7%)	10 (12%)	0%
Cardiac	Chest pain, palpitations	30 (10%)	9 (11%)	0%
Abdominopelvic	Abdominal pain, back/loin pain	9 (3%)	15 (18%)	0%
Integumentary	Cellulitis, rash	14 (5%)	1 (1%)	0%
Other	Overdose, electrolyte derangements	32 (11%)	9 (11%)	2* (6%)
Musculoskeletal	Arthralgia, arthritis	5 (2%)	1 (1%)	0%
Total		296	83	16

*Includes blocked catheter; UTI = urinary tract infection.

determined if type I error rate was <5%. All analyses were performed using SPSS Statistics® software package (version 22.0.0.0). The sensitivity and specificity of the dipstick for symptomatic patients were calculated using all cases with a count of $\geq 10^2$ cfu/mL.

Results

Study population

A total of 4,542 patients were admitted to the General Medicine service during the study period. Of those, 395 (8.7%) patients had a pro forma filled out by the admitting team, and were therefore included in the study. The median age of those included was 76 (range 15–100 years), with a female-to-male ratio of 1.2:1. Forty patients (10%) lived in residential care facilities. The patient demographics of the sample were similar to other patients admitted over the study period (median age 76 vs 74 years and female-to-male ratio of 1.2:1 and 1.2:1, respectively).

Reasons for admission

The triaging diagnoses on admission to the acute medical assessment unit are shown in Table 1. Of these, 24 patients were referred

for possible UTI. There was a similar distribution of most clinical problems recorded on triaging for admission to our service among those with symptoms of an UTI compared with those who did not have any of these features (Table 1). Sixteen patients (4%) had urinary catheters in-situ (nine indwelling urethral catheters and seven suprapubic catheters). Compared with other patients in our sample, patients diagnosed by the clinical teams with UTI on admission were significantly more likely to complain of dysuria (25.5% vs 3.5%, respectively, $p < 0.001$), altered urinary frequency (33.3% vs 8.6%, respectively, $p < 0.001$) and abdominopelvic/back pain (39.2% vs 8.4%, respectively, $p = 0.001$), but not new nocturia (9.1% vs 3.6%, respectively, $p = 0.23$).

Patterns of urinalysis and urine culture requests

The numbers of symptomatic and asymptomatic patients in whom a dipstick and midstream urine (MSU) results were recorded are shown in Table 2. The numbers of patients with a urinary catheter was too small to be analysed separately.

A dipstick result was recorded in 304 (76%) of the 395 patients in this study; it is

Table 2: The proportion of symptomatic and asymptomatic patients admitted to the acute medical assessment unit who had a urine dipstick performed, and had a mid-stream or catheter urine sample sent to the laboratory for culture and sensitivity testing.

	Symptomatic				Asymptomatic			Total
	No catheter		Catheter	Sub total	No catheter	Catheter	Sub total	
	Localising symptoms	Systemic features	Localising symptoms or systemic features					
Number	83 (21%)	45 (11%)	11 (3%)	139 (35%)	251 (64%)	5 (1%)	256 (65%)	395
Dipstick done	66 (80%)	32 (71%)	8 (73%)	106 (76%)	195 (78%)	3 (60%)	198 (77%)	304 (76%)
Dipstick positive								
MSU cultured	17 (26%)	5 (16%)	6 (75%)	28 (26%)	27 (14%)	1 (33%)	28 (14%)	56 (18%)
Culture result	17 (100%)	4 (80%)	6 (100%)	27 (96%)	21 (78%)	1 (100%)	22 (79%)	49 (88%)
≥10 ⁵ cfu/ml	11 (65%)	2 (50%)	5 (83%)	18 (67%)	8 (38%)	0 (0%)	8 (29%)	26 (53%)
10 ² –10 ⁵ cfu/ml	2 (12%)	1 (25%)	1 (17%)	4 (15%)	1 (5%)	1 (100%)	2 (9%)	6 (12%)
Total ≥10²cfu/ml	13 (76%)	3 (75%)	6 (100%)	22 (81%)	9 (43%)	1 (100%)	10 (45%)	24 (49%)
Dipstick negative								
MSU cultured	49 (74%)	27 (90%)	2 (25%)	78 (56%)	168 (86%)	2 (66%)	170 (86%)	248 (82%)
Culture result	24 (49%)	20 (74%)	1 (50%)	45 (58%)	51 (30%)	0%	51 (30%)	96 (39%)
≥10 ⁵ cfu/ml	7 (29%)	1 (4%)	0 (0%)	8 (18%)	5 (10%)	0%	5 (10%)	13 (14%)
10 ² –10 ⁵ cfu/ml	2 (8%)	0	0 (0%)	2 (4%)	0 (0%)	0 (0%)	0 (0%)	2 (2%)
Total ≥10²cfu/ml	9 (38%)	1 (4%)	0 (0%)	10 (22%)	5 (10%)	0 (0%)	5 (10%)	15 (16%)
Dipstick not done or not recorded								
MSU cultured	17 (20%)	13 (29%)	3 (27%)	33 (24%)	56 (22%)	2 (40%)	58 (23%)	91 (23%)
Culture result	13 (76%)	6 (46%)	2 (66%)	21 (67%)	9 (18%)	0%	9 (18%)	30 (33%)
≥10 ⁵ cfu/ml	0 (0%)	1 (17%)	0 (0%)	1 (5%)	2 (22%)	0%	2 (22%)	3 (10%)
10 ² –10 ⁵ cfu/ml	2 (15%)	0	1* (50%)	2 (10%)	0 (0%)	0%	0 (0%)	2 (7%)
Total ≥10²cfu/ml	2 (15%)	1 (17%)	0 (0%)	3 (14%)	2 (22%)	0%	2 (22%)	5 (17%)

unclear if the other 24% had a dipstick or not as no result was recorded in the notes. There was no difference in the proportion tested by dipstick between symptomatic (76%) and those who were defined as asymptomatic (77%).

Urine samples from 175 (44%) of the 395 patients were cultured. Of these, there was a higher proportion (93/139, 67%) from patients who were symptomatic than those who were asymptomatic (83/261, 32%; $p < 0.001$). Of the 304 patients with a dipstick result recorded, a mid-stream urine specimen was cultured in 145 (48%), compared with 30/91 (33%) when no dipstick result was recorded ($p = 0.003$).

Urine cultures were performed in more samples from symptomatic patients with a positive dipstick (27/28, 96%) compared with symptomatic patients with a negative dipstick (45/78, 58%; $p < 0.001$). Samples from asymptomatic patients with a positive dipstick were cultured on more occasions (19/24, 79%) than samples from asymptomatic patients with a negative urine dipstick 51/172, 30%; $p < 0.0001$).

Among the subset of symptomatic subjects who had dipstick performed and urine samples sent for culture, the sensitivity and specificity of dipsticks in symptomatic patients were 69% and 85%, respectively.

Bacteria identified in urine

The bacteria identified in 35 patients diagnosed with a symptomatic UTI ($\geq 10^2$ cfu/mL) were *Escherichia coli* (n=24), *Pseudomonas aeruginosa* (n=3), *Enterobacter* species (n=3), *Klebsiella* species (n=3) and *Proteus/Providentia* species (n=2). The organisms identified in 15 patients with asymptomatic bacteriuria ($\geq 10^5$ cfu/ml) were *E. coli* (n=10), *Proteus mirabilis* (n=1), *Ps. aeruginosa* (n=1), *Raoultella ornitholytica* (n=1), *Streptococcus agalactiae* (n=1), and *Candida albicans* (n=1).

Empiric antibiotic administration in symptomatic patients

Empiric antibiotics were administered before the urine specimen was taken in 66 (36%) of the 175 samples. Among patients with UTI symptoms or systemic manifestations of infection, 28 had a positive dipstick of whom 13 (46%) received antibiotics before the urine specimen was taken; this is compared with 14 of the 78 (18%) patients with a negative dipstick ($p=0.01$). One of the 15 patients who had asymptomatic bacteriuria ($\geq 10^5$ cfu/ml) received antibiotic therapy prior to the specimen being taken.

Antibiotic administration in asymptomatic patients

Nine of the 15 patients (60%) received antimicrobial therapy after admission that would have treated the organisms isolated, but it is uncertain whether the culture results influenced the decision to initiate treatment or whether these patients received antibiotics for a different indication (eg, concomitant pneumonia and asymptomatic bacteriuria).

Fever as a non-localising symptom of UTI

As the temperature associated with systemic manifestations is debatable, the analysis was repeated using the same parameters of confusion and fever, but a measured temperature of $>37.4^\circ\text{C}$ rather than 38°C . With the criterion, only one patient initially classified as asymptomatic bacteriuria would have been re-classified as a symptomatic UTI.

Discussion

The patients presenting to an acute general medical service had a very wide range of presenting features recorded at triaging, and features of UTI were often not

initially noted. A urinalysis was performed in about three quarters of patients whether or not they had symptoms of an UTI, or had systemic infections without an identifiable focus as expected from the protocol. The result of the dipstick analysis had a significant effect on the decision to send a urine sample for culture, as 96% of symptomatic patients with a positive dipstick had a urine sample sent compared with 39% of patients in whom it was negative.

In practice, the result of the dipstick was not decisive as a large number of urine samples were sent for culture from patients with symptoms of an UTI irrespective of the dipstick's result (or even its complete lack). As in studies in other settings,⁸ we found that a negative dipstick urine test does not exclude an UTI in the presence of relevant symptoms, as the sensitivity and specificity are not adequate to exclude an infection. Together, these results suggest that the clinical presentation alone rather than the dipstick should be the basis of the decision to send a sample for culture.

The classification of patients with systemic features of infection, but no localising signs, is imprecise. We have used the definition of fevers, confusion, lethargy or a temperature of $\geq 38.0^\circ\text{C}$ used in Up-To-Date.⁷ Some physicians may regard the temperature of 38°C as too high since older patients may not mount a febrile response. However, lowering the 'fever threshold' to being $>37.4^\circ\text{C}$ only led to the re-classification of one case from asymptomatic bacteriuria to UTI. This suggests that $\geq 38.0^\circ\text{C}$ is a reasonable criterion to accept.

It is apparent that many samples from asymptomatic patients were cultured. This is unnecessary as asymptomatic bacteriuria—a microbiological diagnosis—often requires no treatment.^{3,4} The indications for antimicrobial treatment of asymptomatic bacteriuria are limited to pregnancy or where an invasive urological procedure is planned that will likely result in mucosal bleeding. Antimicrobial treatment has not been shown to be beneficial in other patients, including those with diabetes mellitus, and has been shown to cause harm.^{9,10} It is likely that a number of our patients, albeit a small proportion, were treated with antibiotics on the basis of a positive urine culture alone. This has also been the case in other studies where having a positive dipstick increased the probability of patients receiving low-value care including

unnecessary antibiotics.² At a time where diagnostic and anti-microbial stewardships are priority, avoiding superfluous tests, and limiting unnecessary exposure to antibiotics ought to be reinforced.

In this study, urine samples from 82 (32%) of asymptomatic patients were processed that may be regarded as unnecessary and without the risk of missing the diagnosis in patients in need of treatment. This would result in a significant reduction in cost and burden to the laboratory. Utilising local laboratory test guide references, an estimated \$20,000 could have been saved in laboratory costs if a careful diagnostic testing approach (ie, diagnostic stewardship) was employed for all patients admitted to the General Medicine service over a year.

It is likely that the number of cases of UTI found in the study was underestimated as urine samples were sent in about one third of patients after they had been treated with empiric anti-microbial therapy. While this is not ideal, getting timely urine specimens in many elderly and confused patients is often very difficult in the acute setting.

There are inherent limitations to this type of study. The inclusion of all general medicine patients admitted during the study period was not feasible as the admitting teams would have been, at times, too busy to fill in the pro forma. Therefore, selection bias (time of admission, day of week and nursing shift) cannot be excluded.

Despite these limitations, this is a study performed in real clinical practice with the added strengths that urinary symptoms were collected by a pro forma rather than just accepting the data recorded in the clinical record, and is one of the largest reported in the literature on the subject. This study highlights a high frequency of unnecessary testing (both urinalysis and urine microscopy and culture) for UTI in patients presenting without specific UTI symptoms. Future research ought to focus on different patient populations (eg, UTI in the community and hospital-acquired UTI) in order to examine appropriateness of urinalysis practices in the various clinical settings.

Conclusion

The best outcomes for patients would be achieved if urine samples were sent for culture only from patients who were symptomatic or had systemic features of infection without localising manifestations. Superfluous processing of urine samples not only adds to the laboratory workload, resulting in unnecessary costs, but also leads to inappropriate treatment. Our next step is to address testing practice through education, and to encourage the consideration of better clinical information through the use of a new request form in an attempt to limit unnecessary urinary dipstick analysis in patients without symptoms.

Competing interests:

Nil.

Acknowledgements:

Khurram Shahid and Yassar Alamri contributed equally to this paper. Thanks are extended to the nursing and medical staff members who helped with data collection by filling the pro forma.

Author information:

Khurram Shahid, Canterbury District Health Board, Christchurch;
Yassar Alamri, New Zealand Brain Research Institute; Canterbury District Health Board, Christchurch; Hannah Scowcroft, Canterbury District Health Board, Christchurch;
Liane Dixon, Canterbury District Health Board, Christchurch;
Julie Creighton, Canterbury Health Laboratories, Christchurch;
Heather Isenman, Canterbury District Health Board, Christchurch;
Sarah Metcalf, Christchurch Hospital, Infectious Diseases, Christchurch;
Steve Chambers, University of Otago Christchurch Department of Pathology, Christchurch.

Corresponding author:

Dr Yassar Alamri, Department of Medicine, Canterbury District Health Board, 66 Stewart St, Christchurch 8011.

yassar.alamri@nzbri.org

URL:

<http://www.nzma.org.nz/journal/read-the-journal/all-issues/2010-2019/2019/vol-132-no-1488-18-january-2019/7782>

REFERENCES:

1. Yin P, Kiss A, Leis JA. Urinalysis orders among patients admitted to the General Medicine service. *JAMA Intern Med.* 2015; 175(10):1711–3.
2. Pallin DJ, Ronan C, Montazeri K, Wai K, Gold A, Parmar S, Schuur JD. Urinalysis in acute care of adults: pitfalls in testing and interpreting results. *Open Forum Infect Dis.* 2014; 1(1):ofu019.
3. Cope M, Cevallos ME, Cadle RM, Darouiche RO, Musher DM, Trautner BW. Inappropriate treatment of catheter-associated asymptomatic bacteriuria in a tertiary care hospital. *Clin Infect Dis.* 2009; 48(9):1182–8.
4. Lee MJ, Kim M, Kim NH, Kim CJ, Song KH, Choe PG, Park WB, Bang JH, Kim ES, Park SW, et al. Why is asymptomatic bacteriuria overtreated?: A tertiary care institutional survey of resident physicians. *BMC Infect Dis.* 2015; 15:289.
5. Cai T, Nesi G, Mazzoli S, Meacci F, Lanzafame P, Caciagli P, Mereu L, Tateo S, Malossini G, Selli C, et al. Asymptomatic bacteriuria treatment is associated with a higher prevalence of antibiotic resistant strains in women with urinary tract infections. *Clin Infect Dis.* 2015; 61(11):1655–61.
6. World Health Organization. Diagnostic stewardship: A guide to implementation in antimicrobial resistance surveillance sites. 2017 25/08/2018. Available from: <http://apps.who.int/iris/bitstream/handle/10665/251553/WHO-DGO-AMR-2016.3-eng.pdf;jsessionid=B2326FE-F06A1ADF490FE5FE840044C07?sequence=1>
7. Acute simple cystitis in women. Up-To-Date®. 2017. Available from: http://www.uptodate.com/contents/acute-simple-cystitis-in-women?search=simple%20cystitis&source=search_result&selectedTitle=1~150&usage_type=default&display_rank=1
8. Zhanel GG, Nicolle LE, Harding GK. Prevalence of asymptomatic bacteriuria and associated host factors in women with diabetes mellitus. The Manitoba Diabetic Urinary Infection Study Group. *Clin Infect Dis.* 1995; 21(2):316–22.
9. Nicolle LE, Zhanel GG, Harding GK. Microbiological outcomes in women with diabetes and untreated asymptomatic bacteriuria. *World J Urol.* 2006; 24(1):61–5.

Quality of electronic records documenting adverse drug reactions within a hospital setting: identification of discrepancies and information completeness

Rhiannon Braund, Courtney K Lawrence, Lindsay Baum, Brittany Kessler, Madison Vassart, Carolyn Coulter

ABSTRACT

AIM: Incomplete and incorrect documentation of adverse drug reactions (ADRs) can restrict prescribing choices resulting in suboptimal pharmaceutical care. This study aimed to examine the quality of information held within electronic systems in a hospital setting, to determine the preciseness of ADR documentation, and identify discrepancies where multiple electronic systems are utilised.

METHOD: Over a four-week period, consecutive patients admitted to the general medical ward at the study hospital had their electronic profiles reviewed. Patient demographic information (de-identified), ADR history and discrepancies between information sources (as recorded in all electronic systems utilised at initial prescribing) were recorded and analysed.

RESULTS: Over the four-week period, 332 patient profiles were reviewed, and over 1,200 alerts were identified and analysed (including duplicates of ADR reactions). Of these patients, 151 (45.5%) had at least one documented allergy or intolerance which generated 585 reactions, relating to 526 unique events. A further 151 (45.5%) were classified as having *no known* (drug) allergies or intolerances; however, 20 (15%) of these patients did have at least one allergy documented in at least one other electronic system. The remaining 30 (9%) patients were classified as having an *unknown* allergy status and of those nine had allergies documented in at least one other electronic system. Further, most systems contained information duplication, which had not been addressed during the admission process.

CONCLUSION: ADR information was both imprecise and inaccurate, as multiple discrepancies between ADR information recorded in different electronic patient management systems were found to exist. Information sharing between systems needs to be prioritised in order to allow full, accurate and complete ADR information to be collected, stored and utilised; both to reduce current inadequacies and to allow optimal pharmaceutical care.

Incomplete documentation of known adverse drug reactions (ADRs), which includes both allergies and intolerances to medications, can potentially lead to inappropriate prescribing, compromised patient outcomes and patient harm.¹⁻³ The World Health Organization (WHO) defines ADRs as “a response to a medicine which is noxious and unintended, and which occurs at doses normally used in man” and can range from intolerances such as mild gastrointestinal

upset, headache, nausea or diarrhoea to medical emergencies involving true hypersensitivity such as anaphylaxis involving rash, angioedema and respiratory distress.⁴⁻⁵ In general, ADRs are not well understood by patients, which can lead to both over- and under-reporting of reactions. This may lead to misdiagnosis and inaccurate or incomplete classification and documentation by healthcare professionals.

As ADRs related to medicines could be intolerances or allergies, re-exposure becomes problematic. True allergic reactions can be life threatening and therefore re-exposure should be avoided if at all possible, whereas intolerances do not necessarily preclude the use of the suspect medication or medications with possible cross-sensitivity.²

This means inadequate documentation of ADRs can lead to suboptimal patient care. For example, if allergies are listed as intolerances and prescribers challenge with the offending agent, this may lead to severe allergic reactions and a risk of death that could have been avoided with proper documentation.⁷ Conversely, intolerances listed as allergies often limit the therapeutic options available to prescribers; prescribers then resort to prescribing second- or third-line medications, which may be less effective or carry higher risk of further adverse reactions.¹

The increasing use of technology and integration of electronic health records (EHR) allows information to be held “permanently” and to be more easily accessed at the time of therapy initiation, such as on admission to hospital. Within New Zealand, integration of electronic patient management systems and national reporting of ADRs against patient unique National Health Index (NHI) numbers⁸ means there is the potential for enhanced sharing of information that is more timely and complete, making prescribers more appropriately informed.

However, these systems are only as accurate as the information that is currently entered (or historically held).⁹ Additionally, with the convergence of multiple information systems that may not be fully integrated, this can contribute to data loss or duplication when the systems cannot accurately communicate.¹¹ This contributes to cluttered patient profiles, which may obscure important information. Further, the electronic inputting of allergy and intolerance information can become complex due to system deficiencies. For instance, some systems are limited in that they cannot record the difference between an allergy or an intolerance, or they can record a class allergy but not a class intolerance, and this results in information being entered in a

suboptimal manner with the possible loss of information or in cumbersome entering needing to be duplicated. This leads to further issues when the doctor needs to make a prescribing decision. Ideally, electronic prescribing systems should have the capacity to allow accurate and precise, or correct and complete, data entry of medication allergies and intolerances and should allow conservation of high-quality information.¹² There should also be safeguards against duplication of information, conservation of inferior information and removal of information.

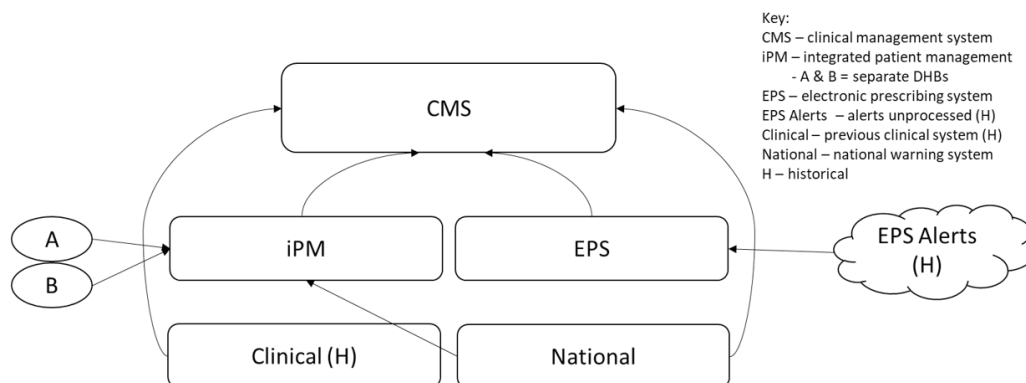
In a previous study comparing paper-based and electronic storage of ADR information, it was found that there can be suboptimal, incomplete and conflicting ADR reporting documented in patient management systems (both paper and electronic) used in this hospital in New Zealand.¹³ The aim of this study was to assess the quality of ADR information by identifying the nature of discrepancies, duplications and incomplete information within the current *electronic* prescribing tool. Once the scale and complexity of poor information storage and transfer for ADR records are quantified, it will be possible to determine how this information can be better utilised and to appropriately prioritise information storage for ADR information. This will then allow prescribers to efficiently and confidently access information on ADRs that is both accurate and precise, so as to inform prescribing practice for optimal pharmaceutical selection to allow best possible patient outcomes.

Method

Study context

This study was undertaken at a tertiary hospital in New Zealand with approximately 400 patient beds. Various electronic systems, including an electronic prescribing system (EPS), are utilised within the hospital to manage patient data, including documentation of ADRs. Additionally, an integrated clinical management system (CMS) which merges information from multiple databases to maintain a comprehensive patient summary is used and this overarches the other electronic systems (see Figure 1).

Figure 1:



There are three key databases relevant for holding ADR information that were focused on in this study. Firstly, the integrated patient management system (iPM) which holds information such as a patient's address, contact details and some background clinical information. Secondly, there is the overarching clinical management system (CMS), which holds the clinical information relevant for the current admission, and thirdly, the EPS. However, as the electronic system has changed over time, there are also the previous versions of the patient management systems (iPMA and iPMB) that feed into the CMS. This is also complicated by the fact the current district health board (DHB) is a merger of two previous DHBs, each of which had its own patient management system. All of these historical electronic systems hold ADR information. Finally, in New Zealand external information is pulled into a patient's DHB profile from the National (Medication) Warning System, which 'houses' individual alerts and national warnings linked to an individual via use of the National Health Index (NHI) number. All of this information feeds into both the CMS and the iPM.

When accessing and prescribing in the EPS, the initial task is to review all information that has been imported into the electronic medication chart. This consists of viewing all (previously) processed and unprocessed ADR listings, including historical EPS alerts held and generated from the previous versions and updates of the EPS. This requires a clinician to review the ADR records to allow them to move into the current EPS. In all there are six separate repositories that hold ADR information and can be accessed at admission in the prescribing process. This does not include any community-held ADR information, eg, from the patient's community doctor.

Given these different information sources, not all information is current, validated or appropriately detailed, so ADR information can be incomplete and/or inaccurate. Further, there is significant duplication in reports and variation in quality, that is some only list the agent implicated, while others also give the clinical reaction experienced, but few list the date when the ADR occurred, while it is very rare to find information of re-challenge and/or cross sensitivity. Until very recently, this information was currently only available to prescribers and not associated healthcare team members such as pharmacists and nurses. In summary the data transferred between systems is currently non-synchronous which, in many cases results in an inadequate and incomplete summary of patient-specific ADRs.

Data collection

This study was intended as a quality improvement audit which did not require HDEC ethical approval as all patients were 18 years or over and patient data was de-identified at initiation of the audit. Local approval was completed, as was Māori consultation. All electronically recorded patient-specific ADR information available to prescribers at initiation of prescribing (from all six sources) were accessed over a four-week period between 8 January and 7 February, 2018. Patients admitted to the general medicine service at the study hospital during this time were included in the analysis. Patient demographics including age, gender and number of documented ADRs were collected. Where available, the causative agent, drug or drug class, reaction and classification (ie, allergy or intolerance) were recorded. Patient profiles were viewed in the CMS and the EPS to determine if there were known ADRs, no known ADRs or an unknown allergy status (ie, the allergy status has not been determined), as well as

the status selected by the initial prescribers on the EPS. These are the two systems that prescribers would access when initiating therapy. All six repositories were then accessed to determine if there was other ADR information held. The veracity of the ADR information was not independently investigated and verified with patients during this study.

Data analysis

Data collected was compared between the different electronic patient management systems to determine the content and extent of information held across the systems, to examine the level of detail present and to identify discrepancies and where they occur. Discrepancies were identified when systems contained information that did not match. For example, medication class or reaction manifestation was incomplete or intolerances and allergy appeared to be misclassified. Evaluation of ADR classification, that is allergy versus intolerance with regards to the causative agent and reaction documented, was then conducted where appropriate (reaction types were defined as per Inglis 2017),⁶ that is a rash was deemed to be an allergy whereas diarrhoea was deemed to be an intolerance.^{5,6} Table 2 outlines the respective reactions and whether they are more likely to be classed as an allergy or intolerance.⁶

All data analysis was completed in Microsoft Excel. The number of medication classes implicated in ADRs from patients in this study was quantified as was the frequency of agents and common reactions implicated in documented ADRs.

The number of entries in each electronic patient management system was also quantified. The amount of non-ADR clinical information that was listed in the databases was also documented. This highlights the problem that non-ADR information is stored as ADR information because there is no other way to flag highly important clinical and non-clinical information. Other discrepancies concerning duplications and duplications where some information was incomplete were also documented.

Results

Over the four-week period, data from 332 patients admitted to general medicine wards were included in our study. Of the 332 patients included, 57% were female (n=190) and 43% male (n=142). The age distribution is shown in Figure 2 and includes all patients and those patients with at least one documented ADR (whether allergy or intolerance), which had been processed in the EPS. A total of 1,260 adverse reaction events were listed (including duplicates) from all of the study databases.

Figure 2: Age distribution of patients from the general medicine wards.

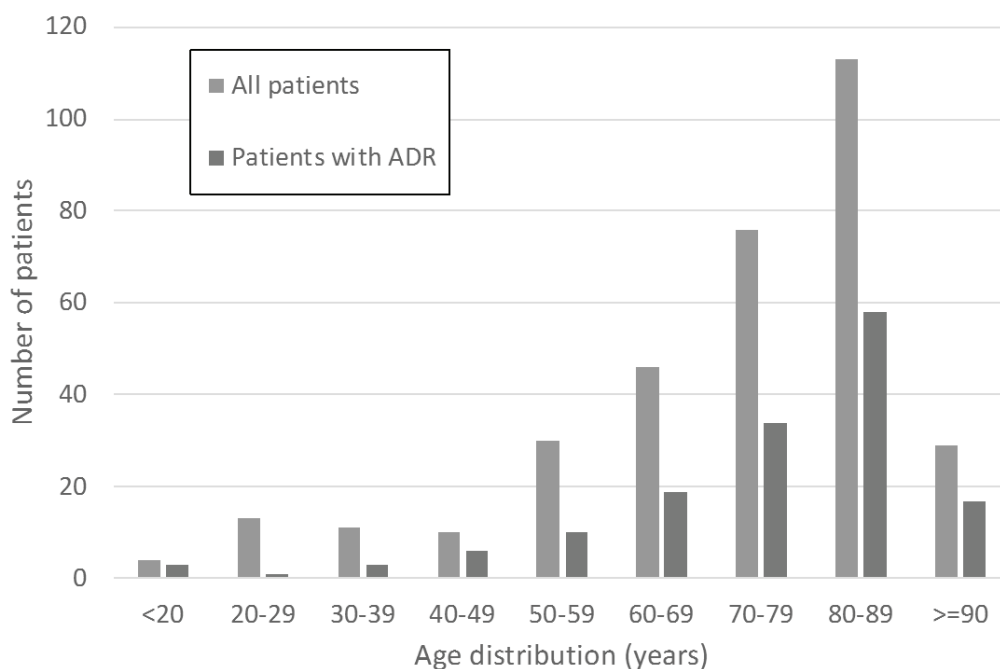


Table 1: Agents implicated in ADRs documented from any electronic patient management system.

Causative agent	Number of patients with ADR	Entries ^a documented as 'allergy'	Entries ^a documented as 'intolerances'	Other entries ^b
Penicillins ^c	65	33	17	24
Cephalosporins ^d	11	7	3	4
Sulfur-containing antibiotics ^e	39	18	8	13
Other antibiotics ^f	29	8	11	10
Opioids	76	25	51	18
NSAIDs [*]	58	33	20	10
ACE* inhibitors	30	20	11	2
CCBs [*]	16	8	11	1
Diuretics	12	7	4	1
Statins	10	6	5	1
Sulfur	11	2	1	8
Iodine/contrast media	4	2	1	3
Non-drug ^g	34	16	1	16
Other medicines ^h	132	51	60	34

^aNote: all entries include duplications.

^{*}NSAIDs—Non-steroidal anti-inflammatory drugs; ACE—Angiotensin converting enzyme; CCB—Calcium channel blockers

^bInclude entries with no recorded reaction (ie, unclassified/unable to classify as either an allergy or intolerance) or entries that were ADRs recorded as non-drug.

^cIncludes; penicillin antibiotics, penicillin, amoxicillin, amoxicillin, Amoxil, Aaugmentin, flucloxacillin.

^dIncludes; cephalosporin, cefaclor, cefuroxime, cefazolin, Ceclor.

^eIncludes; sulfamethoxazole, cotrimoxazole, sulfonamide, sulpha, Bactrim, Triprim.

^fIncludes; erythromycin, ciprofloxacin, nitrofurantoin, norfloxacin, clavulanic acid, roxithromycin, tetracyclines, aminoglycoside antibiotics, Chlorsig, neomycin, griseofulvin, Bactroban, vibromycin, clindamycin, doxycycline, metronidazole, trimethoprim.

^gIncludes; foods, sticking plasters.

^hIncludes all other medications/allergens not listed above.

Within the EPS, 45.5% of patients (n=151) were classified as having at least one allergy or intolerance. Another 45.5% of patients (n=151) were listed as having no known allergies or intolerances, however 20 (15%) of these had information regarding adverse drug events found in other databases. Nine percent of patients (n=30) were classified with an unknown allergy status, a status which indicates that the patients allergy status has not (yet) been assessed by the admitting doctor(s). Of this group, nine patients had documented reactions held in another database. Causative agents implicated in documented ADRs were tabulated to determine the number of patients with each ADR and the frequencies of allergies or intolerances associated with each agent (Table 1).

Clearly shown in Table 1, antibiotics account for the majority of documented ADRs. Combining penicillins, cephalosporins, sulfur-containing antibiotics and

other antibiotics, this accounts for 27% of all ADRs (143 of 526). The penicillins accounted for a large portion (12%) of antibiotic-related ADRs (n=65). Opioids 14% (n=76) and NSAIDs 11% (n=58) were agents that also accounted for a large portion of documented ADRs found in this study.

Similarly, the types of common reactions (at least five entries per reaction) implicated in ADRs are shown in Table 2. No reaction information was included in 19% of the documented ADRs.

Table 3 shows classification discrepancies noted for the 585 documented ADRs from any of the six electronic patient management systems accessed in this study.

As mentioned previously, discrepancies were identified when either systems contained information that did not match, or the information listed in any one system was incomplete (eg, lacking reaction information) or contained inaccurate classifications of intolerances/allergies. Although

Table 2: Types of reactions implicated in documented ADRs from any electronic patient management system.

	Total number of entries	Percentage of all reactions
Symptoms reported typical of allergic reactions		
Rash and/or urticaria	83	12%
Swelling or angioedema	31	5%
Respiratory distress ^a	12	2%
Anaphylaxis	11	2%
Symptoms reported typical of intolerances		
Nausea and/or vomiting	81	12%
GI ^b upset	43	6%
Diarrhoe ^a	21	3%
Muscle effects ^c	20	3%
Cough	20	3%
Sedation ^d	13	2%
Hallucinations	11	2%
'Unwell'	11	2%
Confusion	10	2%
Renal dysfunction ^e	9	1%
Hyponatremia	9	1%
GI ^b bleed	9	1%
Abdominal pain	6	1%
Headache	6	1%
Sleep disturbances ^f	5	1%
Other ^g	139	20%
No reaction listed	130	19%
Total	682	101% ^h

^aIncludes; wheeze, tight throat, and dyspnea.

^bGI = gastrointestinal.

^cIncludes; a rise in CK, myalgia, myositis, muscle weakness/soreness, myositis and muscle cramps.

^dIncludes; drowsiness, grogginess, tired, sleepy and fatigue.

^eIncludes; poor kidney function, urinary retention, decline in renal function.

^fIncludes; nightmares, poor sleep, and bad dreams.

^gIncludes all other symptoms that had less than five entries.

^hGreater than 100% due to rounding of percentages.

there were 526 unique allergies documented for the population of 332, before removal of the duplicates there were 585 documented reactions. Out of 585 reaction entries, 12 allergy entries (2%) were incorrectly documented as intolerances, 124 intolerance entries (21%) were incorrectly documented as allergies, nine drug allergy/intolerance entries (2%) were classified as non-drug entries and 135 entries (23%)

had no reaction listed (and so could not be assessed). Conversely, 112 entries (19%) were correctly classified as allergies, and 192 as intolerances (33%).

Of note, across 47 patients there were 59 non-ADR information notes recorded in the patients ADR information, these ranged from clinical information not related to medicines to who to phone following a procedure.

Table 3: Classification discrepancies for 585 documented ADR entries from any electronic patient management system.

	Accurately documented allergies	Accurately documented intolerances	Allergies documented as intolerances	Intolerances documented as allergies	Allergies/intolerances classified as non-drug reactions	Unclassified reactions
Total	112	192	12	124	9	136
Penicillins ^a	24	16	1	9	0	24
Cephalosporins ^b	7	2	1	0	0	4
Sulfur-containing antibiotics ^c	14	6	2	4	2	11
Sulfur/sulphur	1	0	1	1	1	7
Other antibiotics ^d	4	10	1	4	0	10
Opioids ^e	3	51	0	22	0	18
NSAIDs ^f	11	18	2	22	0	10
Other ^g	48	89	4	62	6	52

^aIncludes; penicillin antibiotics, penicillin, amoxicillin, amoxicillin, Amoxil, Augmentin, flucloxacillin.

^bIncludes; cephalosporin, cefaclor, cefuroxime, cefazolin, cCclor.

^cIncludes; sulfamethoxazole, cotrimoxazole, sulfonamide, sulpham, Bactrim, Triprim.

^dIncludes; erythromycin, ciprofloxacin, nitrofurantoin, norfloxacin, clavulanic acid, roxithromycin, tetracyclines, aminoglycoside antibiotics, Chlorsig, neomycin, griseofulvin, Bactroban, vibromycin, clindamycin, doxycycline, metronidazole, trimethoprim.

^eIncludes; morphine, codeine/dihydrocodeine, tramadol, oxycodone, methadone, Oxycontin, DHC continus, dextropropoxyphene.

^fIncludes; NSAIDs (non-steroidal anti-inflammatory drugs), diclofenac, aspirin, ibuprofen, naproxen, Voltaren, Celebrex, Naprosyn, tenoxicam, celecoxib.

^gIncludes all other medications/allergens not listed above.

Discussion

Overview

Within this study over 1,200 medication “alerts” were identified for 332 patients. This information related to 585 recorded reactions from 526 unique events, as over 600 were exact duplicates. It was noted that more than half of those individuals in this study had at least one documented ADR.

Rates of patients with at least one “allergy” within inpatient hospital populations have previously been reported as high as 39%,³ however these are not always true allergies but rather encompassed intolerances as well.³ This study found that within the sample investigated, 46% of patients had a documented allergy in their profile, however subsequent evaluation of the information found that those with a true hypersensitivity (“allergy”) was actually only 20%.

Of the individual ADRs, 23% had no information on the type of reaction, ie, there was no clinical description of the adverse reaction experienced by the patient previously and therefore no way to determine the clinical significance of the event, which could guide future prescribing.

Where reaction information was documented, 21% of these were suggestive of an intolerance rather than an allergy as documented. This incorrect documentation is important from a clinical perspective, as an intolerance such as mild gastrointestinal distress does not usually preclude future use, in comparison to a true allergic event such as anaphylaxis.

Differences between allergies and intolerances are important, as the exclusion of potential therapeutic options based on information that is inaccurate can lead to second- and third-line therapeutic choices, which may be less effective, have a larger financial cost, and lack of medication familiarity can increase the risk of medication errors.¹⁻² Additionally, with antibiotics, poor treatment choices may also impact on future patterns of resistance.

Interestingly, there were 59 non-ADR, non-clinical events listed in the ADR warning system, highlighting a deficit in current systems, as there is no other warning system distinct from ADRs. Worryingly, this incorrect inputting of information, both clinical and non-clinical, may be potentially problematic in the future. The need for

a non-ADR alert system within the hospital EMR program has been identified. This is so that valuable and important clinical information can still be communicated to all healthcare team members without cluttering the ADR documentation system.

This current study found that 9% of patients were “allergy status unknown”. That is, the allergy status of the patient has not (yet) been assessed, and this may be for a variety of reasons ranging from not being able to speak (eg, if unconscious), not being able to comprehend (eg, if dementia is present), to not remembering this information (eg, if the reaction was in childhood). While some patients may not be able to provide any information on admission, it was concerning that within this group there was information for nine of the 30 that they had a documented ADR. This important, as the implementation of electronic medical records has largely been promoted as being more accurate and more complete. The rate of unstated allergy documentation may be high in our study of electronic records due to data overload (eg, duplicates of ADRs) and cluttering (eg, non-clinical information) within the system.

In an attempt to address this, one hospital in the literature required allergy status information to be recorded and signed off before any medication could be prescribed. Even after these requirements, it was found that 2.6% of patients had nothing recorded (signature/date also absent), and an additional 10.3% of the studied patients reported that the ADR information recorded was incorrect.¹⁴ This is similar to the current study hospital in that the EPS requires allergy status to be completed prior to prescribing, however in practice (and in this study) it appears that prompts and warnings are commonly over-written.

Specific ADRs

Antibiotics have frequently been reported as the most common cause of drug allergies.¹⁵ One paper found 33% of recorded allergies were attributable to antibiotics, while NSAIDs represented the next significant group with 13% of allergies.¹⁵ This current study found that of the entries deemed true allergies, 44% (54/124) were attributable to antibiotics and 9% to NSAIDs (11/124).

Historically and in this study, ‘sulfur’ allergies were reported—where this generally refers to sulphonamide antibiotics, however except for sulfamethoxazole in co-trimoxazole these are little used. Entering them in a modern database is also fraught, as often practitioners look for a ‘sulfur’ allergy but only find the term ‘sulfur’ as an extemporaneous compound. If this is then selected the alert will not appear when a sulphonamide agent is prescribing, making this safety function useless. So drug allergies that are incorrectly classified as non-drug allergies can lead to avoidable life-threatening allergic reactions.

Veracity of information

Lyons et al have previously noted a low percentage of agreement between inpatients’ electronically documented allergies and their allergies identified via interview, which agrees with our conclusion that inaccuracies in electronic ADR documentation is common in hospitals.¹⁶ This highlights the need for better ADR documentation across hospital electronic medical record systems, and that this does also interface with community electronic records, and the need for improved communication with patients regarding allergy status.

DHBs and the New Zealand Pharmacovigilance Centre (NZPhvC), Centre for Adverse Reaction Monitoring (CARM), can add to the national warning system. Reports entered via CARM have been medical assessed for causality, however those reports entered from DHBs have not. Further, the national system warnings contains “other” information (ie, clinical trial information). Again, the ability for multiple agencies to add to this system without verification or completeness of information can lead to similar concerns regarding accuracy of information.

Limitations

This study was limited in that the accuracy of the information was not confirmed with the patients or healthcare providers themselves. This contributed to our large number of ADRs that we were unable to classify due to the absence of reaction information. This however is similar to the problem faced in ‘real life’ when prescribing medicines to patients who are unable to provide this information. While doctors or other healthcare practitioners should review the

ADR status of all patients admitted with the patient themselves, often in emergency situations doctors do not have time to confirm accuracy and thus must rely on the accuracy of the electronic medical records program, but also in many other situations, eg, dementia and when reactions occurred in childhood. Therefore, there is a crucial need for complete and accurate documentation of ADRs, including reaction data in order to facilitate optimal healthcare decisions.

Recommendations

Recommendations from this work include firstly, the need for systems to have an 'archive' function for historical or duplicate information so that it is still retrievable, but does not clutter other valuable information. Secondly, the electronic prescribing systems have a field for important non-ADR alerts separate from ADR information, which would allow for easier readability of patient ADRs at initiation of prescribing. Thirdly, improved system functions such as the ability to enter a 'class intolerance' would be ideal, as this would prevent intolerances being entered as allergies, as well as being able to manage colloquial terms such as 'sulfur' allergy. Fourthly, it is recommended that any time an allergy or intolerance is entered it should be required that the user input a reaction, even if the reaction is 'unknown', to ensure that all information documented is as precise and accurate as possible with a high level of relevance and reliability.

Fifthly, it is suggested that there is improved education nationally to healthcare providers about which medication and non-medication (eg, latex) reactions are to be reported. National systems that communicate warnings should ensure that the data integrity is preserved so that it is useful, providing the medication name, the reaction description and the date when this happened. This may require changes in the capacity of data that is allowed to be transmitted between multiple systems. The infrastructure currently in place for national medication warnings has potential to allow important medication allergy information to be communicated nationwide and the suggested improvements can facilitate capitalisation of this potential.

In summary, information transfer between electronic systems needs high-quality data to be entered at the time of a reaction initially being recorded to ensure there is appropriate robustness and maximal clinical utility of information through sharing of the information. Further education of the importance of documenting the causative agent, the type of reaction, date of event, and subsequent rechallenges or cross-reactivity (whether positive or negative) and better understanding of the differences between an allergy and an intolerance will enhance patient care and safety and ensure that each patient receives the most appropriate pharmaceutical therapy.

Competing interests:

Nil.

Acknowledgements:

The research team wish to thank the study hospital and their pharmacy department for the support, access to resources and insights provided.

Author information:

Rhiannon Braund, Associate Professor at the New Zealand Pharmacovigilance Centre, University of Otago, Dunedin; Courtney K Lawrence, BSc in Pharmacy Candidate, University of Manitoba, College of Pharmacy, Winnipeg, Manitoba, Canada;

Lindsay Baum, BSc in Pharmacy Candidate, University of Manitoba, College of Pharmacy, Winnipeg, Manitoba, Canada; Brittany Kessler, BSc in Pharmacy Candidate, University of Manitoba, College of Pharmacy, Winnipeg, Manitoba, Canada;

Madison Vassart, BSc in Pharmacy Candidate, University of Manitoba, College of Pharmacy, Winnipeg, Manitoba, Canada; Carolyn Coulter, Senior Clinical Pharmacist, Dunedin Hospital Pharmacy, Dunedin at the time of the study; Pharmacy Manager, Timaru Hospital Pharmacy, Timaru.

Corresponding author:

Rhiannon Braund, New Zealand Pharmacovigilance Centre, PO Box 913, Dunedin 9054.
rhiannon.braund@otago.ac.nz

URL:

<http://www.nzma.org.nz/journal/read-the-journal/all-issues/2010-2019/2019/vol-132-no-1488-18-january-2019/7783>

REFERENCES:

1. Sastre J, Manso L, Sanchez-Garcia S, et al. Medical and economic impact of misdiagnosis of drug hypersensitivity in hospitalized patients. *J Allergy Clin Immunol*. 2012; 129:566–567.
2. Picard M, Begin P, Bouchard H, et al. Treatment of patients with a history of penicillin allergy in a large tertiary-care academic hospital. *J Allergy Clin Immunol Pract*. 2013; 1:252–257.
3. Jones TA, Como JA. Assessment of medication errors that involved drug allergies at a university hospital. *Pharmacotherapy*. 2003; 237:855–860.
4. Radford A, Undre S, Alkhamisi NA, et al. Recording of drug allergies: are we doing enough? *J Eval Clin Pract*. 2007; 13:130–137.
5. Edwards IR, Aronson JK. Adverse drug reactions: definitions, diagnosis, and management. *Lancet*. 2000; 356:1255–1259.
6. Inglis JM, Caughey GE, Smith W, Shakib S. Documentation of penicillin adverse drug reactions in electronic health records: inconsistent use of allergy and intolerance labels. *Internal Medicine Journal*. 2017; 47:1292–1297.
7. Turner RD. Are we aware of hospital patients' drug allergies? *J Clin Pharm Ther*. 2006; 31:649–650.
8. Kunac DL, Harrison-Woolrych M, Tatley MV. Pharmacovigilance in New Zealand: the role of the New Zealand Pharmacovigilance Centre in facilitating safer medicines use. *N Z Med J*. 2008; 121:76–89.
9. Blumenthal KG, Park MA, Macy EM. Redesigning the allergy module of the electronic health record. *Ann Allergy Asthma Immunol*. 2016; 117:126–131.
10. Ash JS, Berg M, Coiera E. Some unintended consequences of information technology in health care: the nature of patient care information system-related errors. *J Am Med Inform Assoc*. 2004; 11:104–112.
11. Sitting DF, Singh H. Defining health information technology-related errors. *Arch Intern Med*. 2011; 171(14):1281–1284.
12. Hui C, Vaillancourt R, Bair L, et al. Accuracy of adverse drug reaction documentation upon implementation of an ambulatory electronic health record system. *Drugs Real World Outcomes*. 2016; 3:231–238.
13. Shen W, Wong B, Chin JY, et al. Comparison of documentation of patient reported adverse drug reactions on both paper-based medication charts and electronic medication charts at a New Zealand hospital. *N Z Med J*. 2016; 129:90–96.
14. Gay KJ, Hill C, Bell T. Accuracy of drug-allergy recording in a district general hospital. *Int J Pharm Pract*. 2009; 17:253–255.
15. Chen CJ, Cheng CF, Lin HY, et al. A comprehensive 4-year survey of adverse drug reactions using a network-based hospital system. *J Clin Pharm Ther*. 2012; 37:647–651.
16. Lyons N, Rankin S, Sarangam P, et al. Disparity in patients' self-reported and charted medication allergy information. *South Med J*. 2015; 108:332–336.

A qualitative analysis of adolescents' opinions of proactive long-acting reversible contraceptive (LARC) provision

Rebecca Duncan, Helen Paterson, Lynley Anderson, Neil Pickering

ABSTRACT

AIM: In New Zealand, there are sexually active adolescents who are using poor or no methods of contraception, and who do not intend to become pregnant. The most effective methods of contraception suitable to this population are long acting reversible contraceptive (LARC) methods. A proactive LARC provision (PLP) programme has been proposed, and this study investigates whether such a model would be acceptable to adolescents. This study aims to determine how adolescents feel about a PLP programme.

METHODS: We conducted four focus groups (FGs) of female adolescents at three high schools and one university residential college, with 32 participants in total. The data from these were analysed for themes using a general inductive thematic analysis approach.

RESULTS: When asked how they felt about a PLP programme, the adolescents found the concept acceptable. This study identified misconceptions and myths around contraception in the adolescent population. The five identified themes were reproductive health fear, sex and body shame, adolescents' requirements for sexual health provision, barriers to contraception and sexual health knowledge.

CONCLUSIONS: Adolescents consider a PLP programme to be acceptable. More research is needed about the acceptability of an adolescent PLP programme in other groups, and the feasibility of such a programme.

Forty-one percent of New Zealand adolescents aged 16 to 19 report ever having had sex.¹ More than 90% of adolescent pregnancies are unintended,² demonstrating that current models for adolescent contraception provision are inadequate. Of adolescents using contraception, many rely on condoms, with a 13% typical use failure rate, or oral contraceptive pills (7% failure rate).³ That leaves a significant risk for pregnancy in a group not intending to become pregnant. While adolescent pregnancy rates have been declining in New Zealand,⁴ we still have the sixth highest rate in the OECD.⁵ The cause for the decline in adolescent pregnancy is not fully understood.⁶ Contraceptive implants and intrauterine devices (IUDs), known collectively as long-acting reversible contraceptives (LARCs) are 22 times as effective as oral contraceptive pills.⁷ This effectiveness in pregnancy prevention

makes LARCs a focus of contraceptive care.^{8,9} The World Health Organization (WHO) recommend LARCs as first-line contraceptives for all women.¹⁰ LARCs are on the WHO's list of essential medicines,¹¹ but are not being adequately provided to adolescents.^{12,13}

There are some common barriers that reduce LARC uptake in adolescent populations. Financial cost varies from country to country.¹⁴ Costs are not limited to the cost of the device itself and may include an appointment charge, and transportation charges. Transport costs may be higher if the adolescent wishes to obtain contraception without parental assistance. There are also opportunity costs involved in taking time away from employment or education. Another key barrier is the lack of adolescent awareness of LARCs.¹⁵⁻¹⁷ This may be driven by the perception among adolescents that oral contraceptives are the norm.^{17,18}

A survey of post-partum teenagers in Texas demonstrated that the majority favoured school-based contraception provision.¹⁹ Other postpartum teenagers have identified inadequate information and financial barriers to contraception use.²⁰ Little is known regarding the opinions of the wider teenage population, with nulliparous teenagers rarely consulted on how contraception should be provided to them.¹⁸

In response to this low uptake of LARCs in a population suited to them, we have suggested that proactive LARC provision (PLP) could be offered to all adolescents.^{21,22} A PLP programme would provide adolescents with a contraceptive counselling appointment, and provision of a LARC method if chosen. The details of such a model have not been determined, and we felt that adolescent input would be beneficial prior to finalising an approach. A proactive approach would mean healthcare providers routinely offer contraception to all teenagers, thereby removing some barriers that currently exist for young people seeking contraception. This approach presents the opportunity to increase overall uptake of LARC methods within the adolescent population.

There is no published research exploring the adolescent view on a PLP programme. The purpose of this study was to investigate how adolescents feel about PLP.

Materials and methods

Participants

We conducted four focus groups (FGs) with female adolescents enrolled in secondary or tertiary education in New Zealand. We contacted six high schools, three in Gisborne and three in Dunedin to initially gauge their interest. Three high schools and one university hall of residence agreed to participate, and five high schools chose not to be involved. Inclusion criteria were female students aged 14 to 18 who consented to participate. The FGs were advertised to students who were in a class that was available at a time that suited both the school and the researchers. For the university hall, the FG was advertised to all residents who met the inclusion criteria. We began recruiting participants early

2016 and finished end of 2016. All participants provided written consent, with those younger than 16 requiring parental consent.

Procedures

Participants were asked to complete a short survey including age, gender, ethnicity and optional questions about previous pregnancies and current contraception.

FG discussion was led by the primary researcher (RD). An experienced contraceptive provider was there only to answer adolescents' contraceptive questions, and to ensure health information provided was accurate.

RD is a Pākehā female who grew up in Gisborne and studies medicine in Dunedin. RD is not a contraception provider, and has been informed by the scientific literature surrounding LARCs over and above clinical experience. Gisborne and Dunedin were chosen as sites of data collection as RD had a pre-existing relationship with some of the schools and residential colleges. Using an interview guide informed by a literature review (see Table 1), FGs began by gauging health literacy regarding contraception and LARCs, followed by discussing the acceptability of PLP. FGs allowed for us to elicit a wide range of ideas and views within a discussion setting.

FGs were audio recorded, and transcribed verbatim. Field notes were also recorded. The audio was transcribed by RD. Different participants within the FGs were not identified. When transcribing, a dash (-) was used to depict one speaker from the FG continuing a sentence around other participants' interjections.

We obtained ethics approval from the University of Otago Human Ethics Committee (16/035).

Data analysis

Transcripts and field notes were analysed using NVivo, qualitative data analysis software. We used a general inductive thematic analysis²³ where key ideas were drawn from the texts, informed by the literature and the FG discussion. There were five steps to this approach.²⁴ The transcripts and field notes to be fully immersed in the data. The texts were then divided into segments of information. Coding was performed, aided by NVivo—ideas and concepts were categorised as 37 unique nodes.²⁵ These nodes

Table 1: Focus group interview guide.

Opening questions	What types of contraception are there?	
	Why do people use contraception?	
Teenage pregnancy	How common is teenage pregnancy?	
	Why do teenagers get pregnant?	
	How does pregnancy influence teenagers?	<ul style="list-style-type: none"> • Their lives • Their family • The community • Their friends
Contraception perceptions	How much do teenagers know about contraception?	
	Can you name the different types of contraceptives available?	
	How do you understand each of these works?	
	Have you heard of LARCs?	
	What makes LARCs attractive or not attractive?	
	Where do you learn about contraception?	<ul style="list-style-type: none"> • What provides the best info • Is the info easy to access
	What have you been told about contraception?	<ul style="list-style-type: none"> • Are there any myths you have heard? • Are there things you still don't understand?
	Whose responsibility is it to know about contraception?	
LARC responses	How do you like the idea of IUDs (Mirena, copper IUD)?	
	How do you like the idea of implants (Jadelle)?	
	Do you think these options would be good for teenagers?	
Public health programmes	What are your thoughts on other public health programmes?	
	What are your thoughts on you and other teenagers being offered LARCs?	
	How do you feel about you and your peers each having a scheduled appointment to discuss long acting reversible contraceptives with a family planning nurse, with the option to be fitted with one of your choice if you wish?	
	What do you think your parents'/teachers'/community's responses would be?	
Closing	Any more thoughts or views?	
	What prompted you to participate in this study?	
	What has it been like to participate in the group today?	

were reviewed and condensed to create a framework of 11 separate themes. This work was reviewed and refined by the entire research team, and a final five-theme model was agreed upon. As the model was created using a general inductive approach,²³ this model used ideas from within the text and

was informed by the literature. Transcripts were coded by RD and reviewed periodically by other research team members.

Themes and subthemes represent points of importance and/or consensus between the discussions in the different FGs.

Results

Demographics

Four FGs were conducted, with a total of 32 participants, from three high schools and a first year university residential college. There was a range of ethnicities among participants, with the majority (56%) identifying as New Zealand European (see Table 2). Contraceptive use differed among participants (see Table 3), with 9% of the total using a LARC. Participants were not asked to report their sexual activity; as we sought their views on the acceptability of PLP regardless of sexual activity. No pregnancies were reported.

Table 2: Characteristics of all participants.

Baseline characteristics	All (n=32)
Mean age (range)	17 (15–18)
Gender (%)	
Female	32 (100%)
Ethnicity (%)	
New Zealand European	16 (50%)
Māori	10 (31%)
Māori, New Zealand European	2 (6%)
Other	2 (6%)
Indian	1 (3%)
Chinese	1 (3%)
Current contraception (%)	
None	13 (40%)
Rod (Jadelle)	3 (9%)
'The Pill'	8 (25%)
Depo-Provera	1 (3%)
Not reported	7 (21%)
Previous pregnancies (%)	
None	27 (84%)
Not reported	5 (16%)

Themes

Five key themes emerged from the data. These were: reproductive health fear, sex and body shame, adolescents' requirements for sexual health provision, barriers to contraception and sexual health knowledge.

Reproductive health fear

Fear came up in a variety of contexts, most often related to reproductive health.

Within this theme, two further subthemes emerged: fear of LARC insertion and pain, and fear of what happens to their bodies.

Subtheme: fear of LARC insertion

Across all groups there was discussion of pain; how to control or avoid it. The types of pain mentioned included period pain, pain during sex, implant and IUD insertion pain. The unknown and unpredictable aspect of pain with LARC methods was a fear, especially for intrauterine methods.

"[IUD insertion is] really scary aye, this lady tried to make me get one [an IUD], and I was like nah nah, no, no thank you, not having it, get out of here."

"with the Jadelle, like my friend got it and then everyone's like you're gonna have like a massive scar on your arm...which I don't know if that's true or not...but like I'd never get the rod cause I don't want a huge scar on my arm."

Subtheme: body fear

While some participants expressed curiosity regarding the human body, many expressed fear and revulsion. Participants were often horrified by their own bodies. *"what happens if there's some [eggs] left over at the end [menopause], wait so...they all die...do eggs actually come out...wait what how do they come out?!...I haven't seen one"*.

Sex and body shame

Participants linked discussions of sex and bodies to ideas of shame and embarrassment. *"Yeah, I find, we learn a lot from our friends, more than what we learn from the doctors... because it's not embarrassing, like, with your friends...with the doctor it's kinda like...a bit embarrassing"*.

Some of this was a form of shame from external sources, often expressed as a concern of what other people might think about visible signs of contraceptive use, pregnancy and sexuality.

"They'll think things of you...Think you're a slut...you could have sex once, and then get pregnant and they will just think you're like automatically a slut."

Other elements of shame were internalised, where participants expressed

Table 3: Participant characteristics by group.

Baseline characteristics	Group 1 (n=10)	Group 2 (n=8)	Group 3 (n=8)	Group 4 (n=6)
Mean age (range)	16 (16–17)	17 (17)	18 (18)	15 (15–16)
Gender				
Female	10 (100%)	8 (100%)	8 (100%)	6 (100%)
Ethnicity				
New Zealand European	6 (60%)	-	5 (63%)	5 (83%)
Māori	2 (20%)	7 (88%)	-	1 (17%)
Māori, New Zealand European	1 (10%)	1 (13%)	-	-
Other	1 (10%)	-	1 (13%)	-
Indian	-	-	1 (13%)	-
Chinese	-	-	1 (13%)	-
Current contraception				
None	5 (50%)	2 (25%)	3 (38%)	3 (50%)
Rod (Jadelle)	-	3 (38%)	-	-
'The Pill'	2 (20%)	1 (13%)	4 (50%)	1 (17%)
Depo-provera	-	-	-	1 (17%)
Not reported	3 (30%)	2 (25%)	13%	17%
Previous pregnancies				
None	7 (70%)	8 (100%)	7 (88%)	5 (83%)
Not reported	3 (30%)	-	1 (13%)	1 (17%)

embarrassment about their bodies, accompanied with a discomfort about others seeing their genitalia.

"When you see the person again it's awkward...if you're like, faaaa, you've seen my [vagina]."

Adolescents' requirements for sexual health provision

There was a high degree of consensus across all groups when it came to matters participants deemed most important in contraceptive care. This included the subthemes of social context and self-determination.

Subtheme: social context

Participants noted they were most likely to seek and/or use a contraceptive method if they had peers who had used it, citing the pill as an example of this social influence. *"I just never thought about long, long term contraceptives at this age, all your friends are on the pills".*

The majority of participants didn't know anyone using LARCs so knew very little about them. *"I've heard of no-one using the rod [Jadelle], I'm sure people our age do use them, but I don't know anybody who has, so I don't know much about that..."*

I only know one of my close friends started using it last year...I didn't even know that it existed".

Social context also was a major point of discussion when the possibility of a PLP programme was discussed. Initially all groups considered the opinions of parents, and most continued the discussion to community opinions.

"Some people [in the community] are like out of it [unaware of adolescent needs], they'll be like 'why are they having sex?' well it ain't your kid [that needs contraception]!"

While there was often a desire for the opinions of others to be unimportant, *"Well they can go mind their own bee's*

wax”, some participants acknowledged programmes would run best if accepted by parents, and ideally the general public.

“Some people would support it [PLP] because they know that a lot of young people do it [have sex], so, especially like in our region, so they’ll wanna support it, but there’s other people that are so against it, so just depends on the people.”

Subtheme: self-determination

Participants were adamant they had a right to be informed about, and in control of their reproductive health. Choice was brought up frequently, with emphasis on adolescents being able to choose the best contraception for themselves, whatever that may be.

“Nah they [parents] stay out of it, they can’t like force you to have contraception, so they should just not be involved, if you don’t want them to. It’s your decision...your body, your rules.”

Adolescents were only accepting of LARCs if they were something they could control, ie, the implant or IUD could be removed when they no longer wanted it. *“Can you get it [a LARC] taken out if you don’t wanna use it anymore?”*

The concept of a PLP programme was only accepted on the premise that this would be a confidential service.

“I think you educate the parents...but you have to keep stressing to the girls that it’s your choice, we don’t need to tell your parents, if this is what you want, go for it, if you don’t want [it], then don’t go for it.”

Barriers to contraception

In both direct and indirect ways, participants mentioned barriers to seeking, accessing and/or using contraception. These barriers largely fit into two categories: abstract, ie, social, moral or personal constraints; and practical, ie, things needing to be worked around in order to receive care, such as financial barriers.

Subtheme: abstract barriers

Sometimes when considering using contraception, the limiting factors experienced by participants were not strictly clear-cut and visible, but still stopped participants from accessing or using contraception.

“Other people seeing the implant...so then they would make assumptions on like what you’re doing.”

Subtheme: practical barriers

Practical barriers to contraception mentioned by participants were access to and experience of health providers “I was told I couldn’t have the pill until I was 18 or 19”, lack of awareness about services or options “where is the family planning clinic?”, financial cost “you’re expensive Mirena! [a participant exclaimed]” and finding time.

Each of these factors made it harder (or seem harder) to access contraception.

“If I was to go to family planning, I’d probably try and go during school, so my parents wouldn’t know, and if I was to go during school then teachers would, if I wanted to have a friend [for support for an IUD insertion], they would be like why is your friend coming...and then your parents get called.”

These barriers were mentioned in the context of accessing any form of contraception.

“Coz I saw by the [sanitary] pads and stuff, and I was like wow they’re [condoms] so expensive.”

Sexual health knowledge

Participants were very keen to know as much as they needed to in order to navigate the world of contraception. *“I don’t think anyone knows about the LARCs, well I didn’t know—if it gets out there...I reckon people will get them.”*

Knowledge came up in two broad contexts: what they did or did not know; and where their information was from. All groups mentioned they had left the FGs with more knowledge about contraception than at the beginning. When asked about their experience of the discussion, they responded positively:

“It was cool—I learnt a lot—it was informative—learnt heaps.”

The level of health knowledge at the beginning of the discussions regarding contraception varied:

“They [teenagers] probably don’t know as much as they should [about contraception]. Some of the year groups, everyone knows

that the pill and stuff stops you from what was, like 90% chance or something?...I think people know the basics but it's just like more details people just don't know."

"Because there are people who you know need contraception...they may know all about it, whereas others it's never a problem in their life, so they don't know much."

Doctors, friends, and the Internet were seen to be mostly reliable sources of information. *"I don't think I remember learning anything about contraception, yeah, I feel like mostly you learn from your parents, and also the own research you do on Google"*.

Participants highly valued unbiased sources of information. Biased information was thought to undermine their ability to make informed choices.

"Or the YouTuber, you know she's really good, I feel like she's really onto it with all her stuff and she's really upfront, it's cool, and she's not really biased...whereas doctors can also be a bit more biased."

While there was some variation in the importance of the themes across the different groups, all themes were discussed in all four groups.

Response to a PLP programme

Analysing the primary aim of this study, participants found the concept of a PLP programme acceptable.

"Yeah, that [PLP] would encourage people more to get it. Especially coz...lots of girls are probably scared to make that first appointment, but if people reached out, and...it's all confidential, then I think more people would put their hand up and go for it."

Adolescents in the FGs were mostly positive about the concept of PLP. When framing these ideas in the context of a PLP programme, this positive reaction is best summarised by a participant quote: *"[If] all the females had that ins[erted]...it would just be the same as what boys have all the time [not having the fear of accidentally becoming pregnant]...rather than something completely different".* The benefit of pregnancy prevention was seen as sufficient to justify PLP.

Discussion

If we have tools to significantly reduce unintended pregnancy,^{7,9} why not offer them? After being educated about the present recommendations of LARC use in adolescents [8], participants perceived LARCs as, most importantly, a reliable way to offer freedom from unintended pregnancy—a freedom their male peers already experience. No other research has sought the opinions of adolescents regarding a proactive contraception provision model.

In collecting this data we found myths believed by participants, gaps in their contraceptive knowledge and misconceptions held. Most adolescents do not want to be pregnant (as adolescents)²⁶—inadequate contraceptive knowledge puts them at risk of unintended pregnancy. Therefore, it could be argued that the current sexuality education framework in New Zealand is not providing adolescents with sufficient contraceptive information.²⁷ A PLP programme would address this lack of accurate knowledge by providing factual contraceptive information to each adolescent.

Teenagers consider the ability to make decisions about their own sexual health to be of utmost importance. Contraception provision is not about deciding whether adolescents should be sexually active, but to keep them safe from unintended consequences—a concept that should be central to any programme.

Our research shows the gap in effective contraceptive coverage comes from abstract and practical barriers. There is temptation to declare that in preventing pregnancy, the responsibility should rest with the sexually active adolescent. However, barriers to contraceptive care have been identified, including financial cost, opportunity cost, lack of awareness and the self-sustaining cycle of pill prescription.^{28,29} Even when adolescents seek information, it is not always available. The lack of accurate knowledge was a source of frustration for participants. The educative role of a proactive provision programme could resolve this frustration.

Participants identified fears, as shown in the theme reproductive health fear. Some of these fears stemmed from misconceptions, others were reflective of real problems: insertion of LARCs can be unpleasant,³⁰ there is no contraceptive that guarantees period control,³¹ no method 100% effective⁷ and LARCs do not provide STI protection. While LARCs are highly effective and should be promoted, they are a form of medical intervention, and associated with many reproductive health fears.³² This should be considered in any proactive contraceptive programme, as it is unreasonable to believe a LARC method would be the optimum method for every adolescent.

Participants described the context that keeps LARC use low. The three key components of this are the lack of knowledge among health practitioners about LARC suitability in the adolescent population;^{33,34} adolescents not knowing of any peers using a LARC, therefore not having a first person account of the experience; and fear of the unknown aspects of LARC use. Addressing these components, as a PLP programme would, could increase LARC use.

More research is needed to determine the acceptability of PLP programme in New Zealand to doctors, nurses, schools and parents. There are a number of other courses of action to address the issues raised by our data. Sexuality education in New Zealand secondary schools needs to be medically accurate and inclusive of contraception. The recent Education Review Office (ERO) report highlights concerns about the quality of this.²⁷ All contraceptive information from healthcare providers needs to be accurate, consistent and unbiased. The shortcomings of the current system of sexuality education and healthcare present a limitation to the PLP concept—major changes would be required to adequately run such a programme in New Zealand.

Limitations

There are limitations to this study. Not every New Zealand adolescent would necessarily share this positive opinion. However, this study shows that adolescent opinion is not a barrier to successfully implementing a PLP programme in New Zealand.

While the positive reactions to LARCs are encouraging, this required 30–60 minutes

of discussion and explanation with two researchers well-informed regarding LARC use. The social atmosphere of the FGs was open and jovial, and the number of participants allowed for relaxed discussion. The positive response towards LARCs is much less likely to arise from 15-minute consultations with practitioners who may be less confident in their LARC knowledge than those present at the FGs.

Qualitative research does not aim for generalisability, and our FG participants have not spoken for all New Zealand adolescents. There are some voices in particular missing from our data. We did not have voices from Pacific Island adolescents, those currently using IUDs, adolescents who had been pregnant or those with intellectual disability. Intellectual disability has been used as an indication for LARC use in New Zealand,³⁵ and so the lack of intellectually disabled participants has limited the range of experiences covered by our FGs.

Implications for practice and policy

It is helpful to note that after adequate time to explain the LARC methods (approximately half an hour), many participants were willing to consider using a LARC. It is often believed that adolescents would be unwilling to consider a LARC, but our findings are in line with other research that concludes that what LARCs offer, and what young women want from their contraception mean LARCs are a suitable option.³⁶ This willingness to consider LARC methods among adolescents should be incorporated into contraceptive counselling. In New Zealand, most general practitioner appointments are 15 minutes long,³⁷ so may be inadequate for general practitioners to fully explain what each LARC method entails. Considering this alongside the subtheme of practical barriers, demonstrates that offering adolescents multiple visits across different days (to allow adequate time to explain LARCs) could be unsuitable, considering the practical constraints and costs. A school-based programme offering 30-minute contraception consultations to adolescents would mean adolescents would not have to make multiple visits to their healthcare practitioner.

Some participants only knew about LARCs because they had heard negative things about them. To counter this, adolescents

should have easy access to honest and open accounts about LARCs, to avoid deterring adolescents from using a LARC method.

Most importantly in implications for policy, the adolescents' priorities outlined give us scope for planning a PLP programme. Social context discussions highlighted two aspects: knowing a peer using a LARC method made it seem more acceptable, and any provision programme would be most successful if parents and communities accepted it. A PLP programme would address the first concern by initially increasing LARC uptake, thereby increasing LARC awareness. The second concern highlights the importance of carefully crafting and marketing any provision programme.

The discussions of self-determination highlight some of the cornerstones of adolescent healthcare. Adolescents want to make their own choices based on unbiased

information, and they consider confidentiality to be essential. In New Zealand, competent adolescents are considered able to make contraceptive health decisions,^{38,39} and so allowing adolescents to make their own informed decisions about contraception while maintaining their confidentiality is in line with medical practice in New Zealand.

Conclusion

This study indicates that adolescents support a PLP programme in New Zealand. More research is required to explore the opinions of other key stakeholders, such as GPs, as well as assessing the feasibility of such a programme. Sexuality education needs to be tailored to better reach the adolescent population in New Zealand. Adolescent-focused LARC resources are needed to communicate the suitability of LARCs among the adolescent population.

Competing interests:

Dr Helen Paterson was supported by Bayer HealthCare to attend an educational conference in 2012. No competing financial interests exist. This research did not receive any specific grant from funding agencies in the public, commercial or not-for-profit sectors.

Acknowledgements:

Three of the four focus groups involved Sue Schroder and Emma MacFarlane as experienced contraception providers, and we are very grateful for their time and enthusiasm.

Author information:

Rebecca Duncan, Department of Women's and Children's Health, Dunedin School of Medicine, Dunedin; Bioethics Centre, Division of Health Sciences, University of Otago, Dunedin; Helen Paterson, Senior Lecturer, Department of Women's and Children's Health, Dunedin School of Medicine, Dunedin; Lynley Anderson, Associate Professor, Bioethics Centre, Division of Health Sciences, University of Otago, Dunedin; Neil Pickering, Associate Professor, Bioethics Centre, Division of Health Sciences, University of Otago, Dunedin.

Corresponding author:

Rebecca Duncan, Bioethics Centre, Division of Health Sciences, University of Otago, PO Box 56, Dunedin 9054.
dunre441@student.otago.ac.nz

URL:

<http://www.nzma.org.nz/journal/read-the-journal/all-issues/2010-2019/2019/vol-132-no-1488-18-january-2019/7784>

REFERENCES:

1. Clark TC, Lucassen MFG, Fleming T, Peiris-John R, Ikihele A, Teevale T, et al. Changes in the sexual health behaviours of New Zealand secondary school students, 2001–2012: findings from a national survey series. *Australian and New Zealand Journal of Public Health*. 2016;n/a-n/a.
2. Klein JD. Adolescent Pregnancy: Current Trends and Issues. *Pediatrics*. 2005; 116(1):281–6.
3. Sundaram A, Vaughan B, Kost K, Bankole A, Finer L, Singh S, et al. Contraceptive Failure in the United States: Estimates from the 2006–2010 National Survey of Family Growth. *Perspectives on Sexual and Reproductive Health*. 2017; 49(1):7–16.
4. University of Waikato. Current Trends for Teenage Births in New Zealand. National Institute of Economic and Demographic Analysis; 2013.
5. Brazier C. Building the Future: Children and the Sustainable Development Goals in Rich Countries. Innocenti, Florence: UNICEF Office of Research; 2017 June 2017.
6. Lewycka S, Clark T, Peiris-John R, et al. Downwards trends in adolescent risk-taking behaviours in New Zealand: Exploring driving forces for change. *Journal of Paediatrics and Child Health* 2018.
7. Winner B, Peipert JF, Zhao Q, Buckel C, Madden T, Allsworth JE, et al. Effectiveness of long-acting reversible contraception. *New England Journal of Medicine*. 2012; 366(21):1998–2007.
8. American College of Obstetricians and Gynecologists (ACOG). ACOG Committee opinion no. 539: adolescents and long-acting reversible contraception: implants and intrauterine devices. *Obstetrics and gynecology*. 2012; 120(4):983–8.
9. Ricketts S, Klingler G, Schwalberg R. Game Change in Colorado: Widespread Use Of Long-Acting Reversible Contraceptives and Rapid Decline in Births Among Young, Low-Income Women. *Perspectives on Sexual and Reproductive Health*. 2014; 46(3):125–32.
10. McNicholas C, Peipert JF. Long-Acting Reversible Contraception (LARC) for Adolescent. *Current opinion in obstetrics & gynecology*. 2012; 24(5):293–8.
11. 19th WHO Model List of Essential Medicines. World Health Organization; 2015.
12. Whitaker AK, Sisco KM, Tomlinson AN, Dude AM, Martins SL. Use of the Intrauterine Device among Adolescent and Young Adult Women in the United States from 2002 to 2010. *Journal of Adolescent Health*. 2013; 53(3):401–6.
13. Pazol K, Daniels K, Romero L, Warner L, Barfield W. Trends in Long-Acting Reversible Contraception Use in Adolescents and Young Adults: New Estimates Accounting for Sexual Experience. *Journal of Adolescent Health*. 2016.
14. ACOG. ACOG Committee Opinion no. 450: Increasing use of contraceptive implants and intrauterine devices to reduce unintended pregnancy. *Obstetrics and gynecology*. 2009; 114(6):1434–8.
15. Russo JA, Miller E, Gold MA. Myths and misconceptions about long-acting reversible contraception (LARC). *Journal of Adolescent Health*. 2013; 52(4):S14–S21.
16. Hoopes AJ, Gilmore K, Cady J, Akers AY, Ahrens KR. A Qualitative Study of Factors That Influence Contraceptive Choice among Adolescent School-Based Health Center Patients. *Journal of Pediatric and Adolescent Gynecology*. 2015.
17. Harris K, Byrd K, Engel M, Weeks K, Ahlers-Schmidt CR. Internet-Based Information on Long-Acting Reversible Contraception for Adolescents. *Journal of Primary Care & Community Health*. 2015.
18. Denis L, Storms M, Peremans L, Van Royen K, Verhoeven V. Contraception: a questionnaire on knowledge and attitude of adolescents, distributed on Facebook. *International Journal of Adolescent Medicine and Health* 2015.
19. Patel PR, Huynh MT, Alvarez CA, Jones D, Jennings K, Snyder RR. Postpartum Teenagers' Views on Providing Contraception in School-Based Health Clinics. *Journal of Women's Health (Larchmt)*. 2016; 25(1):32–7.
20. Lawton B, Makowharemahihi C, Cram F, Robson B, Ngata T, Pounamu: E Hine: access to contraception for indigenous Māori teenage mothers. *Journal of Primary Health Care*. 2016; 8(1):52–9.
21. Pickering N, Anderson L, Paterson H. Authors' reply re: Teens and young adults should be started on longacting reversible contraceptives before sexual activity commences. *BJOG: An International Journal of Obstetrics & Gynaecology*. 2015; 122(13):1848–9.
22. Pickering N, Anderson L, Paterson H. Teens and young adults should be started on long-acting reversible contraceptives before

- sexual activity commences: FOR: An opt-out programme would avoid teen pregnancy and associated costs. *BJOG: An International Journal of Obstetrics & Gynaecology*. 2015; 122(8):1052.
23. Thomas DR. A general inductive approach for analyzing qualitative evaluation data. *American Journal of Evaluation*. 2006; 27(2):237–46.
 24. Creswell JW. *Educational research: Planning, conducting, and evaluating quantitative*: Prentice Hall Upper Saddle River, NJ; 2002.
 25. What is NVivo? | NVivo 2018 [Available from: <http://www.qsrinternational.com/nvivo/what-is-nvivo>]
 26. Birgisson NE, Zhao Q, Secura GM, Madden T, Peipert JF. Preventing Unintended Pregnancy: The Contraceptive CHOICE Project in Review. *Journal of Women's Health (Larchmt)*. 2015; 24(5):349–53.
 27. Education Review Office. Promoting well-being through sexuality education. In: Education Review Office, 2017.
 28. Shoupe D. LARC methods: entering a new age of contraception and reproductive health. *Contraception and Reproductive Medicine*. 2016; 2(1):1–9.
 29. Sundstrom B, Billings D, Zenger KE. Keep Calm and LARC On: A theory-based long-acting reversible contraception (LARC) access campaign. *Journal of Communication in Healthcare*. 2016:1–11.
 30. Smith SA. The Use of Intrauterine Devices (IUDs) in Adolescents and Nulliparous Women: A Systematic Review. *Journal of Women's Health Care* 2015.
 31. Glasier A. Non-contraceptive benefits of contraceptive methods. *Medicine*. 2006; 34(1):23–4.
 32. Gomez AM, Fuentes L, Allina A. Women or LARC First? Reproductive Autonomy and the Promotion of Long-Acting Reversible Contraceptive Methods. *Perspectives on Sexual and Reproductive Health*. 2014; 46(3):171–5.
 33. Moreau C, Bohet A, Hassoun D, Ringa V, Bajos N. IUD use in France: women's and physician's perspectives. *Contraception*. 2014; 89(1):9–16.
 34. Luchowski AT, Anderson BL, Power ML, Raglan GB, Espey E, Schulkin J. Obstetrician–Gynecologists and contraception: practice and opinions about the use of IUDs in nulliparous women, adolescents and other patient populations. *Contraception*. 2014; 89(6):572–7.
 35. Paterson H, Miller D, Devenish C. A survey of New Zealand RANZCOG Fellows on their use of the levonorgestrel intrauterine device in adolescents. *Australia and New Zealand Journal of Obstetrics and Gynaecology*. 2009; 49(2):220–5.
 36. Gomez AM, Clark JB. The Relationship between Contraceptive Features Preferred by Young Women and Interest in IUDs: An Exploratory Analysis. *Perspectives on Sexual and Reproductive Health*. 2014; 46(3):157–63.
 37. Edmunds S. Cost of doctor's visit varies widely depending on where you are. *Stuff* 2016.
 38. Medical Council of New Zealand (MCNZ). Information, choice of treatment and informed consent 2011 30/9/16 [cited 2016 30 September]. Available from: <http://www.mcnz.org.nz/assets/News-and-Publications/Statements/Information-choice-of-treatment-and-informed-consent.pdf>
 39. Care of Children Act. Sect. 38 (2004).

Doctors, drugs of dependence and discipline: a retrospective review of disciplinary decisions in New Zealand, 1997–2016

Katharine A Wallis, Susie Middleton

ABSTRACT

AIM: To describe disciplinary cases for inappropriate prescribing of drugs of dependence by doctors in New Zealand, 1997–2016.

METHODS: A retrospective analysis of disciplinary decisions to describe characteristics of cases (setting, drugs, outcome) and doctors (sex, specialty, years since qualification).

RESULTS: There were 25 disciplinary decisions involving 24 doctors. Disciplined doctors were mostly male (19;76%), working in general practice (19;76%), and older (mean 24 years in practice). Pharmacists were the most common source of notification to the authorities (6;24%); medical colleagues reported only four (16%). The alleged misconduct often involved behaviour in addition to inappropriate prescribing. In all cases the doctor was found guilty of professional misconduct. Penalties were severe: six doctors were removed from practice, 11 were suspended, and of the remainder all but one had restrictions on practice imposed. In many decisions there was no patient harm documented.

CONCLUSION: Disciplinary cases for inappropriate prescribing of drugs of dependence by doctors in New Zealand are not common, but the consequences can be dire. The role of discipline in doctors with drug dependence is unclear.

Little is known about disciplinary cases in New Zealand involving doctors and drugs of dependence.^{1,2} Disciplinary charges against doctors are heard by the Health Practitioners Disciplinary Tribunal (HPDT), and prior to 2004 by the Medical Practitioners Disciplinary Tribunal (MPDT). A doctor may be found guilty of professional misconduct because of “*any act or omission that, in the judgment of the Tribunal, amounts to malpractice or negligence ... or ... has brought or was likely to bring discredit to the profession*”.³ The purpose of the disciplinary process is to “*protect the health and safety of members of the public*”, not to punish doctors.³ Nevertheless, it is generally accepted that most doctors perceive the process as punishing, and the process can have punitive consequences. Penalties can

include removing the doctor from the register, suspending the doctor for a period up to three years, imposing conditions on practice, costs, and a fine up to \$30,000.

Drug dependence is recognised as a disease, not a crime.⁴ Drug dependence can have dire consequences for a doctor’s personal and professional life, although when treated the prospects of return to work can be good.^{4,5} Regular attendance at meetings and ongoing monitoring are encouraged to minimise the risk of relapse.⁶

Drug-dependent doctors may be reluctant to seek help for fear of losing their licence to practice. Colleagues are required by law to notify the Medical Council if they believe a doctor “*is unable to perform the functions required for the practice of his or*

her profession because of some mental or physical condition" (s.45), but colleagues may also be reluctant to report.^{3,7} The Medical Council manages most doctors with drug dependence through its Health Committee.⁸ Some doctors are referred for discipline, not for drug dependence but for offences such as inappropriate prescribing, falsification of the clinical record and forging a colleague's signature.

The role of discipline in drug dependence is not clear. We sought to describe disciplinary cases for inappropriate prescribing of drugs of dependence by doctors in New Zealand, with a view to understanding risk factors and outcomes.

Methods

Data source

In New Zealand, all written decisions for medical practitioner disciplinary proceedings are published on the websites of the Disciplinary Tribunals (MPDT and HPDT).^{9,10} Our data came from the MPDT website 1997–2005, and the HPDT website 2004–2016. Available data included the full texts of the decisions, barring redacted names and identifying details in cases where the doctor was granted name suppression, including the charge, evidence submitted by prosecution and defence, the Tribunal's decision and penalties imposed.

Data collection

SM examined all decisions on the websites to identify cases where the alleged misconduct included inappropriate prescribing of drugs of dependence. SM collected data from these decisions, including the characteristics of the doctor (sex, specialty, years since qualification, prior knowledge by authorities) and characteristics of the case (setting, drugs, means of detection, disciplinary proceeding outcomes). Missing demographic data on named doctors was supplemented with data from the Medical Council of New Zealand's website, where available.¹¹

Data analysis

The analytical approach to these data was mainly descriptive as we aimed to determine the content of the decisions and their ability to inform about risk factors and outcomes.

Results

Over the 20 years 1997 to 2016, there were 236 disciplinary cases against doctors, 25 of which included inappropriate prescribing of drugs of dependence (11%). Over the eight years 1997–2005 the MPDT heard 143 charges against doctors (18 per year on average), five involving inappropriate prescribing (3%); and over the 12 years 2004–2016 the HPDT heard 93 cases (eight per year on average), 20 involving inappropriate prescribing (22%). In all cases the doctor was found guilty of professional misconduct (100%).

Characteristics of cases

The alleged misconduct was diverse and often involved misconduct in addition to inappropriate prescribing, including sexual relations with patients and forging a colleague's signature. It was not always clear in the decision for whom the inappropriately prescribed drugs were intended, although in some cases it was clear the drugs were not for self-use. The prescriptions were usually made out for patients, family or self. The prescribed drugs included opioids (17;68%) (pethidine (8), codeine (7), morphine (4), dextropropoxyphene, oxycodone, tramadol and fentanyl); benzodiazepines (12;48%); pseudoephedrine (2); and sibutramine (1).

Pharmacists were the most common source of notification to the authorities (6;24%), followed by reporting from medical colleagues (4;16%). Other sources of notification were the patient or family (3), patient's caregiver (1), police (2) and patient death (1). It was not possible to determine the source of notification in eight cases (32%). In some decisions it was clear the doctor was already known to the authorities: in seven cases (involving six doctors) the doctor was being monitored by the Medical Council's Health Committee (28%); in one case the doctor had previously appeared before two separate tribunals for unrelated matters (HPDT 05/27D; 06/32D; 10/145P); and in another a doctor had previously been cautioned by the Medical Council for prescribing to those close to her but not disciplined (16/348P). One doctor faced two separate charges for inappropriate prescribing of drugs of dependence six years apart (MPDT 00/63C; HPDT 06/29P).

Patient harm or the potential for harm was mentioned in some decisions, usually as a consequence of inappropriate prescribing or inaccurate patient records (for example when a prescription was made out for but never intended for a patient). Other decisions documented that there was no patient harm or safety concerns.

Characteristics of doctors

Twenty-four doctors were involved in the 25 cases. Most doctors were male (19;79%). Most were working in general practice (19;79%); and there was one each in anaesthesia, internal medicine, registrar, medical officer, house officer and not available. Most doctors were on the general register (17;71%), and seven were on the vocational register (general practice 6; anaesthetics 1). Most doctors had been in practice a long time, with a mean of 24 years between qualification and discipline (range 2 to 36 years). The year of qualification was not available in seven cases.

Penalties

The diversity of misconduct is reflected in the diversity of penalties imposed by the tribunals, as set out in Table 1. Six doctors were removed from the register (24%); 11 doctors (44%) were suspended for between three and 24 months; and most of the remainder had conditions imposed on practice. Conditions included supervision

(20); prescribing restrictions (12); drug urine or hair monitoring (8); counselling and/or being part of a support group (6); enrolling with a general practitioner (4); re-training, for example in record keeping (5); abstaining from drugs and/or alcohol (4); and practising in an approved practice (4) or a group practice (3). In nearly all cases the tribunal censured the doctor and imposed costs of 6% to 50%. In nearly half of cases the tribunal also fined the doctor, with fines varying from \$5,000 to \$20,000.

In seven cases (28%) the doctor was given name suppression, one on appeal. The tribunals were not always consistent in their reasoning. For example, in White (MPDT 98/36C) the tribunal denied name suppression in part because there was already extensive publicity about the case, but in Dr K (MPDT 00/63C) the tribunal allowed name suppression in part because previous publicity reduced the need for further publicity to protect patient safety (but also to support Dr K's rehabilitation). When Dr K faced a second disciplinary charge for inappropriate prescribing, he was denied name suppression since the previous suppression had failed to prevent relapse and reoffending (Keshvara HPDT 06/63P). In nine cases (36%) the doctor appealed all or part of the tribunal's decision, in particular concerning name suppression or conditions on practice.

Table 1: Disciplinary decisions involving inappropriate prescribing of drugs of dependence in New Zealand, 1997–2016.

Case	Charge	Penalty			
		Registration	Conditions	Fine	Costs
MPDT 98/36C White, Gen	Prescribing to patient; excessive triazolam	Cancelled	-	0	40%
MPDT 00/63C Dr K, Voc, GP	Forged colleague's personal stamp on prescriptions for pethidine, morphine	-	Y	0	45%
MPDT 01/74C van Rhyn, Gen	Prescribing for self; zopiclone	-	Y	\$5,000	25%
MPDT 05/127C Dassanayake, Gen	Gave patient clonazepam and temazepam without a prescription; sexual relationship with patient	Cancelled	-	\$5,000	0
MPDT 05/128C Laubscher, Voc, Anaes	Forged signature on prescriptions for pethidine	-	Y	0	25%
HPDT 04/03P Nuttall, Gen	Prescribing midazolam and dihydrocodeine to patient, in sexual relationship with patient	Cancelled	-	0	\$10,000

Table 1: Disciplinary decisions involving inappropriate prescribing of drugs of dependence in New Zealand, 1997–2016 (continued).

HPDT 05/08P Brock-Smith, Gen	Prescribing to restricted persons; diazepam and temazepam	-	Y	\$7,000	30%
HPDT 06/29P Keshvara, Voc, GP	Forged signature on prescriptions for dihydrocodeine	Suspended 12m	Y	0	33%
HPDT 06/36D Patel, Voc, GP	Prescribed zopiclone to patient, in sexual relationship with patient	Suspension 24m	Y	\$10,000	50%
HPDT 06/44P Cullen, Voc, GP	Prescribing pseudoephedrine	Cancelled	-	\$15,000	34%
HPDT 07/76D Dr E, Voc, GP	Prescribed paradex to patient in de-facto relationship with	-	Y	\$7,500	0
HPDT 07/80P Aitcheson, Gen	Prescribed to patients for self; pethidine	Suspension 12m	Y	\$10,000	40%
HPDT 08/102P MacDonald, Voc, GP	Prescribing morphine to patient, in sexual relationship with patient	Suspension 9m	Y	0	47%
HPDT 10/145P Wilson, Gen	Prescribing pseudoephedrine, alprazolam and paradex	Cancelled	-	\$20,000	50%
HPDT 10/155P Dr E, Gen	Forged prescriptions to get sibutramine for self	Suspension 3m	Y	0	10%
HPDT 11/197P Dr S, Gen	Prescribing to patients with dependency; pethidine, morphine, codeine, diazepam, triazolam and nitrazepam	-	Y	0	30%
HPDT 11/201P Wong, Gen	Prescribing to restricted persons; benzodiazepines	-	Y	\$7,000	30%
HPDT 14/272P Dr T, Gen	Prescribing to self, family, and patients; codeine, lorazepam, zopiclone	-	Y	0	15%
HPDT 15/310P Dr Y, Gen	Prescribing to patients, collected for self; codeine	Suspension 3m	Y	0	30%
HPDT 15/315P Hodgson, Gen	Prescribing to patients and family; dihydro-codeine, diazepam, zopiclone and triazolam	Suspension 3m	Y	0	15%
HPDT 15/320P Thorne, Voc, GP	Prescribing to patients with history of dependence; oxycodone, morphine, tramadol, codeine, clonazepam, triazolam, clonazepam, zopiclone, dihydro-codeine, diazepam	Suspension 6m	Y	0	35%
HPDT 15/335P Dr N, Gen	Forged signatures in controlled drug register to obtain pethidine, morphine and fentanyl	-	Y	\$8,000	30%
HPDT 16/348P Craig, Gen	Prescribing to patients, family and self; triazolam and zopiclone	-	Y	0	30%
HPDT 16/351P Cooper, Gen	Prescribing to patients to stock practice	-	N	0	6%
HPDT 16/353P Kleszcz, Gen	Prescribing to patient; pethidine, diazepam and nitrazepam	Cancelled	-	0	26%

Discussion

We identified only 25 disciplinary decisions involving inappropriate prescribing of drugs of dependence over the 20 years 1997–2016. One of the 25 cases was for repeat offending by the same doctor. While the HPDT heard fewer cases per year than the MPDT,¹² a greater proportion involved inappropriate prescribing. In all cases the doctor was found guilty of professional misconduct. The consequences were dire, often spelling the end of a doctor's career. Most disciplined doctors were men, working in general practice, and had been in practice a long time. Patient harm was not a strong feature. It may be that drug-dependent doctors pose a greater risk to themselves than they do the health and safety of the public.

Few cases came to the attention of the authorities via notification from medical colleagues (16%). Doctors may be unaware of drug dependence in their midst, unaware of their duty to report, or unwilling to report. It may be that the threat of discipline

acts more as a deterrent to reporting than to drug dependence.

Our findings are consistent with those reported elsewhere.^{13–15} The study provides an insight into the disciplinary consequences of inappropriate prescribing of drugs of dependence in New Zealand, but provides no indication of the extent of drug dependence in doctors. In some disciplinary decisions it was clear the drugs were not for self-use.

The paucity of disciplinary cases and diversity of misconduct mean it is not possible to generalise, but it appears that discipline is used as the last resort for dealing with drug-dependent doctors. Doctors with drug dependence should be encouraged to get help. The Medical Council's Health Committee has an important role to play here. The role of discipline is unclear. Further work is needed to understand the barriers and enablers to reporting by colleagues, to understanding the extent of the problem in New Zealand, and to identifying systems that best manage drug dependence in doctors.

Competing interests:

Nil.

Acknowledgements:

University of Auckland Summer Research Scholarship.

Author information:

Katharine A Wallis, Senior Lecturer, Department of General Practice and Primary Health Care, School of Population Health, University of Auckland, Auckland;
Susie Middleton, Medical Student, University of Auckland, Auckland.

Corresponding author:

Katharine Wallis, Department of General Practice and Primary Health Care, University of Auckland, Private Bag 92019, Auckland 1142.
k.wallis@auckland.ac.nz

URL:

<http://www.nzma.org.nz/journal/read-the-journal/all-issues/2010-2019/2019/vol-132-no-1488-18-january-2019/7785>

REFERENCES:

1. Fry RA, Fry LE, Castanelli DJ. A retrospective survey of substance abuse in anaesthetists in Australia and New Zealand from 2004 to 2013. *Anaesth Intensive Care*. 2015; 43:111–7.
2. Elkin K, Spittal M, Elkin D, et al. Doctors disciplined for professional misconduct in Australia and New Zealand, 2000–2009. *Med J Aust*. 2011; 194:452–6.
3. Health Practitioners Competence Assurance Act 2003, Stat. 48 (NZ). http://www.legislation.govt.nz/act/public/2003/0048/latest/DLM203312.html?search=ts_act_health+practitioners_rese&p=1&sr=1 (accessed 15 Oct 2012).
4. Mayall RM. Substance abuse in anaesthetists. *BJA Education*. 2016; 16:236–41.
5. Dyer C. Julien Warshafsky: how this doctor died and what it tells us about the system that failed him. *BMJ*. 2018; 361:k2564.
6. Domino KB, Hornbein TF, Polissar NL, et al. Risk factors for relapse in health care professionals with substance use disorders. *JAMA*. 2005; 293:1453–60.
7. Medical Council of New Zealand. What to do when you have concerns about a colleague. 2010. <http://www.mcnz.org.nz/assets/News-and-Publications/Statements/Concerns-about-a-colleague.pdf> (accessed August 2018).
8. Medical Council of New Zealand. Health concerns. Available at: <http://www.mcnz.org.nz/fitness-to-practise/health-concerns/> (accessed: August 2018).
9. Medical Practitioners Disciplinary Tribunal. Available at: <http://www.mpdtd.org.nz> (accessed: 15 Aug 2018).
10. New Zealand Health Practitioners Disciplinary Tribunal. Available at: <http://www.hpdt.org.nz> (accessed: 15 Aug 2018).
11. Medical Council of New Zealand. List of registered doctors. Available at: <http://www.mcnz.org.nz/support-for-doctors/list-of-registered-doctors/> (accessed: 15 Aug 2018).
12. Wallis KA. New Zealand's 2005 'no-fault' compensation reforms and medical professional accountability for harm. *N Z Med J*. 2013; 126.
13. Mendelson D. Disciplinary proceedings for inappropriate prescription of opioid medications by medical practitioners in Australia (2010–2014). *J Law Med*. 2014; 22:255–79.
14. Mendelson D. Disciplinary proceedings against doctors who abuse controlled substances. *J Law Med*. 2015; 23:24–40.
15. Cadman M, Bell J. Doctors detected self-administering opioids in New South Wales, 1985–1994: characteristics and outcomes. *Med J Aust*. 1998; 169:419–21.

The time has come for New Zealand to improve outcomes after emergency laparotomy

Katherine Broughton, Era Soukhin, Andrew R Moot, Ben Griffiths

The time has come for New Zealand healthcare to focus on emergency laparotomies (ELs) and enhancing outcomes through data collection, real-time clinician feedback and quality improvement in the processes of care. Adult patients with acute abdominal conditions present throughout the country and many of them will need an emergency laparotomy. European evidence has shown that those requiring surgery are some of our highest risk patients, with a 30-day mortality in excess of 10%.¹⁻³ To offer some perspective, this is 10 times the mortality following first-time coronary artery bypass graft.⁴ Yet, unlike patients with acute coronary syndrome,⁵ there is no national dataset looking into specific measures of care delivery and outcomes for this high risk group of patients. Without evidence, there can be no recommendations or guidelines, especially those applying specifically to patients within New Zealand. Therefore, unlike the management of acute coronary syndromes^{5,6} there is no standardised care pathway.

Summary of evidence

An EL typically refers to patients who undergo an unscheduled operation for an acute abdomen via a midline abdominal incision, although many EL audits⁷⁻⁹ include laparoscopic approaches when traditionally the same procedure would be performed by open means, such as a perforated peptic ulcer.

Evidence worldwide for improving outcomes following ELs includes a standardised process of care pathway, including undertaking an objective risk assessment, early identification and treatment of sepsis,

consultant-led care, reaching the operating theatre in a timely manner and post-operative critical care admission.² Despite the high-risk nature of this operation and considerable inter-hospital variation, prospective audit alone has been shown to improve outcomes.¹²⁻¹⁴ The National Emergency Laparotomy Audit (NELA) in England and Wales has demonstrated steadily improved outcomes and care processes for patients undergoing ELs.⁷⁻⁹ Over three years for example, NELA has shown a reduction in 30-day mortality (11.8% to 10.6%), average length of hospital stays (from 19.2 to 16.6 days) and unplanned returns to theatre (10.2% to 9.0%).⁷⁻⁹

The Copenhagen and EPQuiC studies, conducted since NELA, demonstrated a reduction in mortality by standardising the perioperative care pathway.^{2,11} Most recently the UK's Emergency Laparotomy Collaborative (ELC) has used quality improvement methodology to increase compliance with key standards of care. Preliminary results demonstrating crude mortality for the last four months was 7.5%, a reduction from 9.7%. There has also been a two-day reduction in length of hospital stay (unpublished data, Nial Quiney, Principal Investigator of ELC) as compliance with their care bundle improved.

In Australia, the first multi-hospital prospective EL audit, the Perth Emergency Laparotomy Audit (PELA), was published last year. It showed lower 30-day mortality than in the UK, despite poor compliance with process of care targets.¹⁰ While there are differences in resource allocation, privatisation of the health system, referral

patterns and case mix, a likely significant contributor to this lower mortality is avoiding surgery on very high-risk patients whose chances of long-term survival are extremely low and where a return to an acceptable quality of life is unlikely.

Unfortunately, it was beyond the scope of NELA to capture patients who did not undergo surgery, which makes direct comparison difficult. However, NELA's patient group did have a higher pre-operative mortality risk than those in Western Australia (WA).⁸ Furthermore, 1% of patients in NELA (approximately 700 patients) had surgery with an operative diagnosis of 'not amenable to surgery'.⁸ Such open/close laparotomies, while not completely avoidable, are unusual in WA with the advent of mandatory reporting to the Australian and New Zealand Audit of Surgical Mortality (ANZASM). Better selection of those patients who will not survive despite surgery, or have an unacceptable quality of life following surgery, will clearly reduce operative mortality rates. While it would not reduce overall mortality, avoidance of futile surgery offers an important opportunity to improve end-of-life care.

Despite the overseas evidence showing high mortality following ELs and the benefits that a standardisation of care approach can impart, we lack baseline multi-hospital data in New Zealand on outcomes and process of care compliance. A retrospective review at Auckland City Hospital showed a 30-day mortality of 8% over two years.¹⁵ If we extrapolate such generalised data from all surgical procedures, we are unlikely to be outliers in outcomes compared to other Western nations. We know from the Perioperative Mortality Review Committee, as a surrogate to allow international comparisons, crude 30-day mortality after colorectal resections in New Zealand between 2010 and 2015 was 3.69%.¹⁶ Not unexpectedly, acute/emergency colectomy carried an almost four-fold increase in mortality than elective (8.09% compared with 1.87%) without adjusting for risk factors such as age, comorbidities and colonic obstruction.¹⁶ This compares with international studies including the NHS's English data with an overall 6.7% 30-day mortality, including both acute and elective resections.¹⁷

Problems with existing evidence

Direct adoption of a UK model of care will expose the differences between the two health systems and the problems of not modifying the model to fit within the New Zealand healthcare environment. In New Zealand there are hospitals undertaking emergency laparotomies without level 3 critical care units, a requirement for such a hospital in the UK. The remoteness of some patients and therefore the transfer times to tertiary hospitals is also a significant difference.

Furthermore, while many countries have shifted towards acute general surgery being undertaken by subspecialty upper and lower GI surgeons, there are still a significant proportion of generalists or breast surgeons undertaking emergency laparotomies throughout New Zealand. Overseas evidence has shown improved outcomes when emergency laparotomies are undertaken by GI surgeons, and especially where colorectal emergencies are treated by specialist colorectal surgeons.¹⁸⁻²² The feasibility of this in New Zealand is questionable, as it is only in the larger district health boards where there may be sufficient numbers of colorectal surgeons to run a sub-specialist on-call roster. In the New Zealand context, removing general and breast surgeons from on-call rosters may substantially increase the burden of out of hours work for GI surgeons.

The specialist general surgical training program in New Zealand and Australia has a stated aim of training specialist general surgeons to a level where they could confidently perform a weekend on call as a consultant general surgeon at a regional hospital. The length of the specialist general surgical training program is likely to be increased from four years to five years, to ensure that trainees have adequate exposure in the setting of reducing working hours for resident medical officers. Trainees enter the training program with a greater level of experience than their US equivalents, and sub-specialisation occurs later than in UK training programmes. The difference in performance between our 'generalist' general surgeons and our sub-specialist colorectal surgeons in performing emergency colorectal surgery may not be as significant as witnessed overseas.

Why we need a similar project in New Zealand

While there are obvious differences between our healthcare system and that in the UK, the current situation in New Zealand is far from defined. We have some data that demonstrates overall, our mortality post emergency laparotomy is similar to comparable countries internationally, but there are significant socioeconomic and ethnic differences in perioperative mortality^{15,16,23} and we need to explore this in more depth.

In addition, we have limited data at a national level regarding:

- The characteristics of these patients; level of frailty, sepsis, age groups and primary pathology
- The current standard; rate of operative *versus* non-operative management, types of operations performed
- Why we are doing what we are doing?

The latter is particularly relevant for our highest risk patients in terms of the broader ethical decisions around surgery. The care of these patients is resource-intensive, but it is unknown what actual resources are being utilised in New Zealand, and the differences in resource provision between hospitals. Furthermore, there has not previously been a prospective EL audit that has collected data on patients who were managed non-operatively.

Lastly, and most importantly, is the assessment of how patients fare in the medium to long term. While mortality is an obvious discrete outcome, and easy to capture at a national level in New Zealand using the National Minimum Dataset, we should also be looking for other outcomes that mean something to our patients—such as post-operative level of function and return to independent living following an emergency laparotomy. Morbidity and complication rates have been notoriously difficult to obtain routinely at national level, however a new outcome measure of days alive and out of hospital can be used as an index of morbidity.²⁴ In New Zealand, days alive and out of hospital *can* be obtained routinely and with relative ease from the National Minimum Dataset.

How we can do this in New Zealand

To draw the kind of meaningful national information on processes and outcomes for our patients undergoing emergency laparotomies we need to enable the electronic recording of everyday clinical information as a matter of routine and in a prospective fashion. In so doing, we can extract accurate project-related data ‘in bulk’, using the existing (or minimally improved) health informatics and business intelligence support structures and collate results at a national level.

Fortunately, within New Zealand there are already some district health boards that are in an excellent position from this perspective.²⁵ These information technology platforms are crucial, not only for this project but potentially for hospital quality improvement as we know it. Many DHBs are moving towards more patient records being electronic. Some district health boards have the ability to electronically extract a significant majority of the relevant dataset. Data points such as the time patient arrived in theatre, which surgeon and anaesthetist were present and which operation was performed are already recorded. Some of these data fields are reported to the Ministry of Health for the National Minimal Database (NMD), others form part of the hospital’s own administration records. Additional data such as frailty scoring and mortality risk calculators can be added as part of the electronic record with minimal adjustments to the already present clinical portal software. This data can then be uploaded into REDCap, a free healthcare database and already used internationally for healthcare research and audit projects.^{26,27}

It is possible to combine electronic data collection tools, streamlined to the clinicians’ workflow together with an automatic data-capture system. Key information, in turn, can be fed back to the clinicians, enabling them to make positive changes. In doing so, the data collection burden on clinicians (an issue in the UK in NELA) would be removed. While ultimately there will still be the requirement for some specific clinician-entered data, this would still be significantly less than NELA and similar projects. For example, the extent of support a patient may require at home after hospital discharge is

currently recorded manually in all DHBs and not currently easily extractable, therefore there will be the need for a clinician to enter this in the audit form. We believe that by 'freeing up' clinicians to instead focus on ways of improving clinical care based on high-quality data, a blueprint for future quality improvement is established.

Introducing the Australia and New Zealand Emergency Laparotomy Audit-Quality Improvement (ANZELA-QI) and its adaptation for New Zealand

The Royal Australasian College of Surgeons (RACS) and the Australia and New Zealand College of Anaesthetists (ANZCA) have committed to supporting a bi-national bi-college Emergency Laparotomy Quality Improvement project (ANZELA-QI). This is the first of its kind and is potentially highly significant for perioperative medicine. The pilot version of this aims to roll out during 2018 and, following funding support, will extend across hospitals in Australia and New Zealand in both public and private sectors. Further information, including governance, inclusion/exclusion criteria, data collection form and the minimal dataset can be found on the RACS website.²⁸ The pilot will allow assessment of the feasibility of the data collection methods, the end-user experience of clinicians as they enter data into an electronic assessment form (as opposed to handwriting in the clinical notes) and the data collection burden of the small number of remaining 'manual entry' data points. Standardised scores and measurements have been chosen for the pilot in both Australia and New Zealand; Rockwood frailty scoring, P-POSSUM and others and will be incorporated into the electronic assessment form.

We are in a unique position in New Zealand in that we have the potential to produce the high-quality process-of-care *and* outcome data with greater ease than Australia. This allows us to expand our dataset beyond the minimum stipulated by ANZELA-QI.²⁸ Due to a smaller population size in New Zealand, less variation between health information system platforms, multiple DHBs moving towards electronic clinical record keeping (and therefore already collecting the majority of the data needed for this project), the National Health Index (NHI) and the NMDS (which

is inclusive of NHIs, dates of admission and discharge, primary diagnosis and surgery performed (if any) and linked with the date of death), we can expand the project to include all cases of acute surgical abdomen and provide greater certainty of our data completeness. This will ensure that patients who qualify are not missed and the true denominator is captured, for example, to include patients who qualify for an EL but for various reasons do not undergo one.

Furthermore, we can combine this data with outcome measures of 30-day and one-year mortality, as well as days alive and out of hospital at 90 days after diagnosis of an acute abdomen at the national level. Such an extension of the project is not currently achievable in Australia.

Therefore, the New Zealand arm of ANZELA-QI has been designed with an expanded scope, entitled Care Delivery in New Zealand for the Acute Abdomen (CADENZAA). Combining the CADENZAA data with data from Australia will result in a larger dataset and greater statistical precision when interpreting results. Feedback of both New Zealand and combined bi-national results to the institutions will help drive quality improvement at a local level.

In practical terms, CADENZAA Site Lead Investigators at each district health board would need to first identify how much of the required data is already collected electronically. After this, an assessment of the ability to convert currently hand-written clinical notes (lost data) into an electronic format will take place. Once the data source blueprint is established for each DHB, guided by the CADENZAA Steering Group investigators, the project's long-term sustainability is ensured through more reliable and largely automated data collection. Moreover, other clinical projects in the perioperative domain can be enabled by harnessing the established inter-professional networks both within and between DHBs. An example of such an established and successful network between DHBs is the New Zealand Global Rating Scheme (NZGRS).²⁹ This was started by the National Endoscopy Quality Improvement Program, (Ministry of Health funded) to improve endoscopy services prior to the roll-out of colorectal cancer screening. It has been implemented across all DHB endoscopy units.

Funding for CADENZAA is currently being applied for. The initial funding, covering several pilot sites, is required to demonstrate that the concept of electronic data collection and extraction is achievable and to enable further funding for a nationwide project. The sustainability of such projects has been illustrated by NELA with a two-day reduction in average length of stay, resulting in a £22 million saving per annum.⁷⁻⁹

We believe the opportunity to measure accurately and continuously (yet unobtrusively) what we are doing nationally, by

combining the expertise of clinicians from multiple specialties, together with health informatics specialists and business intelligence professionals is the way forward in healthcare quality improvement. Feeding this information back promptly and continuously will equip clinicians with the knowledge and armamentarium to optimally engage in raising quality and safety of patient care. Success in achieving this 'proof of concept' approach will have a far reaching and ultimately positive impact on healthcare in New Zealand and beyond.

Competing interests:

Nil.

Author information:

Katherine Broughton, Colorectal Fellow, Western General Hospital, Edinburgh, Scotland; Era Soukhin, Specialist Anaesthetist, Auckland City Hospital; Principal Co-Investigator of CADENZAA: CARE DELIVERY in New Zealand for the Acute Abdomen; Andrew R Moot, Consultant Colorectal Surgeon, North Shore Hospital, Auckland; President New Zealand Association of General Surgeons; General Surgical Representative on the New Zealand National Board of the Royal Australasian College of Surgeons; Ben Griffiths, Specialist Anaesthetist, Auckland City Hospital, Auckland; Co-Chair of ANZELA-QI (Australia and New Zealand Emergency Laparotomy Quality Improvement Project) Working Group; Principal Co-Investigator of CADENZAA: CARE DELIVERY in New Zealand for the Acute Abdomen.

Corresponding author:

Katherine Broughton, Department of Colorectal Surgery, Western General Hospital, Crewe Rd South, Edinburgh EH4 2XU.
katherinebroughton@hotmail.com

URL:

<http://www.nzma.org.nz/journal/read-the-journal/all-issues/2010-2019/2019/vol-132-no-1488-18-january-2019/7786>

REFERENCES:

1. Saunders DI, Murray D, Pichel AC, Varley S, Peden CJ. Variations in mortality after emergency laparotomy: the first report of the UK Emergency Laparotomy Network. *Br J Anaesth*. 2012 Sep; 109(3):368–75.
2. Tengberg LT, Bay-Nielsen M, Bisgaard T, Cihoric M, Lauritsen M, Foss N. Multidisciplinary perioperative protocol in patients undergoing acute high-risk abdominal surgery. *Br J Surg*. 2017 Mar; 104(4):463–471.
3. Watt DG, Wilson MS, Shapter OC, Patil P. 30-day and 1-year mortality in emergency general surgery laparotomies: an area of concern and need for improvement? *Eur J Trauma Emerg Surg* 2015 Aug; 41(4):369–74.
4. Swanton RH, Banerjee S. Swanton's cardiology. 6. ed. ed. Malden, Mass. [u.a.]: Blackwell; 2008.
5. Webster M. Early angiography and revascularisation for acute coronary syndromes in New Zealand. *N Z Med J* 2016 Jan; 129(1428):7–9.
6. NZ Cardiac Network recommendations for referral and access to secondary care for common cardiac conditions [Internet]. New Zealand Cardiac Network. [Cited 2018 Mar 22]. Available from: <http://cardiacsociety.org.nz/wp-content/uploads/NZCN-expected-standards.pdf>
7. Organisational Report of the National Emergency Laparotomy Audit. [Inter-

- net]. London: National Emergency Laparotomy Audit [Cited 2018 Mar 22]. Available from: <http://www.nela.org.uk/Organisational-Audit-Report#pt>
8. Second Patient Report of the National Laparotomy Audit [Internet]. London; NELA Project Team [Cited 2018 Mar 22]. Available from: <http://www.nela.org.uk/Second-Patient-Report-of-the-National-Emergency-Laparotomy-Audit#pt>
 9. Third Patient Report of the National Emergency Laparotomy Audit [Internet]. London: NELA Project Team [Cited 2018 Mar 22]. Available from; <http://www.nela.org.uk/Third-Patient-Audit-Report#pt>
 10. Broughton KJ, Aldridge O, Pradhan S, Aitken RJ. The Perth Emergency Laparotomy Audit. *ANZ J of Surg.* 2017 Nov; 87(11):893–897.
 11. Huddart S, Peden CJ, Swart M, McCormick B, Dickinson M, Mohammed MA et al. Use of a pathway quality improvement care bundle to reduce mortality after emergency laparotomy. *Br. J. Surg.* 2015 Jan; 102(1):57–66.
 12. Kiermeier A, Babidge WJ, McCulloch GAJ, Maddern GJ, Watters DA, Aitken RJ. National surgical mortality audit may be associated with reduced mortality after emergency admission. *ANZ J Surg.* 2017 Oct; 87(10):830–836.
 13. Watters DA, Babidge WJ, Kiermeier A, McCulloch GA, Maddern GJ. Perioperative Mortality Rates in Australian Public Hospitals: The Influence of Age, Gender and Urgency. *World J Surg.* 2016 Nov; 40(11):2591–2597.
 14. van Gijn W, van de Velde CJ; members of the EURECCA consortium. Improving quality of cancer care through surgical audit. *Eur J Surg Oncol.* 2010 Sep; 36 Suppl 1:S23–6.
 15. Sayer C. Emergency Laparotomy; Achieving better patient outcomes. Queenstown Update in Anaesthesia (AQUA), Queenstown 2014. [Cited 2018 August 22]. Available from: <http://www.aqua.ac.nz/upload/resource/Emergency%20laparotomy;%20achieving%20better%20patient%20outcomes.pdf>
 16. Perioperative Mortality in New Zealand: Sixth report of the Perioperative Mortality Review Committee [Internet]. Perioperative Mortality Review Committee. Report to the Health Quality & Safety Commission New Zealand. Health Quality & Safety Commission New Zealand [Cited 2018 Mar 22]. Available from; <http://www.hqsc.govt.nz/our-programmes/mrc/pomrc/news-and-events/news/2951/>
 17. Morris EJ, Taylor EF, Thomas JD, Quirke P, Finan PJ, Coleman MP, et al. Thirty-day post-operative mortality after colorectal cancer surgery in England. *Gut.* 2011 Jun; 60(6):806–13.
 18. Hussain A, Mahmood F, Teng C, Jafferbhoy S, Luke D, Tsiamis A. Patient outcome of emergency laparotomy improved with increasing “number of surgeons on-call” in a university hospital: Audit loop. *Ann Med Surg (Lond).* 2017 Sep 28; 23:21–24.
 19. Biondo S, Kreisler E, Millan M, Fraccalvieri D, Golda T, Frago R et al. Impact of surgical specialization on emergency colorectal surgery outcomes. *Arch Surg.* 2010 Jan; 145(1):79–86.
 20. Barrow E, Anderson I, Varley S, Pichel AC, Peden CJ, Saunders DI et al. Current UK practice in emergency laparotomy. *Ann R Coll Surg Engl.* 2013 Nov; 95(8):599–603.
 21. Zorcolo L, Covotta L, Carlomagno N, Bartolo DC. Toward lowering morbidity, mortality, and stoma formation in emergency colorectal surgery: the role of specialization. *Dis Colon Rectum* 2003 Nov; 46(11):1461–18.
 22. Boyce SA, Bartolo DC, Paterson HM. Subspecialty emergency management of diverticulitis is associated with reduced mortality and fewer stomas. *Colorectal Dis* 2013; 15:442–447.
 23. Myles PS, Shulman MA, Heritier S, Wallace S, McLroy DR, McCluskey S et al. Validation of days at home as an outcome measure after surgery: a prospective cohort study in Australia. *BMJ Open.* 2017 Aug 18; 7(8):e015828.
 24. McDonald K. Southern DHB to go live with HealthOne, South Island-wide [Internet]. ACP; 2016 [Cited 2018 Mar 22]. Available from: <http://www.pulseitmagazine.com.au/new-zealand-ehealth/3116-southern-dhb-to-go-live-with-healthone-south-island-wide-acp>
 25. Report finds ‘unacceptable’ difference in death rates [Internet]. Perioperative Mortality Review Commit-

- tee, Health Quality and Safety Commission of New Zealand. 2017 [Cited 2018 Mar 22]. Available from: <http://www.hqsc.govt.nz/our-programmes/mrc/pomrc/news-and-events/news/2951>
26. Harris PA, Taylor R, Thielke R, Payne J, Gonzalez N, Conde JG. Research electronic data capture (REDCap) – A metadata-driven methodology and workflow process for providing translational research informatics support, *J Biomed Inform.* 2009 Apr; 42(2):377–81.
27. Research electronic data capture (REDCap) [Internet]. Vanderbilt University, Tennessee, USA 2004 [Cited 2018 Sept 12]. Available from: <http://www.project-redcap.org/>
28. ANZ Emergency Laparotomy Audit– Quality Improvement [Internet]. Melbourne: Royal Australasian College of Surgeons 2018. [Cited 2018 Aug 22]. Available from: <http://www.surgeons.org/for-health-professionals/audits-and-surgical-research/morbidity-audits/anzela-qi/>
29. New tool is changing patients' experience of endoscopy [Internet]. Health Quality and Safety Commission New Zealand, July 2012. [Cited 2019 Aug 22]. Available from; <http://www.hqsc.govt.nz/our-programmes/other-topics/news-and-events/news/522/>

Hot tub lung: take a bathing history from the breathless

Dave A Duggan, Andrew G Stanley, Phil Shoemack

Hot tub lung is a non-infectious hypersensitivity granulomatous inflammatory condition caused by inhalational exposure to non-tuberculous mycobacteria. We report a case of confirmed hot tub lung in an immunocompromised host with underlying lung disease.

Case report

In July 2018, a 77-year-old New Zealand European male presented with a two-day history of acute on chronic dyspnoea with subjective fever and worsening dry cough.

He reported a 50m exercise tolerance on admission which had significantly declined from three months earlier when he could walk several kilometers. A 5kg weight loss was noted over the previous three months. He noted an acute on chronic exacerbation of his cough. On direct questioning he reported owning a spa pool which he kept in his garage and used on a regular basis.

He had multifactorial causes of dyspnea on exertion, including chronic obstructive pulmonary disease and obstructive sleep apnoea. He also had a history of rheumatoid arthritis and polymyalgia rheumatica for which he required methotrexate and low dose prednisone.

On examination he was noted to be hypoxic and tachycardia with inspiratory lung crepitations. The white cell count was 15.8 with CRP of 61. Chest x-ray revealed widespread reticular nodular opacities which had progressed over the preceding few months.

At the time of presentation the patient was under investigation by the general surgeons for a change in bowel habit and ongoing weight loss. A colonoscopy in June 2018 revealed an entirely normal colon. An outpatient CT thorax, abdomen, pelvis

was performed one week prior to the presenting admission to further investigate these symptoms. This revealed extensive ground glass attenuation, with centrilobular nodules commonly referred to as tree-in-bud appearance throughout both lungs¹ (Figure 1).

Intravenous augmentin was commenced and methotrexate was stopped. Expecto-rated sputum grew mycobacterium avium intracellulare complex (MAC) after 14 days of culture. Bronchoscopy cultures confirmed MAC growth on day 24 of culture. The public health officer visited the patient's home and took samples of the spa pool water which also demonstrated the presence of MAC.

Prednisone 30mg daily was commenced and he was advised to dispose of his spa pool. Two weeks post-discharge, his cough was markedly better with a 2kg weight gain but no significant improvement in dyspnoea. He reported that he had stopped using the spa pool but had not emptied its contents.

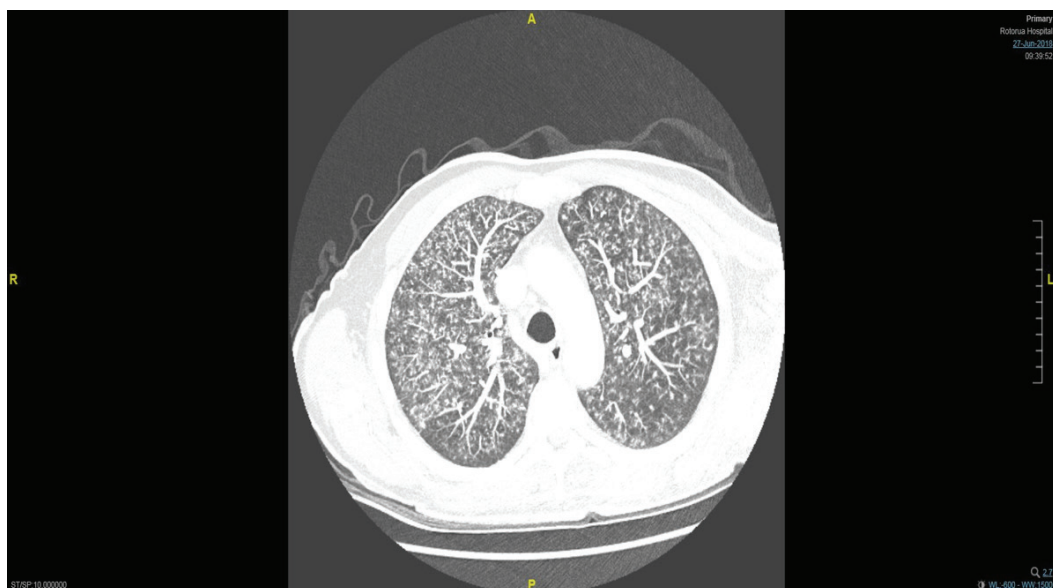
Prednisone was weaned by 5mg weekly. The spa pool was removed from the patient's premises. At two months post-discharge the patient's cough had resolved and his dyspnoea had also significantly improved.

Discussion

MAC is the most common bacteria that can cause hot tub lung.² In cases where hypersensitivity pneumonitis is demonstrated radiologically, it should be recognised as a possible differential diagnosis.³

It most commonly affects immunocompetent individuals.⁴ Our case is one of few reported in the literature where both underlying lung disease and immunosuppression were present at the time of diagnosis.

Figure 1: CT thorax at presentation showing extensive centrilobular nodules and ground glass appearance throughout both lungs consistent with hypersensitivity pneumonitis.



This case also demonstrates a challenging diagnostic process. Initial evaluation of this patient would likely trigger a differential diagnosis of methotrexate-induced pneumonitis or rheumatoid lung disease. Therefore, a detailed history and evaluation should be sought.

Avoiding further exposure to spa pools with or without the use of oral corticosteroids is the mainstay of treatment. It does not appear that antimycobacterial therapy is indicated in the treatment of these patients.⁵ Frequent spa pool cleaning with strict maintenance of pool filters and regular water changes reduces the risk of contamination.⁶

Competing interests:

Nil.

Author information:

Dave A Duggan, Medical Registrar, Rotorua Hospital, Rotorua;
 Andrew G Stanley, Respiratory Physician, Rotorua Hospital, Rotorua;
 Phil Shoemack, Medical Officer of Health, Bay of Plenty District Health Board.

Corresponding author:

Dr Dave Duggan, Rotorua Hospital Medical Department, 35B May Street, Mount Maunganui,
 Tauranga 3116.
 d.duggan457@gmail.com

URL:

<http://www.nzma.org.nz/journal/read-the-journal/all-issues/2010-2019/2019/vol-132-no-1488-18-january-2019/7787>

REFERENCES:

1. Griffith DE, Aksamit T, Brown-Elliott BA, et al. An official ATS/IDSA statement: diagnosis and treatment and prevention of nontuberculous mycobacterial diseases. *American Journal of Respiratory and Critical Care Medicine*. 2007; 175(4):367–16.
2. Hanak V, Kalra S, Aksamit TR, et al. Hot Tub Lung: presenting features and clinical course of 21 patients. *Respiratory Medicine*. 2006; 100(4):610–5.
3. Hartman TE, Jensen E, Tazelaar HD, et al. CT findings of granulomatous pneumonitis secondary to mycobacterium avium-intracellulare inhalation: “Hot Tub Lung”. *American Journal of Roentgenology*. 2007; 188(4):1050–3.
4. Rossi SE, Franquet T, Volpacchio M, et al. Tree-in-Bud Pattern at Thin-Section CT of the Lungs: Radiologic-Pathologic Overview. *Radiographics*. 2005; 25(3).
5. Waller EA, Roy A, Brumble L, et al. The expanding spectrum of mycobacterium avium complex-associated pulmonary disease. *Chest*. 2006; 130(4):1234–41.
6. Yassin H, Mangano WE, Malhotra P. Hot Tub Lung: A Diagnostic Challenge. *Cureus*. 2017; 9(8).

Over and under? Ethnic inequities in community antibacterial prescribing

Scott Metcalfe, Sandhaya (Sandy) Bhawan, Meena Vallabh, Peter Murray, Catherine Proffitt, Greg Williams

Whyler et al (17 August 2018)¹ have valuably highlighted the differences in community antibacterial dispensing patterns by ethnicity and the important issue of over-prescribing of antibacterials in New Zealand.¹ However, we are concerned that their analysis does not adequately consider the appropriateness of dispensings for Māori and Pacific Peoples, given their greater burden of infectious disease. Taking this into consideration, our recent analysis suggests in fact antibacterials may be *under-prescribed* in these populations.

In their article, the authors have clearly identified a tension with antibacterial use in New Zealand: the need to balance appropriate use against the risks of antibacterial resistance that can arise from overuse. They reported the overall rates of community antibacterial dispensing were high in New Zealand, being highest in Māori and Pacific Peoples. They surmised that the higher rates of dispensing in Māori and Pacific Peoples reflected the higher incidence of various infectious diseases. They also discussed a need for nuancing, so programmes to reduce antibacterial consumption do not inadvertently lead to reduced treatment for infections.

However, the article's summary ends with "...health care workers caring for patients in the community need to reduce antibiotic prescribing *for all population groups*" [our emphasis]. This contradicts the earlier messaging about nuancing—where prescribing rates for some groups may still be too *low* relative to their much higher rates of infectious disease.

We believe greater consideration is needed as to whether the dispensing rates of antibacterials align appropriately with the higher infectious disease burden in Māori

and Pacific populations. Updated PHARMAC-commissioned analysis (of disease burden-adjusted dispensings of funded prescription medicines in New Zealand for 2012/13)² reports that, after adjusting for the infectious disease burden,³ there is a shortfall in the number of antibacterial treatments Māori receive compared with non-Māori. Building on this analysis (adjusting for access to primary care and prescription affordability), we recalculate that overall antibacterial dispensings in Māori and Pacific Peoples might be up to 29% less than their higher disease burden warrants (derived from adjusted rate ratio (RR) of 1.41; see endnote for calculations).

This degree of under-prescribing of antibacterials relative to health need requires further refinement, as its norm (the non-Māori and non-Pacific population) will be contaminated by over-prescribing (and we do not know whether over-prescribing for Māori and Pacific people is as high or even worse). Whyler et al surmise that over-prescribing may account for half of all antibacterial prescriptions.¹ This may indeed be the case, but the cited supporting evidence came from the US,⁴ where prescribing may be more profligate than in New Zealand, and that study reported 30% over-prescribing, not 50%.⁴ Recent UK estimates suggest 8–23% over-prescribing of community antibacterials.⁵ Applying the UK estimates to our updated 1.41 RR (see endnote) still gives shortfalls in Māori and Pacific People of between 8 and 23% lower antibacterial use when compared with the non-Māori and non-Pacific population.

An important limitation to both analyses,^{1,2,endnote} has been the inability to capture the 4.2% of antibacterials dispensed as a Practitioner's Supply Order (PSO) or in school-based public health programmes

including for sore throat management. Further research is warranted into the significance of antibacterial PSOs on the shortfall of scripts seen between Māori and non-Māori in New Zealand.

The above updated calculations suggest that Māori and Pacific Peoples, overall, might well be *under-prescribed* antibacterials relative to their disease burden, even after adjusting for health system factors (primary care access and prescription part-charges) and likely bounds for overprescribing of antibacterials. The calculations reinforce the need for nuancing, which Whyler et al call for.¹ Unless very carefully designed, programmes aiming to reduce the general rates of antibacterial treatments could worsen already existing inequity gaps in access. Worse, they may contribute to inequitable health outcomes for Māori and Pacific Peoples.^{6,7}

Notwithstanding the above calculations, there are clear instances where over-prescribing is occurring for Māori and Pacific Peoples. Whyler et al reported that topical antibacterial dispensing in young Māori and Pacific patients is disproportionately high when compared with other ethnic groups.¹ We consider much of this is inappropriate and could be causing harm, given the few indications for topical antibacterial use and the documented risk of antimicrobial resistance.⁸

Since that time, New Zealand's community use of topical fusidic acid has lessened,⁹ and to support this further, PHARMAC has received clinical advice¹⁰ and from March 2019 will list a smaller 5g tube of fusidic acid ointment, which will replace the currently funded 15g tube.

We are not saying that, overall, inappropriate prescribing of antibacterials is not occurring for Māori and Pacific Peoples. But overall for Māori and Pacific Peoples, antibacterial under-prescribing does seem even higher, and hence the need for careful messaging. The challenge is having two distinct problems: over- and under-prescribing, when it can be difficult distinguishing when antibacterials are needed or not. We do not know the extent of over-prescribing for Māori and Pacific Peoples—and indeed, worst case, they may suffer double jeopardy, being impacted by both over-prescribing and under-prescribing.

Both issues need to be addressed, but overall our updated analysis suggests under-prescribing may be more important here for Māori and Pacific Peoples.

Finally, Whyler et al have reported clear seasonal patterns in community antibacterial dispensing.¹ PHARMAC is supporting appropriate antibacterial prescribing with our programme '[Keep antibiotics working](#)' launched last winter, aimed at reducing patient demand for antibacterials for use in predominantly viral winter illnesses. This campaign has been social media-based and has focused on strategies for patients to manage common viral symptoms without antibacterials. PHARMAC will continue to provide [resources and information](#) to support optimal prescribing of antibacterials to all New Zealanders.

Endnote: During 2012/13 Māori received 647,431 scripts for antibacterials (of 4.157 million dispensings for antibacterials overall), with age-standardised dispensing rates of 1,042.6 and 897.5 per 1,000 for Māori and non-Māori respectively. This gave a Māori:non-Māori age-standardised rate ratio (RR) of 1.16, ie, Māori were dispensed antibacterials at levels 16% higher than non-Māori. However, New Zealand Burden of Disease Study estimates have an age-standardised burden of disease RR Māori:non-Māori of 1.82 for of bacterial infections—ie, the burden of disease from bacterial infections for Māori was nearly double that for non-Māori. Subtracting Pacific People from the non-Māori comparator, and assuming they have rates similar to Māori⁶ increases the burden of disease rate ratio to 1.97 for Māori:non-Māori/non-Pacific People (nMnP). Hence, after adjusting for disease burden, the 1.16 dispensing RR (1.18 adjusting for Māori:nMnP) becomes 0.60 (=1.18/1.97), ie, Māori dispensing rates for antibacterials were only 3/5^{ths} of what they might be (if assuming, optimistically and erroneously, that comparator nMnP rates are the norm, with no over-prescribing), given Māori higher disease burden, and a shortfall of >200,000 scripts.²

However, some of the excess disease burden in Māori and Pacific Peoples is due to Māori and Pacific Peoples having poorer access to primary care, and less ability to afford prescription charges once prescribed. This will reduce the dispensing-adjusted burden of disease RR. The extent that Māori and Pacific Peoples less easily access primary care than nMnP, and then pick up medicines once prescribed because of cost, might combine to as much as 37% in Māori/Pacific Peoples of instances otherwise-presenting-to-primary-care-then-uplifting-dispensing, cf 25% for nMnP. We have calculated this algebraically, with inputs where we estimate, eg, 38% of Māori or Pacific adults reporting unmet need for primary care vs 28% nMnP, 22% Māori adults at times not visiting a general practitioner due to cost; 15% Pacific and 14% Māori adults reporting they are

unable to pick up prescriptions due to cost of 7% of nMnP;¹¹ these combine to perhaps as few as 63% (1 minus the above 37%) of Māori both access primary health care and can afford script part-charges, cf. 75% (1 minus 25%) of nM, a rate ratio of 0.84. So the 1.97 RR becomes 1.66 RR for the infectious disease burden in Māori/Pacific People vs nMnP adjusting also for access to primary care/prescription charges.

Dividing the 1.18 RR for Māori (or Pacific Peoples)⁶ vs nMnP antibacterial dispensings into the multi-adjusted BOD 1.66 RR gives a final M:nMnP age/disease burden/access/affordability-adjusted rate ratio of 1.41 (=1.66/1.18). That is, after standardising for age, access to primary care and affordability, antibacterial dispensings in Māori (and by inference Pacific Peoples)⁶

may be 29% less than their higher disease burden warrants (= 1 minus (1/1.41), = 1 minus (1.18/1.66)). This of course assumes, radically, that there is no inappropriate over-prescribing of antibacterials.

Thus, excessive and inappropriate use of antibacterials in non-Māori could explain some, but unlikely all, of the comparative shortfall. The 'high' dispensing rates reported for Māori by the authors¹ seems still much lower than what is needed, given Māori having so much greater infectious disease burden. Given the similar (or worse) infectious disease incidence for Pacific Peoples in New Zealand that the authors cite and the dispensing figures they quoted,¹ we believe there is likely a shortfall for Pacific Peoples also.⁶

Competing interests:

Nil.

Author information:

Scott Metcalfe, Chief Advisor Population Medicine/Deputy Medical Director (on external secondment); Sandhaya (Sandy) Bhawan, Principal Adviser Access Equity; Meena Vallabh, Senior Implementation Lead; Peter Murray, Deputy Medical Director; Catherine Proffitt, Manager Access Equity; Greg Williams, Manager Procurement and Contracts, PHARMAC, Wellington.

Corresponding author:

Catherine Proffitt, Access Equity Team, PHARMAC, 40 Mercer Street, Wellington 6011.
catherine.proffitt@pharmac.govt.nz

URL:

<http://www.nzma.org.nz/journal/read-the-journal/all-issues/2010-2019/2019/vol-132-no-1488-18-january-2019/7788>

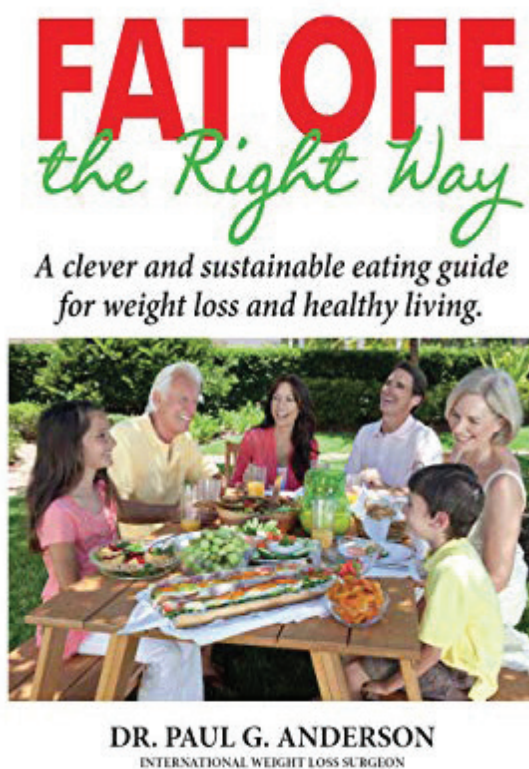
REFERENCES:

- Whyler N, Tomlin A, Tilyard M, Thomas M. Ethnic disparities in community antibacterial dispensing in New Zealand, 2015. *N Z Med J*. 2018; 131(1480):50–60. <http://www.nzma.org.nz/journal/read-the-journal/all-issues/2010-2019/2018/vol-131-no-1480-17-august-2018/7664>
- Auckland UniServices. Variation in medicines use by ethnicity: a comparison between 2006/7 and 2012/13. Final Report. Prepared for PHARMAC. Auckland: University of Auckland, 2018. <http://www.pharmac.govt.nz/tools-resources/research/Māori-uptake-of-medicines/>, <http://www.pharmac.govt.nz/assets/2018-01-19-Variation-in-medicines-use-by-ethnicity-Final-Report.pdf>. Appendices and data <http://www.pharmac.govt.nz/assets/2018-02-26-Māori-uptake-of-medicines-appendices.xlsx>
- Ministry of Health. Health loss in New Zealand: A report from the New Zealand Burden of Diseases, Injuries And Risk Factors Study, 2006-2016. Wellington. Ministry of Health. 2013. [http://www.moh.govt.nz/notebook/nbbooks.nsf/0/F85C39E4495B9684C-C257BD3006F6299/\\$file/health-loss-in-new-zealand-final.pdf](http://www.moh.govt.nz/notebook/nbbooks.nsf/0/F85C39E4495B9684C-C257BD3006F6299/$file/health-loss-in-new-zealand-final.pdf)
- Fleming-Dutra KE, Hersh AL, Shapiro DJ, et al. Prevalence of inappropriate antibiotic prescriptions among US ambulatory care visits, 2010–2011. *JAMA*. 2016; 315:1864–73. <http://jamanetwork.com/journals/jama/fullarticle/2518263>
- Smieszek T, Pouwels KB, Dolk FCK, Smith DRM, Hopkins S, Sharland M, Hay AD, Moore MV, Robotham JV. Potential for reducing inappropriate antibiotic prescribing in English primary care. *J Antimicrob Chemother*. 2018; 73(suppl_2):ii36–ii43. http://academic.oup.com/jac/article/73/suppl_2/ii36/4841818. Also <http://www.gov.uk/government/news/research-reveals-lev->

- els-of-inappropriate-prescriptions-in-england, http://academic.oup.com/jac/issue/73/suppl_2
6. Priorities for Maori and Pacific health: evidence from epidemiology. Public Health Intelligence Occasional Bulletin No. 3. Wellington: Ministry of Health. 2001. [http://www.moh.govt.nz/notebook/nbbooks.nsf/0/A31842D91480064FC-C256A55007A980A/\\$file/PrioritiesForMaoriand-PacificHealth.pdf](http://www.moh.govt.nz/notebook/nbbooks.nsf/0/A31842D91480064FC-C256A55007A980A/$file/PrioritiesForMaoriand-PacificHealth.pdf)
 7. Norris R, Horsburgh S, Keown S, Arroll B, Lovelock K, Cumming J, Herbison P, Crampton P, Becket G. Too much and too little? Prevalence and extent of antibiotic use in a New Zealand region. *J Antimicrob Chemother.* 2011; 66(8):1921–1926. <http://doi.org/10.1093/jac/dkr194>
 8. Williamson D, Ritchie S, Best E, Upton A, Leversha A, Smith A, Thomas M. A bug in the ointment: topical antimicrobial usage and resistance in New Zealand. *N Z Med J.* 2015; 128(1426). <http://www.nzma.org.nz/journal/read-the-journal/all-issues/2010-2019/2015/vol-128-no-1426-4-december-2015/6753>
 9. Best Practice Advisory Committee. Topical antibiotics: keep reducing use. 2018. <http://bpac.org.nz/2018/docs/topical-antibiotics.pdf>
 10. PHARMAC. Dermatology Subcommittee of PTAC Minutes. 30 November 2015. <http://www.pharmac.govt.nz/assets/ptac-dermatology-subcommittee-minutes-2015-11.pdf>
 11. Ministry of Health. New Zealand Health Survey: Annual Data Explorer 2016/17 (Annual Update of Key Results 2016/17: New Zealand Health Survey). Wellington: Ministry of Health, 2017. <http://www.health.govt.nz/publication/annual-update-key-results-2016-17-new-zealand-health-survey>, http://minhealthnz.shinyapps.io/nz-health-survey-2016-17-annual-data-explorer/_w_51d929ff/#!/explore-indicators Populations: Adults (aged 15 years and over), Children (aged 0-14 years); Topic: Barriers to accessing health care; Indicators: Experienced one or more types of unmet need for primary health care in the past 12 months; Unmet need for general practitioner due to cost in the past 12 months; Unfilled prescription due to cost in past 12 months.

Fat Off; the Right Way— A clever and sustainable eating guide for weight loss and healthy living

Frank Frizelle



Dr Paul G Anderson. Published by Junction Publishing, United Kingdom/New Zealand 2018. ISBN 978-1730979927. Soft covered, 90 pages. Price NZ\$19.99. Kindle NZ\$9.14.
<http://www.amazon.com/dp/B07KCSX538?tag=u04d7e-20>

Paul Anderson is a New Zealander who trained in general surgery and works part-time in Australia and part-time in New Zealand. He has been a leader in minimally invasive weight loss surgery for 20 years; despite this there is not a word about surgery in the book! This is his fourth book, the other three being fiction.

This is not a weight loss manual or fad diet book. It is a book about why people put on weight, and how this might be managed. The

book makes the point that this is a long-term issue, no short-term fix.

The book has 20 chapters but is written as two parts. Part one (chapter 1–10) called the “nasty facts” outlines issues around weight gain, the global change in body size, genes and epigenetics, the damages of sugar and cholesterol, as well as the effects of weight gain on an individual’s health. The book is damning of fast food outlets, and the profiteering of food industry pushing health

where harm is the outcome and targeting lower social economic communities with junk food. The book explains the effects of being overweight, including diabetes, hypertension, heart disease, osteoarthritis and the cancer risks.

The second part of the book (Chapters 11–20) is called the “clever eating guide”. These chapters explain it is not just what you eat but how you eat it that is important. The chapters contain many things we have all heard before such as the importance of small plate size, portion size control, no seconds, regular meals, etc, but also makes it clear that the person wanting to lose weight must own this as their problem and arrange appropriate support and keep away from at-risk situations. This part of the book outlines situations where the person

wanting to lose weight will be challenged. It also gives advice on supermarket shopping and provides some meal choices and health tips. Paul also points out that at times the person trying to lose weight will “fall off the horse”. He points out that this happens and not to give up. You need to think about things, get up and have another go.

The book is soft covered with good-sized pages and text. The pages are of good-quality paper. There are good supportive pictures and figures. The book is easy to read and informative. The second part can be used to remind oneself of certain things as required.

This is not a text book, it is meant for people wanting to lose weight and would be a useful addition to direct patients who want to lose weight and manage it themselves.

Competing interests:

Nil.

Author information:

Frank Frizelle, Department of Surgery, Christchurch Hospital, Christchurch.

Corresponding author:

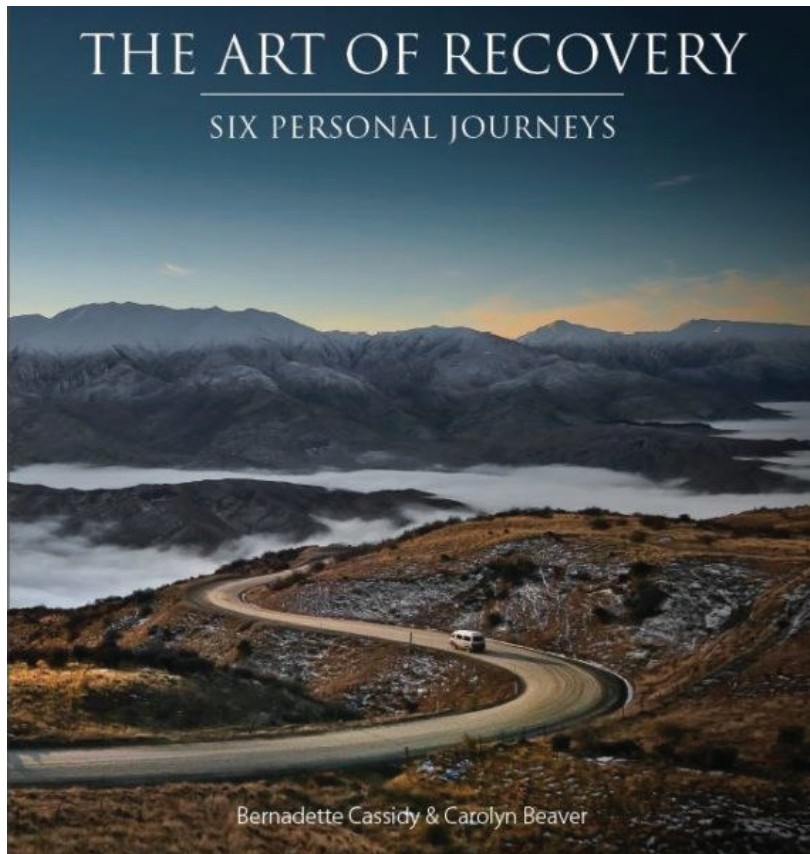
Professor Frank Frizelle, Department of Surgery, Christchurch Hospital, Christchurch.
frank.frizelle@cdhb.health.nz

URL:

<http://www.nzma.org.nz/journal/read-the-journal/all-issues/2010-2019/2019/vol-132-no-1488-18-january-2019/7789>

The Art of Recovery: Six personal journeys

Frank Frizelle



Edited by Bernadette Cassidy and Carolyn Beaver. Published by Burwood Academy of independent living. Printed Spectrum print Christchurch NZ. First edition 2017. ISBN 979-0-41745-1. Soft covered, 94 pages.

As an editor you receive books for review, which are sent to suitable people following an email agreement to review. Usually they do, sometimes, for various reasons they don't. Usually when that happens, the book disappointingly disappears. Rarely books are returned, often with a note of apology. This is such a book.

This book is not a handbook on rehabilitation and is six stories of recovery from various major life/health events with a constant theme. There is a foreword by Gerben DeJong and another by the late Alan Clarke. DeJong (as I found out from this book) published on an independent living paradigm in 1979, and the basis

for this forms one of the main messages for this book. Alan Clarke was Professor of Surgery in Dunedin, before becoming Dean of the Christchurch Clinical School (part of University of Otago) and subsequently Director of the Burwood Spinal Unit. These changes in direction in Alan's life all followed major health issues, as such he had a personal and professional interest in the recovery process.

The message from the book is well outlined in Alan Clarke's foreword, that is during recovery from serious illness or injury the person (patient, consumer) must be in charge of the rehabilitation process, not the rehabilitant professionals; these as

Alan Clarke stated are best regarded as staff. The patient has to own the problem, it is theirs, and they have the most incentive to get it right.

The chapters tell the story in the patients in their own words of their experience of rehabilitation, often with quite long follow-up. The chapters describe the events following various health events, including depression and addiction, head injury, spinal cord injury, cancer, multiple limb amputation and cerebral palsy. Some of the stories are a bit jarring and one chapter comes with a warning “some contents of this story may disturb!” The stories are told in the patients’ own words and are an interesting read in themselves, however the framing, partially

by Alan Clarke’s foreword is excellent and puts a context around the message.

There are a few factual errors, eg, Alan Clarke was a general surgeon, not an orthopaedic surgeon, though he did end up as Head of the spinal unit. The book is well put together, glossy good-quality pages, reasonable binding and has a number of pictures. Text is of a good size and quality. The cover has a picture of a van on a long winding road, emphasising the message of rehabilitation/recovery being a journey.

This book will appeal to any patient or health professional involved in the recovery process, and it is a book that can be read more than once.

Competing interests:

Nil.

Author information:

Frank Frizelle, Department of Surgery, Christchurch Hospital, Christchurch.

Corresponding author:

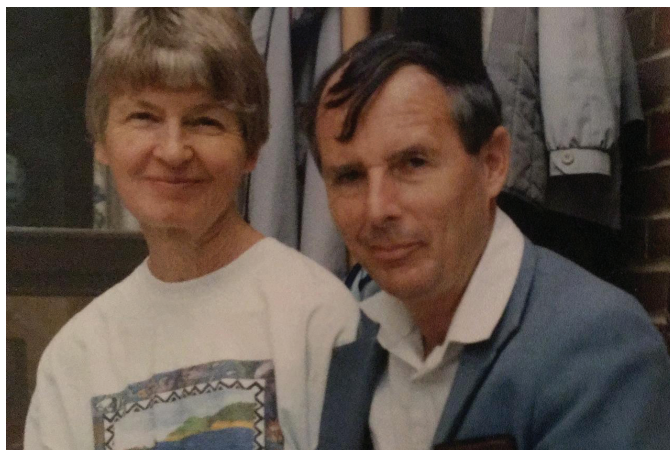
Professor Frank Frizelle, Department of Surgery, Christchurch Hospital, Christchurch.
frank.frizelle@cdhb.health.nz

URL:

<http://www.nzma.org.nz/journal/read-the-journal/all-issues/2010-2019/2019/vol-132-no-1488-18-january-2019/7790>

John Gwyther Richards

12 April 1931–12 December 2018



MBChB, FRNZCGP, FRACP, FRCP(Ed)

John was born in 1931 at home in Mt Eden, to Dorothy and John Richards. His mother trained in anaesthetics, and his father was a surgeon GP, who had been decorated in the first world war. He had a younger brother, Peter. Both his parents were general practitioners, a profession which John was to follow.

After an intermediate year in Auckland, he entered medical school at the University of Otago in 1951, and graduated MBChB in 1955. He travelled to the UK to complete postgraduate studies, initially in Edinburgh, where he obtained his MRCP(Ed), and then London where he worked at the Whittington Hospital. He met his future wife Jill, who worked in the laboratory there over a series of medical specimens. Within a year they were married, and he brought his bride back to Auckland, where they raised three children.

John embraced general practice as a speciality from his early medical days. While in the UK he joined the fledgling North East London Branch of the College of General Practitioners in 1959, which was also the time that the NZ College was being established.

In 1961 he returned to New Zealand to take up partnership in a Mission Bay general practice, where he was to work for many years. Shortly after his return he was nominated as a member of the Faculty Board of the Auckland Branch of the newly

established College of General Practitioners (GPs). His association with the Board lasted many years, including terms as Secretary and Chairman.

In 1962 John also took on a part-time appointment as a visiting consultant in geriatric medicine, a position he held for the next decade. Although John had obtained Membership of the Edinburgh College of Physicians while in Britain, this qualification was not recognised by the Royal Australasian College of Physicians, so in 1966 he undertook the examinations for the Australasian College. He was subsequently elected Fellow of both the Royal College of Physicians of Edinburgh, and the Australasian College of Physicians.

When the first Dean, Cecil Lewis, arrived to set up the new Medical School at the University of Auckland in 1967, John met with him to ask for general practice education to be included in the medical students' curriculum. In 1969 he applied for and was awarded the Nuffield Travelling Fellowship in General Practice, and spent his year visiting centres in Australia, Yugoslavia, Great Britain, USA and Canada to learn about undergraduate general practice education. The following year he was appointed to the University on a part-time basis to develop the general practice curriculum. In 1973 he took up the post of Associate Professor of General Practice, within the Department

of Community Health, and began teaching the first cohort of students to reach their clinical years. His friend and colleague Rae West was later appointed as a second Associate Professor in 1978. That year John also played a role in the establishment of a Director of Postgraduate Education in General Practice (a position taken up by Dr Phil Barham), providing continuing education for GPs and other primary care practitioners. The position was funded through the generosity of the Goodfellow family, and the Goodfellow Unit has grown and flourished. It is still going strong today. In the mid 1980s general practice became its own department, which was subsequently expanded to the current Department of General Practice and Primary Health Care. After the death of his parents, John and his wife Jill donated money to the University in their honour. This was for a prize to be awarded annually, and in perpetuity, to the final year student judged to have completed the best elective in a general practice.

John lobbied hard for a Chair of General Practice. Elaine Gurr, a GP and obstetrician contemporary of John's mother, offered an endowment. She initially established an endowed Chair at the University of Otago, and subsequently a second one at University of Auckland in 1989. The first Chair was Dr Brian McAvoy from England. John resigned from the University in 1996, but remained active in many areas relating to general practice.

He was involved with the College of GPs throughout his career. He served as College's nominee on the Medical Education Committee of the New Zealand Medical Council, and was Chairman of the Examination Committee for the College. In 1979 he was made a Fellow of the New Zealand College of General Practitioners (subsequently the Royal New Zealand College of General Practitioners). In the 1980s the Auckland Faculty found it had surplus funds and set up a Charitable Trust to provide research funds for GPs. The

money was invested in shares, but in 1987 John proposed that instead the Trust buy real estate. Soon after the property was purchased, the sharemarket crashed. When later the house was sold, the Trust's money doubled. John was Chair of the Trust for a number of years, and through his wise investments, this resource continues today.

John always enjoyed writing. In 1975 he produced a *Charter for General Practice* for the College. In 1978 he edited a book *The General Practitioner in New Zealand*, which provided an overview to general practice education, organisation and research at that time. Next came *Primary Health Care and the Community* in 1981. His 1992 book *You and Your Doctor* aimed to give patients a better understanding of what they might expect from their GP. He had a number of peer-reviewed publications, particularly in the *New Zealand Medical Journal*, on topics such as GP knowledge, education and their relationship to other primary care practitioners.

Later in his career he became involved with the Doctors' Health Advisory Service, an organisation set up to meet a perceived need for better healthcare for medical professionals. He was an early proponent of the view that all doctors should have their own GP, and in 1997 he co-edited *In Sickness and in Health*, a handbook for doctors, other health professionals, their partners and families.

After his retirement, John's interests centred on 'Class of 55' reunions, and his profitable hobby of dabbling in real estate. John and Jill were a kind, caring and hospitable couple. Both are sadly missed.

John was truly a pioneer of academic general practice in New Zealand, and in many regards he led the way. My colleagues and I are honoured to have known and worked with him.

John is survived by his two sons David (specialist in emergency medicine) and Simon (builder), daughter Mary (university lecturer), and four grandchildren.

Author information:

This obituary was written by Felicity Goodyear-Smith with assistance from John Werry and David Richards, John Richard's elder son.

URL:

<http://www.nzma.org.nz/journal/read-the-journal/all-issues/2010-2019/2019/vol-132-no-1488-18-january-2019/7791>

Harold Bourne

9 April 1923–6 November 2018



LRCP MRCS (1945), MB BS (London 1953), DPM (Conjoint 1953),
FRANZCP (1970), FRCPsych (1971)

Harold Bourne, an inspiring teacher of psychiatry at Otago University with many protégées, has died in London aged 95.

Harold, the elder son of Jack Bourne and Rachel, née Oster, was born in 1923 into a traditional London East End Ashkenazi Jewish family. He won a scholarship to a grammar school in Islington, Dame Alice Owen's School. From there he entered the medical school of University College London acquiring the LRCP MRCS (Conjoint Diploma) in 1945. After his National Service at Banstead Hospital he became a junior doctor at Netherne Hospital and then the Fountain Hospital for the mentally handicapped. In 1953 he passed the London University MB BS and the Conjoint Diploma in Psychological Medicine (DPM).

His experience at Netherne led to a notable and influential paper, *The Insulin Myth*,¹ a review of the evidence for the effectiveness of insulin coma for schizophrenia concluding the treatment was ineffective. Insulin coma, sometimes enhanced with ECT during the coma, was the standard treatment for schizophrenia from the early 1930s until the late 1950s.

In 1955 Harold was appointed Lecturer in Psychological Medicine at the University of Otago. He said the move to Dunedin was to distance himself and his family from the European nuclear war he saw as imminent. After some years Harold was promoted to Senior Lecturer. In 1974 he returned to London to an NHS consultant post in child and adolescent psychiatry at Charing Cross Hospital. On retirement in 1988 he became

a psychiatrist to the ex-patriate anglophone community in Rome. Infirmity compelled a return to England in 2014 to a Jewish old people's residential home in Golders Green where he lived until he died.

Bourne, with his combination of charm, intellect, enthusiasm for his subject and capacity for friendship with the young, influenced students and junior doctors to consider psychiatry as a specialty. Psychiatry then was a neglected and stigmatised service. Among those he influenced and who

have had a career in psychiatry are: Brian Barraclough, Peter Buckley, John Denford, Peter Grant, Brian McConville, the Muir brothers Brian, Roy and Keith, Jim Methven, John Steiner, Jim Wright and Bourne's daughter, Jill Tregenza. This was Harold's main contribution to New Zealand medicine.

Bourne married three times. He is survived by two of his former wives, eight children, nine grandchildren, two great-grandchildren and his brother Stanford, a London Psychoanalyst.

Author information:

Brian Barraclough, 43 Church St, Devonport, Auckland 0624.
brian.barraclough@xtra.co.nz

URL:

<http://www.nzma.org.nz/journal/read-the-journal/all-issues/2010-2019/2019/vol-132-no-1488-18-january-2019/7792>

REFERENCES:

1. Bourne H. The Insulin Myth. *Lancet* 1953; ii:964-8.

Effects of aspirin on risks of vascular events and cancer according to bodyweight and dose

A one-dose-fits-all approach to use of aspirin has yielded only modest benefits in long-term prevention of cardiovascular events, possibly due to underdosing in patients of large body size and excess dosing in patients of small body size, which might also affect other outcomes.

This consideration prompted this international study. Data were obtained from 10 appropriate trials including 117,279 participants.

The results of this trial showed that low doses of aspirin (75–100mg) were only effective in preventing vascular events in patients weighing less than 70kg and had no benefit in the 80% of men and nearly 50% of women weighing 70kg or more. Higher doses were only effective in patients weighing 70kg or more. Other outcomes, including cancer, also showed interactions with body size, a one-dose-fits-all approach to aspirin is unlikely to be optimal, and a more tailored strategy is required.

Lancet 2018; 392:387–99

Tranexamic acid for the prevention of blood loss after vaginal delivery

Tranexamic acid, an antifibrinolytic agent, reduces the incidence of bleeding in elective surgery and has recently been shown to reduce bleeding-related mortality among women with postpartum haemorrhage, especially when the drug was administered shortly after delivery.

This report concerns a study in which tranexamic acid was used prophylactically together with prophylactic oxytocin compared with oxytocin and a placebo.

It was concluded that among women with vaginal delivery who received prophylactic oxytocin, the use of tranexamic acid did not result in a rate of postpartum haemorrhage of at least 500ml that was significantly lower than the rate with placebo.

N Engl J Med 2018; 379:731–42

Periconception glycaemic control in women with type 1 diabetes and risk of major birth defects

This report concerns a population-based historical cohort study conducted in Sweden. The object of the study was to examine the association between maternal type 1 diabetes and the risk of major birth defects according to levels of glycated haemoglobin (HbA1C) within three months before or after estimated conception.

The participants were 2,458 singleton liveborn infants of mothers with type 1 diabetes and a glycated haemoglobin measurement within three months before or after estimated conception and 1,159,865 infants of mothers without diabetes.

The conclusion reached was that increasingly worse glycaemic control within three months before or after estimated conception was associated with a progressively increased risk of major cardiac defects. The risk of major non-cardiac defects was not significantly increased.

BMJ 2018; 362:k2638

URL:

<http://www.nzma.org.nz/journal/read-the-journal/all-issues/2010-2019/2019/vol-132-no-1488-18-january-2019/7793>

The Intolerance of Quinine in Influenza-Pneumonia Patients

By G. Metcalfe Sharpe, M.B.



KATHLEEN MAVOURNEEN. "It may be for years and it may be for ever." Sweltering Shopkeeper: Hullo, Ped. Qoi?ig bowling at one o'clock? Thought your schools had opened again? Schoolmaster (after three months' spell): That's so. You see, we're still weak and incapable through the influenza. Doing 9to 12.30 p.m. until we get strong again. (Observer, 15 February 1919). Alexander Turnbull Library, Wellington, New Zealand. /records/27596499

The reckless way in which quinine has been doled out wholesale to the public as a prophylactic, and in the treatment of this virulent epidemic of influenza-pneumonia through which we have recently passed, induced me to conduct a few experiments and observations with a view to ascertaining its value or otherwise.

Theoretically the treatment is not sound, and clinically I have had evidence which made me discard it altogether.

Let us take the therapeutic action of quinine internally. In the stomach any salt of quinine is converted into a chloride, and some of it, as such, is absorbed there. Into the blood it is readily absorbed as a chloride, and although the blood is alkaline, it is not precipitated, being probably held in solution by the gasses of the blood. The excess of quinine not absorbed by the stomach—passes on into the intestines and is there precipitated by the alkaline secretion, and

is often excreted unchanged in the faeces. Let us review the action of quinine on the blood and divide it up into what we should consider would be the “pros” and “cons” in its administration in this malady. We will take the “cons” first, as they appear to be the more numerous.

“Cons.”—(1) The arrest of movements in the white corpuscles and their “diapedesis” through the capillary walls; (2) the ozonising power of the blood is reduced; (3) the stability of oxy-haemoglobin is strengthened, consequently the blood cannot yield or absorb oxygen so readily; (4) in large doses it lowers blood-pressure probably by its action on the blood-vessels; (5) it diminishes the action of metabolism, because of its retardation of oxidation; (6) the excretion of uric acid and of other nitrogenous bodies in the urine is diminished. If frequent doses are continued over a prolonged period, then we get congestion of the labyrinth and middle ear. I have also known it to cause epistaxis. Moreover, it is contra indicated in persons subject to gastro-intestinal irritation; and as the victims of this epidemic frequently commenced their illnesses with vomiting and gastric irritation the drug was often intolerant. So much, then, for the “cons.”

The “pros” are: (1) Its usefulness as a tonic, and even a stomachic in non-gastric cases; (2) its antipyretic action on the temperature of the blood; (3) its antiseptic action.

Whilst we are all familiar with its action as a direct poison to the haematozoa which infest the blood in malaria, there is no evidence to show that it acts similarly in the septicaemic, virulent toxæmic affection of the blood such as we have all met with in this recent epidemic.

In several cases I gave a four-hourly dose of the bi-sulphate of quinine (per os) during the acute and early stages of this disease, and in most of them I noticed a decided increase in the cyanosis of the patient after the fifth or sixth dose. In one case with a

temperature of 105 (acute lobar pneumonia) I gave a 3-grain dose of the bi-hydrochloride hypodermically on two occasions, and after each administration he developed symptoms of angina pectoris, with distressing dyspnoea.

I am afraid I cannot lay claim to being a bacteriologist, because we general practitioners as a class usually forget more than we retain of our knowledge on the subject; but I would ask the expert: Is it possible for the opsonic action of normal or diseased blood to be arrested or affected in any way by the chemical action of the drug quinine?

We know that the opsonic action—which is dependent on the presence of complement and a small quantity of amboceptor—is capable of acting on the bacilli in the blood, and that these, although not killed, can be so far damaged that they can be taken up by the leucocytes (vide my remarks on white corpuscles).

We all know that the opsonisation of heated normal serum which has been in contact with staphylococcus pyogenes aureus (after removal by centrifugalisation) acquired the property of greatly inhibiting the opsonic action of fresh normal serum, and it would appear that the administration of quinine might have the effect of further doing so.

In a few cases I injected—in various doses—both antistreptococcus and anti-pneumococcus serums on the theory (according to Neufeld) that there are bacteriotropic substances in both the above serums which are thermostable, and which promote phagocytosis, not by stimulating the leucocytes, but by acting directly on the microbe.

Needless to say that I have given quinine a wide berth in the treatment of my influenza-pneumonia patients, at any rate during the latter part of the epidemic, and in future shall refuse to prescribe it in all cases of pyogenic affections of the blood other than its antipathy, malaria.

URL:

<http://www.nzma.org.nz/journal/read-the-journal/all-issues/2010-2019/2019/vol-132-no-1488-18-january-2019/7794>

NZMJDigest

published by the New Zealand Medical Association

NZMJDigest
ISSUE 84
DECEMBER 2018

**Your profession,
your future,
your NZMA**

2018 New Zealand Medical Teaching Award Winners
More clinicians aware of need to reduce unnecessary medical interventions

Interests that matter | Memoir: Sister Salam | Review: Crimes of Grindelwald

NZMA
New Zealand Medical Association
Te Hauora mo iwi hei Kaitiaki

NZMJDigest

<http://www.nzma.org.nz/publications/nzmjdigest>

The NZMA publishes the e-magazine NZMJDigest 10 times a year. It contains news and views from the profession and the NZMA, including the NZMA Chair's editorial, along with highlights from and links to the New Zealand Medical Journal.

Click on the image above to view the latest issue.

We welcome contributions from members and readers. To contribute to the NZMJDigest, please email digest@nzma.org.nz
