

# Over and under? Ethnic inequities in community antibacterial prescribing

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

**W**hyler et al (17 August 2018)<sup>1</sup> have valuably highlighted the differences in community antibacterial dispensing patterns by ethnicity and the important issue of over-prescribing of antibiotics in New Zealand.<sup>1</sup> 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 antibiotics 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)<sup>2</sup> reports that, after adjusting for the infectious disease burden,<sup>3</sup> 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 antibiotics 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 overprescribing 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.<sup>1</sup> This may indeed be the case, but the cited supporting evidence came from the US,<sup>4</sup> where prescribing may be more profligate than in New Zealand, and that study reported 30% over-prescribing, not 50%.<sup>4</sup> Recent UK estimates suggest 8–23% over-prescribing of community antibacterials.<sup>5</sup> 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,<sup>1,2,endnote</sup> 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 over-prescribing of antibacterials. The calculations reinforce the need for nuancing, which Whyler et al call for.<sup>1</sup> 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.<sup>6,7</sup>

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.<sup>1</sup> 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.<sup>8</sup>

Since that time, New Zealand's community use of topical fusidic acid has lessened,<sup>9</sup> and to support this further, PHARMAC has received clinical advice<sup>10</sup> 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.<sup>1</sup> 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 Maori 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 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 Māori<sup>6</sup> 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 3/5ths 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.<sup>2</sup>

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 cf 7% of nMnP;<sup>11</sup> 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)<sup>6</sup> 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)<sup>6</sup>

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 authors<sup>1</sup> 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,<sup>1</sup> we believe there is likely a shortfall for Pacific Peoples also.<sup>6</sup>

#### **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:**

1. 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>
2. 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/Maori-uptake-of-medicines/>, <http://www.pharmac.govt.nz/>
3. 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)
4. 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>
5. 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](http://academic.oup.com/jac/article/73/suppl_2/ii36/4841818). Also <http://www.gov.uk/government/news/research-reveals-levels-of-inappropriate-antibiotic-prescribing-in-primary-care>

- els-of-inappropriate-prescriptions-in-england,  
[http://academic.oup.com/jac/issue/73/suppl\\_2](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](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.