

Improving access to ivermectin for Aboriginal and Torres Strait Islander people in Australia: Big gains from a small change

Victoria R. V. Cox,^{1*} Mike Stephens,² Gurmeet R. Singh,^{1,3} Bart J. Currie^{4,5}

¹Child and Maternal Health Division, Menzies School of Health Research, Charles Darwin University, Darwin, Northern Territory, Australia

²National Aboriginal Community Controlled Organisation (NACCHO), Canberra, Australian Capital Territory, Australia

³Department of Paediatrics, Royal Darwin Hospital, Darwin, Northern Territory, Australia

⁴Global and Tropical Health Division, Menzies School of Health Research, Charles Darwin University, Darwin, Northern Territory, Australia

⁵Department of Infectious Diseases, Royal Darwin Hospital, Darwin, Northern Territory, Australia

Submitted: 3 January 2025; Revision requested: 25 February 2025; Accepted: 13 March 2025

Key words: scabies, ivermectin, access to medicine, best practice, Pharmaceutical Benefits Scheme, Australian Aboriginal and Torres Strait Islander Peoples

Introduction

Scabies is caused by a parasitic mite infestation and is a Neglected Tropical Disease (NTD) with skin manifestations officially recognised by the World Health Organization (WHO).¹ It causes a breakdown in skin barrier function, which allows bacteria to overcome usual defence mechanisms and enter the body leading to secondary sequelae with a high degree of morbidity and mortality.² The co-endemicity of scabies in regions with other NTDs have underpinned a recent international focus to upscale and integrate strategies that promote scabies control,³ including mass-drug administration (MDA) treatment programs.⁴ Scabies is an important public health issue for Aboriginal and Torres Strait Islander people living in northern Australia, with very high prevalence.¹ Cultural, economic and geographic determinants of health impact access to healthcare and medication for Aboriginal and Torres Strait Islander people in Australia.

Topical 5% permethrin cream has been the mainstay of treatment for scabies in Australia since it was approved for use by the Therapeutic Goods Association in 1993.⁵ Permethrin cream is inexpensive, effective and has historically been readily available¹ however we acknowledge the current global shortage.⁶ However, effectiveness relies upon correct application of cream to the entire body for two treatments separated by 7–14 days.⁷ The impracticality of completing a whole-body treatment in a remote Aboriginal community is limiting, especially in crowded households with limited privacy.¹

Ivermectin has been used in the Northern Territory for crusted scabies since 1997, as a broad-spectrum antiparasitic agent that can be administered as an oral tablet or crushed, and is small and easily swallowed by children.² As with topical therapy for the treatment of

individuals with scabies, a two-dose regimen is recommended over a one-dose regimen.^{8,9} At a community level, use of ivermectin as part of an MDA treatment program is highly effective in reducing the disease burden at a population-level, and superior to topical MDA regimens.⁷ Multiple studies of ivermectin-based MDA in Pacific island nations have significantly reduced the prevalence of scabies in hyperendemic regions^{9,10} including as a one-dose treatment regimen for the general population¹¹ causing only mild and self-limiting side effects.¹⁰

The use of ivermectin has been important globally for other NTD management and is included in the WHO Model List of Essential Medicines.¹² WHO-supported MDAs for NTDs include mebendazole and albendazole for soil-transmitted helminths such as hookworm, ascariasis and trichuriasis, azithromycin for trachoma and yaws, and ivermectin for lymphatic filariasis and onchocerciasis. The integration and coordination of MDAs for multiple co-occurring NTDs, including scabies, is now being encouraged.^{3,7} Importantly, Ivermectin is also a first-line treatment for *Strongyloides stercoralis* in Australia, another highly prevalent NTD that is present in remote communities in the NT.¹³ Use of ivermectin in endemic settings will reduce the burden of scabies and strongyloidiasis, and presents an obvious opportunity to combine disease programs in northern Australia.¹⁴

Ivermectin is well tolerated and mainly contraindicated for children under 5 years or weighing less than 15 kg, given the concern for neurotoxicity.¹⁵ However, weight-adjusted doses has previously been administered to young children without concerning adverse events.¹⁶

Various mechanisms of scabicide resistance have previously been proposed¹⁷ and ivermectin resistance has been reported with associated treatment failure in a small number of individuals with

*Correspondence to: Victoria RV Cox, Menzies School of Health Research, John Matthews Building (JMB), Building 58, Royal Darwin Hospital Campus, Corner of Nightingale and Paracelsus Road, Tiwi, Northern Territory 0810, Australia; Tel.: +61 400 7777 14; e-mail: victoria.cox@menzies.edu.au.

© 2025 Published by Elsevier B.V. on behalf of Public Health Association of Australia. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

Aust NZ J Public Health. 2025; Online; <https://doi.org/10.1016/j.anzjph.2025.100237>

crusted scabies.¹⁸ However, these studies predated the current oral and topical treatment guidelines recommended for crusted and treatment-refractory scabies, and likely represent incomplete treatment with subtherapeutic dosing selecting out rare mutant *Sarcoptes scabiei* resistant to ivermectin. In addition, guidelines for crusted scabies now emphasise the importance of the use of concomitant topical keratolytic therapy (to reduce hyperkeratotic skin) alongside a topical scabicide, in conjunction with oral ivermectin¹⁹. Despite anecdotal reports in northern Australia, and increasing international concern,⁶ there is limited clinical evidence reporting treatment-resistant scabies infestations.²⁰

We used 2016 Australian Bureau of Statistics Census data to estimate that approximately 150,000 Aboriginal and Torres Strait Islander people live in regions where most of the burden of scabies is found and 14,000 people require scabies treatment each year.²¹

Advocacy to change the Pharmaceutical Benefits Scheme

Permethrin was previously the only first-line treatment for scabies in Australia. Ivermectin was a second-line treatment agent; only available on the Pharmaceutical Benefits Scheme (PBS) 4 weeks after a patient had failed a complete treatment course of permethrin. Representatives from the National Aboriginal Community Controlled Health Organisation (NACCHO), One Disease and Menzies School of Health Research convened in early 2021 to discuss this issue, which was informed by key health and management staff in the Aboriginal healthcare sector. These discussions resulted in NACCHO leading formal correspondence to the Pharmaceutical Benefits Advisory Committee (PBAC) recommending that ivermectin is listed on the PBS as a first-line treatment option for the management of scabies for Aboriginal and Torres Strait Islander people in Australia.

The premise of the submission was to suggest that ivermectin is a superior therapeutic option to permethrin for a comparatively small population with a disproportionate burden of scabies in remote and very remote Australia. Our principal recommendation to the PBAC was to either¹: amend PBS item 4566; or² create a new ivermectin PBS code. The correspondence was reviewed by the PBAC and accepted in early 2022, and the PBS listing was publicly updated on 1st April 2022. The new code, PBS item 12604 has identical clinical criteria to PBS item 4566, but specifies a population criterion 'patient must identify as Aboriginal or Torres Strait Islander' with no restrictions on whether treatment is first-line or otherwise.

Advocacy to change national clinical guidelines

The new PBS listing provided a timely opportunity to revise national clinical guidelines to reflect the best-practice treatment of scabies across Australia. In parallel to the PBS listing, coordinated updates were made to the Therapeutic Guidelines (for Australian healthcare practitioners) and the Central Australia Rural Practitioners Association (CARPA) Remote Primary Healthcare Manual (for primary healthcare practitioners in central, northern and remote Australia). Updates to the Therapeutic Guidelines occurred in late-2022²² and the 8th Edition of the CARPA Remote Primary Healthcare Manual was published in mid-2023²³ alongside the National Healthy Skin Guideline in 2023.¹⁵

The guideline updates include ivermectin as a joint first-line treatment option for the management of scabies, alongside topical 5% permethrin cream; both requiring a second-treatment dose, after 7 days for permethrin and between 7 and 14 days for ivermectin. The key changes to the scabies and crusted scabies section in the updated CARPA Manual include:

- Oral ivermectin is added as another first-line option for scabies treatment.
- Consideration of ivermectin-based MDA treatment programs for communities where scabies prevalence is assessed as being 10% or more.

Consideration of an ivermectin-based MDA treatment program in a region with an estimated or confirmed prevalence of greater than 10% is consistent with recommendations from the World Health Organization.⁴

Implications for public health

The availability of ivermectin as a first-line treatment option has provided a targeted treatment option for a population impacted by colonisation with a high burden of disease. It has also allowed for alternative management to be promoted as a first-line treatment amidst a global shortage of permethrin, which has impacted health service provision in northern Australia.²⁴ We expect this change will have a large positive public health impact for a small number of Australians, and should reduce the primary burden of scabies and secondary sequelae in Aboriginal and Torres Strait Islander people in central and northern Australia. Creating a new PBS item code is consistent with the commitment of the Australian Government to improve the capability of the PBS,²⁵ and also the National Health Act and PBAC Guidelines' reference to address equity concerns and community need.

We believe that the collaborative update to national clinical guidelines and treatment protocols will ensure the ongoing judicious use of ivermectin, without a negative impact on primary healthcare services or increased cost of hospital workflow. For the individual, we believe this change formalises best-practice prescribing and reflects the prior off-label individual practitioner use of ivermectin. For communities, this change promotes consideration of healthy skin programs and specifically allows for consideration of an ivermectin-based MDA treatment program in remote Australia, with substantial public health implications for endemic regions.¹⁵ Ultimately, we hope that the recent successes of large-scale MDA treatment programs in the Pacific and promotion of integrated management strategies for scabies and other NTDs globally will have a positive public health impact in Australia.⁷

Throughout our consultation, we found the financial cost of scabies treatment with ivermectin under the new proposed PBS item code was very small compared to the very high cost of managing the morbidity of scabies and secondary complications for Aboriginal and Torres Strait Islander populations in northern Australia.²⁶ The projected annual cost was suggested to be less than 50% of the cost to maintain one individual from a remote Aboriginal community on renal dialysis each year.²⁷ Although not proven, it is hypothesised that scabies can lead to secondary complications including acute rheumatic fever (leading to rheumatic heart disease), post-streptococcal glomerulonephritis (leading to chronic kidney disease)

and the development of life-threatening bacterial septicaemia.^{28–30} Alongside the emotional burden, we also acknowledge the profound and intergenerational impact of displacing Aboriginal and Torres Strait Islander people from Country, and temporary or permanent removal from family and culture in order to seek essential healthcare services, which is more difficult to quantify.²⁸

Ivermectin is not a ‘magic bullet’ for scabies control, and we acknowledge that there are therapeutic limitations. Ivermectin is not ovicidal, and the first-dose will not routinely kill larvae that hatch after initial treatment.⁷ Identifying new therapies which are active throughout the life-cycle of a mite and may only require a one-dose regimen is an important focus area of current research. This includes the recent trials which explore the effectiveness against scabies of moxidectin, with its extremely long half-life.³¹ Furthermore, we acknowledge that targeted pharmacotherapy is essential, but only one component of a public health policy which underpins NTD management in Australia. It is critical that population health strategies address the underlying social and cultural determinants of health and should be much broader than a focus on therapeutics.⁷

Conclusion

The availability of ivermectin as a first-line treatment option for the management of scabies in Aboriginal and Torres Strait Islander populations will promote a targeted treatment option for a marginalised population, address health inequity concerns and improve medicine uptake. Ultimately, it is hoped that creating item code 12604 for ivermectin use on the PBS and changes to national clinical guidelines will contribute to improving long-term health outcomes and reducing healthcare costs for First Nations people in Australia.

Ethics

None.

Funding

VRVC and MD were principal investigators in receipt of a project grant from the Australian Centre for Control and Elimination of NTDs (ACE-NTDs) to support a scabies control project in northern Australia. The funding source had no involvement in the study design, or submission to the PBAC. We received technical support to prepare the submission from the medicine’s sponsor, Merck, Sharp and Dohme (Australia), but no financial support or incentive, and they had no involvement in planning conversations.

Conflicts of interest

The authors declare the following financial interests/personal relationships which may be considered as potential competing interests: Dr Victoria RV Cox reports financial support was provided by Australian Centre for the Control and Elimination of Neglected Tropical Diseases (ACE-NTDs). Dr Victoria RV Cox reports financial support was provided by Commonwealth of Australia - Research Training Program. If there are other authors, they declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Acknowledgements

We acknowledge the Aboriginal peoples whose lands we have worked on to develop this paper and understand scabies and its treatments. We pay our respects to the elders of these respective lands that we’ve worked on and travelled to, and thank all Aboriginal and Torres Strait Islander people involved in this project for sharing knowledge and providing guidance. We give specific thanks to John Boffa and Central Australian Aboriginal Congress, Sinon Cooney and Katherine West Health Board Aboriginal Corporation, and the Mala’la Health Service Aboriginal Corporation. We thank Michelle Dowden for her advice and support in advocating for the prescribing changes as the former CEO of One Disease in collaboration with Will Delaat from Merck Sharp & Dohme (Australia).

Author ORCIDs

Victoria R.V. Cox  <https://orcid.org/0000-0002-3898-5226>

Bart J. Currie  <https://orcid.org/0000-0002-8878-8837>

References

- Chandler DJ, Fuller LC. A review of scabies: an infestation more than skin deep. *Dermatology* 2019;**235**(2):79–90.
- Roberts LJ, Huffam SE, Walton SF, Currie BJ. Crusted scabies: clinical and immunological findings in seventy-eight patients and a review of the literature. *J Infect* 2005;**50**(5):375–81.
- Yotsu RR, Fuller LC, Murdoch ME, van Brakel WH, Revankar C, Barogui MY, et al. A global call for action to tackle skin-related neglected tropical diseases (skin NTDs) through integration: an ambitious step change. *PLoS Neglected Trop Dis* 2023;**17**(6):e0011357.
- World Health Organisation. *WHO informal consultation on a framework for scabies control: meeting report*. Manila, Philippines: World Health Organization Regional Office for the Western Pacific Manila; 2020.
- Australian register of therapeutic Goods. Lyclear scabies cream*. 1993. Canberra.
- Khan SS, Fuller LC. Is there a growing global threat of scabies treatment failure? An opportunity to discuss health inequity within UK dermatology. *Br J Dermatol* 2024;**190**(2):139–40.
- Currie BJ. Scabies and global control of neglected tropical diseases. *N Engl J Med* 2015;**373**(24):2371–2.
- Sharma R, Singal A. Topical permethrin and oral ivermectin in the management of scabies: a prospective, randomized, double blind, controlled study. *Indian Journal of Dermatology, Venereology, and Leprology* 2011;**77**(5):581–6.
- Romani L, Whitfeld MJ, Koroivuetu J, Kama M, Wand H, Tikoduadua L, et al. Mass drug administration for scabies - 2 years of follow-up. *N Engl J Med* 2019;**381**(2):186–7.
- Romani L, Marks M, Sokana O, Nasi T, Kamoriki B, Wand H, et al. Feasibility and safety of mass drug coadministration with azithromycin and ivermectin for the control of neglected tropical diseases: a single-arm intervention trial. *Lancet Global Health* 2018;**6**(10):e1132–8.
- Lake SJ, Engelman D, Zinihite J, Sokana O, Boara D, Nasi T, et al. One versus two doses of ivermectin-based mass drug administration for the control of scabies: a cluster randomised non-inferiority trial. *PLoS Neglected Trop Dis* 2023;**17**(3):e0011207.
- World Health Organisation. *Model list of essential medicines*. Geneva, Switzerland, <https://list.essentialmeds.org/?query=ivermectin>; 2024.
- Buonfrate D, Rodari P, Barda B, Page W, Einsiedel L, Watts MR. Current pharmacotherapeutic strategies for Strongyloidiasis and the complications in its treatment. *Expert Opin Pharmacother* 2022;**23**(14):1617–28.
- Kearns TM, Currie BJ, Cheng AC, McCarthy JS, Carapetis JR, Holt DC, et al. Strongyloides seroprevalence before and after an ivermectin mass drug administration in a remote Australian Aboriginal community. *PLoS Neglected Trop Dis* 2017;**11**(5):e0005607.
- The Australian Healthy Skin Consortium. *National healthy skin guideline: for the diagnosis, treatment and prevention of skin infections for aboriginal and Torres Strait Islander children and communities in Australia* -. 2nd ed. Perth, Western Australia: Telethon Kids Institute; 2023.
- Levy M, Martin L, Bursztejn AC, Chiaverini C, Miquel J, Mahé E, et al. Ivermectin safety in infants and children under 15 kg treated for scabies: a multicentric observational study. *Br J Dermatol* 2020;**182**(4):1003–6.
- Khalil S, Abbas O, Kibbi AG, Kurban M. Scabies in the age of increasing drug resistance. *PLoS Neglected Trop Dis* 2017;**11**(11):e0005920.
- Currie BJ, Harumal P, McKinnon M, Walton SF. First documentation of in vivo and in vitro ivermectin resistance in *Sarcoptes scabiei*. *Clin Infect Dis* 2004;**39**(1):8–12.
- NT Centre for Disease Control. *Healthy skin program: guidelines for community control of scabies, skin sores, tinea and crusted scabies in the northern territory*. Darwin: NT CDC; 2024 June.

20. Simonart T, Lam Hoai XL. Escalating threat of drug-resistant human scabies: current insights and future directions. *J Clin Med* 2024;**13**(18):5511.
21. Australian Bureau of Statistics. *Estimates of aboriginal and Torres Strait Islander Australians [internet]*. Canberra: Australian Bureau of Statistics; 2016 [updated 31 August 2018]. 6th ed.[Available from: <https://www.abs.gov.au/statistics/people/aboriginal-and-torres-strait-islander-peoples/estimates-aboriginal-and-torres-strait-islander-australians/latest-release#data-download>.
22. Therapeutic Guidelines. *Scabies*: Melbourne: Therapeutic Guidelines Limited; 2022 [cited 2024 14th May].
23. Central Australia Rural Practitioners Association (CARPA). In: Springs Alice, editor. *CARPA standard treatment manual*. 8th ed. Northern Territory: Flinders University; 2022. p. 548.
24. NT Centre for Disease Control. *Medicine shortage – topical scabicide treatments*. Darwin: NT CDC; 2024. 17th May 2024.
25. Department of Health and Aged Care. *Listings on the PBS for aboriginal and Torres Strait Islander people: Commonwealth government of Australia* [updated 17th January 2024. Available from: <https://www.pbs.gov.au/info/publication/factsheets/shared/pbs-listings-for-aboriginal-and-torres-strait-islander-people#:~:text=The%20Australian%20Government%20is%20committed,and%20Torres%20Strait%20Islander%20people;2024>.
26. Campbell M, van der Linden N, Gardner K, Dickinson H, Agostino J, Dowden M, et al. Health care cost of crusted scabies in Aboriginal communities in the Northern Territory, Australia. *PLoS Neglected Trop Dis* 2022;**16**(3): e0010288.
27. White AV, Hoy WE, McCredie DA. Childhood post-streptococcal glomerulonephritis as a risk factor for chronic renal disease in later life. *Med J Aust* 2001;**174**(10):492–6.
28. Cox VR, Fuller LC, Engelman D, Steer AC, Hay RJ. Estimating the global burden of scabies: what else do we need? *Br J Dermatol* 2021;**184**(2):237–42.
29. Flohr C, Hay RJ. Putting the burden of skin diseases on the global map. *Br J Dermatol* 2021;**184**(2):189–90.
30. Lynar S, Currie BJ, Baird R. Scabies and mortality. *Lancet Infect Dis* 2017;**17**(12):1234.
31. Mounsey KE, Walton SF, Innes A, Cash-Deans S, McCarthy JS. In vitro efficacy of moxidectin versus ivermectin against *Sarcoptes scabiei*. *Antimicrob Agents Chemother* 2017;**61**(8):e00381-17.