

Culturally supported health promotion to See, Treat, Prevent (SToP) skin infections in Aboriginal children living in the Kimberley region of Western Australia: a qualitative analysis

Tracy McRae,^{a,b,*} Francene Leaversuch,^c Slade Sibosado,^b Juli Coffin,^{a,d} Jonathan R. Carapetis,^{a,b,g} Roz Walker,^{d,e,f,j} and Asha C. Bowen^{a,b,g,h,i,j}

^aUniversity of Western Australia, 35 Stirling Highway, Perth, Western Australia 6009, Australia

^bTelethon Kids Institute, 15 Hospital Road, Nedlands, Western Australia 6009, Australia

^cCurtin University, Kent St, Bentley, Western Australia 6102, Australia

^dNgangk Yira Institute for Change, Murdoch University, 90 South St, Murdoch, Western Australia 6150, Australia

^eSchool of Indigenous Studies, Poche Centre for Indigenous Health Research, University of Western Australia, 35 Stirling Highway, Perth, Australia

^fSchool of Population and Global Health, University of Western Australia, 35 Stirling Highway, Perth, Australia

^gPerth Children's Hospital, 15 Hospital Road, Nedlands, Western Australia, 6009, Australia

^hMenzies School of Health Research, Rocklands Drive, Tiwi, Northern Territory 0810, Australia

ⁱUniversity of Notre Dame, 32 Mouat St, Fremantle, Western Australia 6160, Australia



Summary

Background While there are many skin infections, reducing the burden of scabies and impetigo for remote living Aboriginal people, particularly children remains challenging. Aboriginal children living in remote communities have experienced the highest reported rate of impetigo in the world and are 15 times more likely to be admitted to hospital with a skin infection compared to non-Aboriginal children. Untreated impetigo can develop into serious disease and may contribute to the development of acute rheumatic fever (ARF) and rheumatic heart disease (RHD). As the largest organ protecting the body and visible to everyone, skin infections are often unsightly and very painful, therefore maintaining healthy skin and reducing the burden of skin infections is important for overall physical and cultural health and well-being. Biomedical treatments alone will not address these factors; therefore, a holistic, strengths-based approach that aligns with the Aboriginal world view of wellness is required to help reduce the prevalence of skin infections and their downstream consequences.

Methods Culturally appropriate yarning sessions with community members were conducted between May 2019 and November 2020. Yarning sessions have been identified as a valid method for story sharing and collecting information. Semi-structured, face-to-face interviews and focus groups with school and clinic staff were conducted. When consent was provided, interviews were audio-recorded and saved as a digital recording in a de-identified format; for those yarning sessions not recorded, handwritten notes were scribed. Audio recordings and handwritten notes were uploaded into NVivo software prior to a thematic analysis being conducted.

Findings Overall, there was a strong knowledge of recognition, treatment, and prevention of skin infections. However, this did not extend to the role skin infections play in causing ARF, RHD or kidney failure. Our study has confirmed three main findings: 1. The biomedical model of treatment of skin infections remained strong in interviews with staff living in the communities; 2. Community members have a reliance and belief in traditional remedies for skin infections; and 3. Ongoing education for skin infections using culturally appropriate health promotion resources.

Interpretation While this study revealed ongoing challenges with service practices and protocols associated with treating and preventing skin infections in a remote setting, it also provides unique insights requiring further investigation. Bush medicines are not currently practiced in a clinic setting, however, using traditional medicines alongside biomedical treatment procedures facilitates cultural security for Aboriginal people. Further investigation, and advocacy to establish these into practice, procedures and protocols is warranted. Establishing protocols and practice procedures focused on improving collaborations between service providers and community members in remote communities is also recommended.

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*Corresponding author.

E-mail address: tracy.mcrae@telethonkids.org.au (T. McRae).

^jRoz and Asha provide equal contributions to this manuscript.

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Keywords: Aboriginal health; Skin infections

Research in context

Evidence before this study

Remote living Australian Aboriginal children are disproportionately burdened by skin infections, including scabies and impetigo. In the Kimberley region of Western Australia, skin infections attribute to the high hospitalisation rates for Aboriginal children compared to non-Aboriginal children. While treatments have been effective, eradicating skin infections in this context is challenging. There is a gap in understanding the impact of skin infections affecting Aboriginal children living in these remote communities in the Kimberley.

Added value of this study

In this qualitative analysis, we investigate the current knowledge, attitudes, and practices of community members, clinic, and school staff regarding skin infections in a remote Kimberley context to identify barriers and enablers for reducing the burden of skin infections. While

there appears to be a good overall understanding of skin infections and treatments prescribed, there are limited health promotion resources available, particularly at a local community context.

Implications of all the available evidence

This study provides unique insights into the burden of skin infections in a remote Kimberley context. Traditional bush medicines are used by community members but not in a clinical context. Using traditional medicines alongside biomedical treatment procedures facilitates cultural security for Aboriginal people therefore requires further investigation. Improving inter-agency engagement between the clinics, schools and environmental health services can also assist in reducing the burden of skin infections, in addition to co-developing educational resources that can be useful to inform health policy and practice guidelines at the local community level.

Introduction

Reducing the burden of skin infections for remote living Australian Aboriginal people particularly children remains challenging.^{1,2} In the Northern Territory (NT), children continue to experience a high burden of scabies and impetigo,³ and in Queensland, Aboriginal children are reported to be three times more likely to experience skin infections compared to non-Aboriginal children.⁴ In the Kimberley region of Western Australia (WA), Aboriginal children are 15 times more likely to be admitted to hospital with a skin infection compared to non-Aboriginal children.⁵ Globally, high rates of skin infections are reported from tropical, Pacific regions such as Fiji⁶ and Samoa.⁷ However, Australian Aboriginal children continue to experience the highest reported rate of skin infections globally for the past four decades⁸ There are many skin infections including tinea and head lice, however, scabies and impetigo are the most frequently encountered.⁹ Both are highly contagious. Scabies is extremely itchy, leads to feelings of shame and can disrupt sleep. Impetigo occurs as a secondary bacterial infection that often develops following scabies infestation, and minor trauma.¹⁰

Complications from untreated impetigo, can result in invasive disease including abscess, osteomyelitis, septic arthritis and bacteraemia,¹¹ and may contribute to the development of acute rheumatic fever (ARF) and rheumatic heart disease (RHD).¹² As the largest organ protecting the body and visible to everyone, skin infections are unsightly, can cause stigma and the itch and pain can disrupt usual activities. Maintaining healthy skin and reducing the burden of skin infections is important for overall physical and cultural health and well-being.¹³ It is also a critical activity to reduce the heavy burden of ARF and RHD in this region.¹⁴

Historically, biomedical treatments for skin infections have included topical scabies therapies (permethrin and benzyl benzoate), while the benzathine penicillin G (BPG) injection has been widely administered for impetigo.¹ However, given the intramuscular route of administering BPG, patients have reported the pain and discomfort of BPG injection as a barrier to seeking treatment.¹⁵ As an equally effective, alternative option, oral co-trimoxazole (TMP-SMX) has been included in guidelines for treatment of impetigo in Aboriginal children living in Northern Australia.⁹ While

research has focussed on improving acceptability of treatments for skin infections,^{16,17} environmental factors,^{18–20} social determinants²¹ and normalisation²² of skin infections have rarely been considered as priority research areas to reduce the burden through a focus on prevention. In an Australian context, the ongoing effects of colonisation, transgenerational-trauma and racism are confounding and are likely contributory factors to the skin infection burden.^{15,23–25} Biomedical treatments alone will not address these factors; therefore, a holistic, strengths-based approach that aligns with the Aboriginal world view of wellness is required to help reduce the prevalence of skin infections^{15,26,27} and their downstream consequences.

Historically, health services have been considered Western clinical knowledge holders, with little acknowledgement of Indigenous culture, knowledge, and practices.²⁸ This has been particularly true for Australian Aboriginal people, where their culture has been dismissed in many contexts, including biomedical models and treatment programs.^{23,29} However, the development of an effective Aboriginal Community Controlled Health Organisation (ACCHO) sector continues to address this to enhance community engagement and control, cultural security, interagency collaboration, health promotion and prevention programs and allowed for significant employment of Aboriginal people.³⁰ Furthermore, traditional methods using bush medicines for treating ailments are becoming well acknowledged and sometimes available in ACCHO clinics.^{31,32} Within the Tiwi Islands in the Northern Territory of Australia, several plants that are recognised as being both safe and effective are increasingly used as medicinal washes for skin issues. While the knowledge of these plants and their medicinal uses is held by female elders in community, many families reported their desire to learn how to use them.³² Further, the use of bush medicines alongside biomedical cancer treatments has been reported as a preferred method of treatment for some Aboriginal people, instilling feelings of reconnection with their heritage, culture and spirituality.³¹ Bush medicine treatments are culturally appropriate and can facilitate the cultural security of the health service for users.^{31,32} Creating culturally secure^{30,33} environments in modern medical settings empowers Aboriginal people and facilitates a productive dialogue³⁴ to feel comfortable making the right choices for their own health outcomes. Recognising and including traditional Aboriginal ways for treatment and healing facilitates a holistic approach to health and well-being. This must be included in modern medical settings providing health care so that it is meaningful, appropriate and culturally safe for Aboriginal people.^{30,31}

Acknowledging the context of remote Aboriginal communities is essential when developing treatment and prevention strategies. Tailoring programs to meet

the needs and conditions of specific communities and the context in which they are conducted,²¹ helps to eliminate a ‘one size fits all’ approach. Further, community-ownership of strategies at the local level empowers Aboriginal people to choose tools and resources that are effective, sustainable, and widely accepted in community.^{3,35} Health programs and resources incorporating language and visuals have been well received by Aboriginal communities for addressing some diseases including skin infections,^{3,36,37} while art, story, song, and dance are traditional story telling mechanisms used for millennia by Aboriginal people to transfer knowledge.³⁸ These traditional mechanisms of disseminating health messages, can address language barriers³⁶ and empower Aboriginal people to take ownership of the way information is presented in modern medical settings.²³

Despite the effectiveness of hand washing and hygiene programs²⁷ and community swimming pools³⁹ for reducing skin sores, the prevalence of skin infections in remote Australian communities remains high.^{5,22} Understanding the complexities of confounding factors contributing to the heavy burden of skin infections, such as access to functional plumbing, laundry facilities, and suitable housing for the often tropical, or harsh remote environments is fundamental for holistic approaches of treatment and prevention.^{18,19,40} To do so requires a transdisciplinary approach where local knowledge, attitudes and practices of service providers, practitioners and community members need to be investigated and acknowledged. In the remote Pilbara region of WA, Amgarth-Duff et al¹⁵ reported these groups’ perspectives in relation to skin infections. Major themes from their study revealed the (BPG) injection, although an effective treatment for impetigo, had also become a barrier to seeking treatment; the need for improved communication between service providers and community members was also reported; along with adequate training opportunities for health practitioners. The use of bush medicines for treatment and healing was another theme emerging from the Pilbara study.¹⁵ Similarly, Thomas et al²¹ concluded broader determinants such as stress and transgenerational trauma were confounding factors for skin infections in their New South Wales (NSW) study. Importantly, both studies highlighted skin infections had become normalised and accepted as a way of life for these communities.^{15,21}

Adding to the literature and building on the work of these studies, we aimed to explore knowledge in relation to skin infections amongst people living in remote communities in the Kimberley who are involved in the See Treat Prevent (SToP) skin infections trial.⁴¹ To achieve this aim, this study focussed on two objectives:

1. To identify knowledge gaps in current treatment and prevention regarding skin infections from

- clinic staff, school staff and community members; and
2. To inform the development of community-driven health promotion initiatives.

Methods

Geographically, the Kimberley region in the north of WA, Australia spans a vast 423,517 square kilometres (km²) where approximately 35,000 people live across six towns and 100 diverse communities of between 50 and 1000 people.⁴⁰ Since colonisation, the Kimberley has been known for its pearling and tourism industries and, more recently, its growing cattle, mining and agricultural industries are large contributors to the economy.⁴² The Kimberley has a climate of a dry season with limited rainfall and cooler conditions (April–October) and a wet season (November–March) with heavy rainfall and very hot, humid climate. Given the remoteness of the Kimberley and seasonal weather conditions, particularly the wet season when communities can be isolated for lengthy periods of time due to flooding resulting in delayed deliveries of food, health hardware and medical supplies, add to the many barriers to achieving healthy skin.⁴⁰ In addition, poor infrastructure, housing, and plumbing hardware continue to contribute to the lower health status of Aboriginal people in the Kimberley compared to the non-Aboriginal population.⁴⁰

This qualitative project is embedded within the broader clinical trial: See, Treat, Prevent (SToP) aimed at reducing the burden of skin infections by 50% in Aboriginal children living in remote communities in the Kimberley.⁴¹ SToP is a collaboration between Kimberley Aboriginal Medical Service, Western Australia Country Health Service, Nurrumbuk Environmental Health Service and Telethon Kids Institute. Through their governance, Aboriginal people are involved as co-investigators, stakeholders, and collaborators in all phases of the SToP Trial, and as strongly recommended by them, SToP is the first healthy skin program intersecting biomedical elements (Diagnosis (See) and Treatment (Treat)) with prevention (Prevent) activities. The SToP protocol has been reported elsewhere.⁴¹ This paper presents community members, health practitioners, and service providers' current knowledge, attitudes, and practices of skin infections to help identify barriers and enablers for reducing the burden of skin infections in their communities. This study acknowledges the importance of Indigenous standpoint theory and seeks to bring this standpoint into the analysis through discussions with Aboriginal researchers and community members. As non-Aboriginal researchers, we acknowledge the worldview, conscious values, and privilege we bring to this research and are committed to the constructivism philosophy. Through the lens of constructivism, including Aboriginal people's ways of

knowing and doing, we aim to construct a holistic, culturally appropriate approach for prevention activities in the SToP Trial. We anticipate community-owned health promotion initiatives and resources will assist in reducing skin infections and facilitate a culturally secure clinical setting where local language and culture are embedded into the resources.

Using Community Participatory Action Research (CPAR),⁴³ we conducted our formative evaluation to ascertain community, clinic, and stakeholder perspectives to inform the planned health promotion interventions and to reflect variations in cultural and contextual conditions in each community. Integrating formative evaluation activities and participatory action research (PAR) ensured consistency in our research processes across the nine community settings which resulted in strengthening our initial formative relationships and building trust between our academic, community and stakeholder partnerships. Our work with Aboriginal community-controlled organisations and Aboriginal communities in conducting the formative assessment was an important partnership-building opportunity to enable the SToP team to establish a platform for co-designing resources to support their translation into health education protocols and practice.⁴¹ Adopting this decolonising approach⁴⁴ ensured Aboriginal voices were included and privileged by using an iterative approach and Aboriginal researchers are included in the data interpretation and findings. This method avoided using a positivistic frame or imposing mainstream understandings on the needs and perspectives of Aboriginal community members in determining the solutions to reducing the burden of skin disease.^{44–46}

Data collection activities and recruitment sampling methods included purposive and snowball sampling methods. Purposive sampling was used to recruit all school and clinic staff involved in the study based on their knowledge and personal experiences. To recruit community members, a mixed approach of purposive and exponential discriminative snowballing methods were used. Using an exponential discriminative snowball approach,⁴⁷ several Aboriginal clinic and school staff who participated in yarning sessions, also provided names of family members and community members, who they believed would be interested in yarning with SToP researchers. However, not all family and community members suggested, were available at the time, therefore were not recruited into the study. Snowball sampling is a widely employed method of sampling in qualitative research that can enrich sampling populations when other recruiting options have been exhausted.⁴⁸ For our study, snowball sampling provided a culturally appropriate method to approach community members through the relationships already established between researchers and Aboriginal clinic and school staff. This approach was considered less intrusive and allowed an informal yarn to occur prior to discussing the

SToP Trial. All community members who were approached, agreed to yarn with the SToP team.

Led by Aboriginal researchers from the Kulunga Aboriginal Research Unit (Kulunga) at Telethon Kids Institute, one-on-one culturally appropriate yarning sessions⁴⁹ with community members were conducted between May 2019 and November 2020. Semi-structured, face-to-face interviews and focus groups with school and clinic staff were also conducted by Project Officers on the SToP trial during this period. At the beginning of each interview, focus group, and yarning session, personnel leading the discussion introduced themselves and provided an overview of the SToP Trial. Participants were reassured that they did not have to answer questions if they did not want to, and that any content they provided would remain confidential. Throughout the interviews, key points and researcher's interpretation of their responses were fed back to participants to ensure these accurately reflected their statements.

Secondary data providing context through critical reflections and observations of the SToP team was sourced from Researcher Observation Reports (RORs).

When consent was provided, interviews were audio-recorded and saved as a digital recording in a de-identified format; for those yarning sessions not recorded, handwritten notes were scribed. All audio-recordings were transcribed verbatim and uploaded into QSR NVivo v12⁵⁰ along with all handwritten notes and relevant ROR entries. Each transcript was assigned a code number to protect participant privacy. The transcripts, handwritten notes and RORs were coded independently, with iterative discussions about coding development, topic areas and emerging themes until a consensus was met. Underpinned by constructivism⁵¹ and situated within the Patient, Provider and Practice (P3) framework,⁵² an inductive process was undertaken for themes emerging from the analysis. The P3 framework facilitates triangulation of data⁵³ where multiple worldviews and experiences exist. Following the question guide, coding followed the broad topic areas and specific theme codes were added where new themes emerged from the data.

Role of the funding source

The funders had no role in the study design, data collection, data analysis, interpretation or writing of the report.

Ethics

This project was approved by the health ethics review committees at the Child and Adolescent Health Service (Approval number RGS0000000584), the Western Australian Aboriginal Health Ethics Committee (Reference number: 819), University of Western Australia (Reference RA/4/20/4123), Catholic Education Western Australia (Reference number: RP2017/57) and Department of Education (Reference number: D18/0281633).⁴¹

Results

Fifty-six people participated in the yarning, of whom 16 (28%) were Aboriginal. Group 1 involved 18 clinic staff, Group 2 included 22 school and teaching staff with Group 3 involving 16 community members who were also clinic and school staff (100% Aboriginal). As this was culturally inappropriate, we did not collect data that included participant characteristics such as gender, race, age, education level and annual income. Due to the low numbers of participants involved, it would also potentially be identifying of individuals contributing to the yarning to include in Table 1. Baseline data was collected throughout 2019 and also collected in October–November 2020 when the SToP team was permitted to re-enter remote communities following the lifting of the Bio Securities Act which isolates Kimberley communities from the rest of the state of WA and Australia due to COVID-19 in 2020.⁵⁴ We have included all data collected during this time to include COVID-19 context that had affected original SToP study design. Please note COVID-19 data will be reported elsewhere.

Theme 1: perceptions of skin infections

Most participants reported a clear understanding of and had personal experience of skin infections, troubling children, parents, community members and staff living in the community. Skin infections are perceived to be

Group	Description	Interview participants (n = 41)	Focus group participants (n = 17)	Aboriginal (n = 16)	Total participants
Clinic Staff	Remote Area Nurses,	8	10		18
School and Teaching Staff	Principals/Teachers/School Health Nurses	16	6		22
Community Members	Aboriginal Health Workers/Aboriginal Teaching Assistants Elders, Parents & Carers of children involved in the SToP Trial	16	0	16	16
Total					56

Table 1: Data collection activities and recruitment sampling methods.

very common and problematic by school and clinic staff, whereas community members were unsure of how common skin infections were in their communities. Despite this, all respondents reported negative impacts of skin infections on children living in their community including pain, shaming from peers and inability to concentrate at school.

1a. Community member perceptions

Although some community members were unaware of the link between skin sores and RHD, others reported awareness of skin infections and connected these to the broader challenges of RHD which inhibits children's ability to engage and socialise in the school context.

"Scabies, yes, I have [seen scabies] ... Well, I suppose, if you are itchy all the time you won't be able to concentrate. I believe if it got to an infection then it makes you sick and you won't be able to pay attention or learn as best you can, and also just the social aspect. If you are always scratching then kids are making fun of you, so there is a social side". HP004 Community Member/School Leader

"Scabies. It is mainly a problem with the skin, rashes, and stuff like that and get worse, and bugger up [hurt] your heart. With rheumatic heart and children with rheumatic heart and stuff". HP011 Community Member/Aboriginal Health Worker

1b. Clinic and school staff perception

Children were perceived to have the highest burden of skin infections by clinic and school staff who had also observed reoccurrence in certain groups considered less likely to seek treatment. School staff observed children can often have ongoing skin sores that never fully recover, and also acknowledged the impacts of skin sores including pain, limited ability to sit or move around, concentrate, and do everyday tasks. In addition, home and social environments were recognised as contributing factors to skin infections.

"I noticed skin sores and infections were quite common. I had never come across them like that before in so many kids and I agree that, yeah, there are quite a lot of skin scabs and sores and there is lots of itchiness and boils are very common for kids here". S011 & S012 Group Interview School Staff

"Yes. Boils is an area that is very, very prominent. Probably the wet season seems to be the time when, you know, the soil is so wet that it seems to retain infection or something..". S014 School Staff

In one interview, normalisation of skin sores was perceived by some school staff, who believed continual presence of skin sores may have resulted in a form of

acceptance in some families, therefore treatment is not sought.

"Yeah, they are [community members] probably like, "oh, we are fine, we have those [skin sores], and we are fine, so you will be fine". That is what I think like the attitude probably is". S003, S004, S005, S006 Group Interview School Staff

Similarly, to community members, clinic, and school staff, SToP team members observed general awareness of and treatment available for skin infections, however, it was acknowledged that community members may not fully understand the consequences of skin sores.

"One family with three members with ARF/RHD normalised skin sores describing the infant covered in sores on the lower limb as just having battle scars and so treatment was not needed. Disconcerting to the team as the family seemed to understand the ARF story but did not necessarily appreciate how skin sores played into the picture". ROR – dated 09/05/2019.

Theme 2: treatment and prevention strategies

Community, clinic, school and SToP team members articulated their knowledge of current treatment and prevention opportunities available in communities, including going to the clinic for treatment, the importance of swimming pools in cleaning the skin and preventing skin infections, the availability and use of traditional medicines for maintaining healthy skin, and the importance of hygiene sessions at schools.

2a. Community members awareness of prevention strategies

Community members recognised that swimming in community pools was effective in preventing skin sores. The positive impact of swimming pools on school attendance was also observed by school staff due to the 'no school, no pool' policy. While community members identified the clinic as the location for treatment, their confidence in the effectiveness of treatment was limited when skin infections kept returning. The use of traditional bush medicine was perceived as an effective and popular treatment for skin sores instead of or in addition to western medicine available from the clinic.

"I believe the [swimming] pool [in our community] has helped the school sores... And we have no school, no pool policy, [children] have to come to school to go for a swim". HP004 Community Member & School Leader

"[Community members] collect bush, eucalypt leaves. They do it at the art centre. The bush medicine we going to start having that here in school. So, I have to talk to the families, to the community, to coming and letting the kids know like what

plant to use to put on sores. Bush medicine, there is like one medicine to treat the sore. For a long time when kids were having scabies, clinic medicine wasn't working. It didn't help those lumps, so the family went out collecting bush medicine and doing that up, like boiling it up". HP005 Community Member & Aboriginal Teaching Assistant

"We are lucky here in [community name] because our old people still use bush medicine and still eat off the land and we do two way [learning], so they help us with how to make bush medicine to treat any sores, in particular, with different bush and stuff." S009 Community Member & School Staff

"I didn't know much about bush medicine, now I have a good understanding of bush medicine. Yeah, it's really good but as long as they use properly. Like I learnt the proper way, if you use it the wrong way". HP011 Community Member & Aboriginal Health Worker

2b. Clinic and school staff awareness of prevention strategies
School staff articulated the strength-based two-way learning approach of incorporating traditional methods for treating sores with bush medicines. School staff identified a variety of prevention strategies implemented in different communities which included, washing hands, washing faces, showering, and clothes washing. School staff also identified a variety of identification and treatment methods for skin infections including clinic staff visits checking for skin sores, cleaning, and dressing wounds, working with community members to make bush medicine to treat wounds, and referrals to the clinic. Availability of a school nurse, relationship with the clinic, and parent engagement and motivation were observed as factors in identification, treatment, and referral for children with skin sores.

"We just sort of wash hands, so every morning it is just washing hands, washing face, eyes and everything and that is about it. So, the whole school's morning routine would be they would wash hands, eat breakfast and then they would brush their teeth and wash their eyes and then before we came into class they would do breathe, blow, cough and then wash their hands again and then come into class". S001 School Staff

Clinic staff identified a variety of treatment methods for skin sores including educating parents on early prevention. A strong theme emerging from clinic staff was the use of BPG injection as their preferred treatment over oral co-trimoxazole (SXT-TMP) for skin sores, despite the evidence and guidelines recommending as first line therapy⁹

"So, we have got a multifaceted programme. The first step is education every time the person comes in. We talk to them about the risk of skin infections. We talk to them about how useful the [BPG injection] is as opposed to the [SXT-TMP] and I would say I would choose this for my child because

this is the one that will protect you for 28 whole days. So, people know that. We have also got a programme in which the council who runs the community they supply us with soap powder every month". C001 Clinic Staff

"We do give lots of needles...". C008 & C009 Group Interview Clinic Staff

"Oh, we would almost always go for [BPG injection]". C017 Clinic Staff

Theme 3: environmental health

When discussing environmental health factors contributing to skin infections, commonly reported factors including overcrowding, poor housing and plumbing hardware were identified by all groups. Clinic staff communicated issues around overcrowding, including lack of housing and inadequate house sizes to host large families. Community members pointed out environmental health concerns in the home where good working plumbing and showers with hot water are basic requirements needed to help reduce the burden of skin infections.

"...In that scenario it was a very crowded little, tiny house, really overcrowded. It was really hard... But it is overcrowding. Not enough housing is a big thing". C018 Clinic Staff.

"I think that is the base of all the problems. If it wasn't for the environmental health, they wouldn't have scabies... We definitely have kids that present with sores again and again and again. And that is also environmental as is scabies". C019 & C020 Group Interview Clinic Staff

"Environmental health is more about the household, you know, [need] good shower[s], hot water for shower and all this thing". HP011 Community Member & Aboriginal Health Worker

A strength-based and proactive approach was reported by clinic staff in one community where the community council had purchased washing machines for all community members.

"The council have just organised the purchase of an eight-kilo top loading non agitator washing machine for each household". C011 Clinic Staff

The Kimberley have developed a referral process to connect health care events with the opportunity for an environmental health housing assessment by service providers. These are known as environmental health referrals. Due to the cultural sensitivity of environmental health referrals, researchers did not broach this topic with community members, and only discussed with clinic staff, as it is a process that they contribute to. While some clinic staff were reluctant to share their experiences,

others offered their perspectives on the referral process, including the sensitivity of the referral process and the importance of how to address the process.

“So environmental health [services] are very receptive. They want to do any work that they can, and they really do want to help. We are trying to build up our relationship, no, well we already have a well-established relationship with them, but we are trying to improve the sway that they have in the community and the acceptance of their service in the community... We have got good referral pathways now, you know, they are very receptive to an email that I send them. And [local officer name], he will always drop in whenever he is in community”. C011 Clinic Staff

“Because we have so many Aboriginal Health Workers here it is like the biggest percentage of the workforce. You have just got to be very careful of anything you are doing because if there is any kind of stigma attached to anything and then the whole community knows about it. You have just got to be very mindful of how you do it and how you say it and you know”. C012 & C013 Group Interview Clinic staff

Theme 4: challenges in treating and prevention skin infections

There were several challenges to the treatment and prevention of skin infections in remote communities identified by all participant groups. A strong theme identified by clinic staff was the BPG injection as a barrier for treatment, given some children are scared of, or avoid going to the clinic due to fear of the needle.

“So, I think [the BPG Injection], while they are good, I think they have caused some kids to avoid us”. C008 & C009 Group Interview Clinic Staff

“In [community name] you would have the kids that would be sort of used to [BPG injection] and then you would get the ones that would just scream the minute they came near the clinic because they were like expecting to get [BPG injection] even if they were just coming in with their Mum or something like that. They didn't like us, they didn't [like] the clinic, they didn't like anything about it, so they had been traumatised”. C012 & C013 Group Interview Clinic Staff

School staff reported challenges relating to practices and protocols, highlighting gaps in service provision for children to receive and access medical care and treatment in a timely manner. High clinic staff turnover, lack of staff continuity, fly in and out rosters, and staff shortages in both services can potentially affect service availability and existing relationships with community members.

“I guess because we do not have a school nurse, I do find a lot of the time we are cleaning and dressing lots of the sores of the children because they do frequently say that they

have sores, and they are quite often infected and sore. We have been told that we cannot take them to the clinic and that it needs to come from the parents, to try and empower the parents... There is a massive gap because we are not trained medically. We should have somebody here. Our role is to be educators and teachers...”. S003, S004, S005, S006 Group Interview School Staff

Further, barriers for treatment and prevention also included social and cultural factors such as, lore (traditional ceremonies) and sorry business (funerals), when communities are either closed or community members leave for a period of time to attend these ceremonies. The wet season also affected treatment and prevention of skin infections due to being isolated and limited deliveries of food and medical supplies.

Theme 5: skin infection prevention strategies

When asked what strategies might be effective in reducing skin infections, ongoing education on all aspects of health and healthy living practices using appropriate resources emerged as a strong theme among school staff and Aboriginal Health Workers. Clinic staff recognised the importance of using a pictorial resource such as the SToP trial flip charts ([Appendix A](#)), as a means to engage with families and discuss issues associated with skin infections.

“...Just keep up the educating. That is what I tell everyone. You just cannot stop educating people on health to look after our bodies and our mind and all that, so yeah, just keep educating and doing what you guys do. It is really good”. S009 Community Member & School Staff

“Keep on talking and for my family to keep from getting sores. You have to wash the blankets and stuff, cleaning your room and that”. C010 Community Member & Aboriginal Health Worker

“Your flip charts would be very good. Because, I mean, you can sit and talk to them about what it causes and what it can do but I think there is nothing beats a good picture”. C012 & C013 Group Interview Clinic Staff

Health promotion using local languages, art, song, and dance including hip-hop was also identified by community members as culturally appropriate and meaningful, particularly for the children.

“Yeah, absolutely. And like [Researcher] said, you could have the illustrations by the Elders, and you could have traditional language, or you could then flick it and have Aboriginal English for the children's or Creole, that the children can speak. You could have a few different sides to it.” HP004 Community Member & School Leader

“That [video] for hip hop, the kids would really like that. When you write the song, that would be including

everything". HP005 Community Member & Aboriginal Teaching Assistant

"The kids love music and dance and books". S018 School Staff

Discussion

Aboriginal stakeholders and researchers navigated and supported community engagement ensuring governance and local protocols were always adhered to. This was particularly important during COVID-19 when travel to, and engagement with remote communities was restricted. This culturally responsive CPAR approach provided a critical lens for SToP researchers to understand the challenges experienced by remote communities during the pandemic and acknowledge the privilege of visiting and yarning with community members. Underpinned by constructivism principles, community members were able to articulate their knowledge, experience and recommendations for future treatment and prevention of skin infections to improve their health outcomes.

Overall, there was a strong knowledge of recognition, treatment, and prevention of skin infections. However, this did not extend to the role skin infections play in causing RHD or kidney failure. Our study has confirmed three main findings: 1. The biomedical model of treatment of skin infections remained strong in interviews with staff living in the communities; 2. Community members have a reliance and belief in traditional 'bush medicine' remedies for skin infections; and 3. Ongoing skin infection education using culturally appropriate health promotion resources is a priority.

Clinic staff used a biomedical model that identified treatment methods for skin sores including educating parents on early prevention, identification and treatment of skin sores based on symptoms. While guidelines state both oral co-trimoxazole and BPG Injection are equal first line treatments for impetigo,⁹ it was identified that some clinic staff preferred the BPG injection¹⁷ over the oral co-trimoxazole (TMP-SMX) explaining to parents that it is the best treatment, given only once, and communicated misinformation that it lasts for 28 days. This is likely due to the use of BPG for secondary prophylaxis of ARF/RHD with a dosing interval of 28 days.¹⁴ Similarly reported by Amgarth-Duff et al,¹⁵ clinic staff in our study also acknowledged this is the most painful option that instils fear and trauma in children, resulting in a barrier to seeking future treatment. In a previous trial, one-third of children still complained of pain 48 h after the injection (ref 15). This barrier to seeking treatment reduces the likelihood of children receiving appropriate treatment sooner. Subsequently, this highlights the need for creating culturally secure^{30,33} clinic settings where productive dialogues³⁴ between clinic staff and parents allow parents to choose their

preferred treatment rather than this being chosen paternalistically by clinic staff. This provides parents the opportunity to choose the preferred option or a combination of approaches for their children.

Traditional remedies using bush medicines was a strong theme discussed by all participant groups. Although not available or applied in a clinical context, bush medicines were developed and used broadly in some communities to treat a range of ailments, including various skin issues, aligning with Amgarth-Duff et al¹⁵ work in the Pilbara and Thompson et al³² study within the Tiwi Islands. While focussed on skin infections, not cancer treatments, our findings support Shahid et al³¹ study, emphasising the need for bush medicines to be used alongside biomedicine to facilitate a holistic approach to treatment and healing. This allows community members to feel connected to culture, country and spirit and can privilege their voices to choose the preferred treatments for their own health outcome giving them a sense of control and reconnection to country, culture, and spirit.³¹

Ongoing health education was emphasised by all participant groups as an important strategy in skin infection prevention.¹⁵ Community members in particular, articulated the need for educational resources to be developed in local languages, ensuring culture is embedded in the storytelling mechanisms for reducing skin infections.^{36,55} Health promotion initiatives involving song and dance were believed to be an appropriate and important method of engaging children in healthy skin messages.²³ Moreover, this study confirms access to swimming pools as an effective prevention strategy,³⁹ particularly the current 'no school, no pool policy' in some communities which increases both school attendance and swimming. While staff shortages to patrol the pool can be challenging, swimming should be supported as an element of preventative health.

This study revealed ongoing challenges with service practices and protocols associated with treating and preventing skin infections, including the absence of a school nurse in some communities. This made it difficult for teachers, given they are not medically trained or permitted to take children to the clinic. However, offering training in health literacy to Aboriginal Teaching Assistants could assist in addressing this challenge. Clinic staff believed stronger interagency communication between clinics and schools could assist in addressing this gap. Staff shortages, high staff turnover and lack of staff continuity, fly in fly out rosters negatively impacts service provision and can affect existing relationships with community members and inhibits stronger interagency collaboration.¹⁵ Further challenges identified in treatment and prevention of skin infections were cultural factors including lore and sorry business. Similarly to previous research,^{18,19,55} environmental health concerns were reported, particularly issues around overcrowding of households,^{18,56} access to functioning showers and hot

water and the built environment.¹⁹ Leadership and guidance from ACCHOs in communities is essential for protocols and practices to be developed to ensure that concerns are addressed in a culturally appropriate way, including the sensitivity and potential for stigma around environmental health referrals. Our findings reveal the significance of these referral pathways in addressing environmental factors to assist in reducing skin infections. All participant groups in this study believed it was difficult to reduce skin infections without addressing environmental²⁰ and social determinants^{21,57} of health.

This study is the first to report knowledge, attitudes, and practices to reduce the burden of skin infections in remote communities in the Kimberley region of WA including the voices of community members in addition to non-Aboriginal clinic and school staff. Challenges in relation to consent for audio-recording data in some yarning sessions with community members were experienced. This was offset by scribing notes and having an Aboriginal person leading yarning sessions and clarifying participant's answers increasing the cultural and academic rigour. Travel restrictions into community due to COVID-19 impacted data collection from March to September 2020. However, interviews and yarning sessions recommenced in October 2020 when SToP team members were approved to re-commence travel to communities. While these travel restrictions delayed data collection, it did not affect data quality, and also provided opportunities for service provider's and community members to express their experiences during COVID, specifically around health and hygiene practices. COVID data will be reported elsewhere. While our study briefly discusses environmental health factors and referrals, researchers did not interview Environmental Health Officers or community members about environmental health. Further research is currently ongoing in this area.

This study provides unique insights such as the importance of greater inter-agency engagement between the clinics, schools and environmental health services and working with the local community to co-design Health Promotion educational resources that can be useful to inform health policy and practice guidelines. Barriers to seeking treatment for skin infections such as the (BPG) injection have been previously reported,¹⁵ yet remain a concern in this study as untreated skin infections affect longer term health outcomes for children, particularly ARF and RHD. Effective treatment and prevention of skin infections requires culturally appropriate community education on the importance of skin health, empowering parents, and caregivers on various treatment options and procedures, so they are able to choose the best option for their child. Developing culturally secure environments and incorporating culture and language into resources used in a clinical setting explaining skin infections and the range of treatments can help address this issue.

The gap in knowledge relating to the connection between skin sores and RHD is also concerning. Embedding language and culturally appropriate healthy skin messages linking impetigo to RHD are required and will be developed. The critical importance of having ACCHOs in all remote communities and incorporating culture into clinical settings overseen by Aboriginal leadership in communities, can address current gaps in health service practices and protocols. Continuing advocacy for better housing and plumbing hardware in these communities remains a high priority. Overall, the Aboriginal Health Planning Forum (KAPHF) environmental health referral form currently used across the Kimberley was identified as very effective with referral pathways established between the service providers, clinics, and other stakeholders. The referral form may provide a useful information template and process to be used between agencies and service providers for other regions to adapt to their local circumstances. A review by the KAPHF environmental health sub-committee identifies key lessons in implementing the referral form, including the need for leadership, the orientation of all staff, establishing local relationships between environmental health service providers and clinics; and an orientation guide with clinics reminders to standardise practice to ensure consistent practices.⁵⁸

This paper discusses skin health treatment and prevention in a remote Australian context; however, consideration is required for Indigenous populations living in other Western Pacific regions experiencing high rates of childhood skin infections. While bush medicines are not currently practiced in a clinic setting, using traditional medicines alongside biomedical treatment procedures facilitates cultural security for Aboriginal people. Further investigation, and advocacy to establish these into practice, procedures and protocols is warranted. Establishing protocols and practice procedures focused on improving collaborations between service providers and community members in remote communities is also recommended.

Contributors

Tracy McRae

Tracy contributed to design of the study, data collection, an independent data analysis, interpretation of results and led the writing of the manuscript. Tracy has accessed and verified the data and was responsible for submitting this manuscript.

Francene Leaversuch

Francene contributed to an independent data analysis, interpretation of results and critical review of the manuscript. Francene has accessed and verified the data.

Slade Sibosado

Slade provides cultural mentoring to Tracy McRae, facilitated community engagement, and contributed to data collection through leading the yarning sessions with community members.

Juli Coffin

Juli provides supervision & cultural mentoring to Tracy McRae and contributed to critical review of the manuscript.

Jonathan R. Carapetis

Jonathan provides supervision to Tracy McRae, contributed to the study design and review of the manuscript.

Roz Walker

Roz provides supervision to Tracy McRae, contributed to study design, interpretation of the results, critical review of the paper.

Asha C. Bowen

Asha provides supervision to Tracy McRae, led study design, interpretation of the results, critical review of the paper.

Data sharing statement

Acknowledging data sovereignty of Indigenous peoples, unidentified data is shared when consent was provided to audio record interviews. Data has been provided in a Word Document 'DataFile.doc'. Data collected and relating to COVID-19 has not been shared due to being reported elsewhere.

Declaration of interests

The authors declare no conflicts of interests.

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Appendix A. Supplementary data

Supplementary data related to this article can be found at <https://doi.org/10.1016/j.lanwpc.2023.100757>.

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