

CASE STUDY

The challenges faced by clinicians in providing a telehealth service for Aboriginal patients with diabetic foot complications in rural and remote Western Australia

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Abstract

Aboriginal and Torres Strait Islanders are at an increased risk of developing diabetic foot complications including ulceration, infection and amputation with a three-to-six-fold increase when compared with non-Indigenous Australians. With limited health services available in regional areas, this problem is exacerbated. The case reports follow the journey of two Aboriginal patients from remote Western Australia who develop diabetic foot complications requiring transfer from their remote communities to receive treatment in a tertiary metropolitan hospital by the Multidisciplinary Foot Ulcer service. There are many challenges faced by wound management clinicians when caring for this population with diabetic foot complications including late presentation to receive care; lack of resources and staff experienced in the management of the high-risk foot; and obstacles of treating a patient via a telehealth service in rural and remote areas. The aim of the case studies is to highlight the challenges faced by wound management clinicians in the management of rural and remote Aboriginal patients with diabetic foot complications while striving to deliver culturally safe and holistic care.

Keywords Aboriginal and Torres Strait Islander, diabetic foot complication, high-risk foot, rural wound management, telehealth.

For referencing van Rooyen JL, Larsen DE. The challenges faced by clinicians in providing a telehealth service for Aboriginal patients with diabetic foot complications in rural and remote Western Australia. *Wound Practice and Research*. 2026;34(1):42-48.

DOI <https://doi.org/10.33235/wpr.34.1.42-48>

Submitted 1 October 2025, Accepted 13 November 2025

Introduction

Aboriginal and Torres Strait Islanders have survived thousands of years in Australia through harsh and changing environmental conditions with evidence of endurance, community strength and resilience, and a knowledge of medicinal treatments aiding in their survival.¹ Colonisation had a devastating effect on the communities and culture of Aboriginal and Torres Strait Islanders and is recognised as negatively impacting their health, leading to poorer health outcomes than non-Indigenous Australians.² Aboriginal and Torres Strait Islanders are at increased risk of developing chronic diseases including diabetes,³ with diabetic foot-related complications being a major health care burden in Australia.⁴ Poor foot health leads to complications including ulceration, infection and amputation.⁵ Aboriginal and Torres Strait Islanders have higher rates of both diabetes-related foot ulcers and lower limb amputations with a three to six-fold increased risk of experiencing a diabetes related foot complications than non-Indigenous Australians.⁶ With limited

availability of health care services in regional areas, this problem is exacerbated.

In Western Australia (WA) Aboriginal and Torres Strait Islanders comprise 3.3% of the population with the majority living in Perth, Peel and Southwest regions followed by the Kimberley region.⁸ WA is the largest area in the world covered by a single public health authority and access to specialist services required by people with a high-risk foot is limited in rural and remote areas⁹ often requiring patients to travel large distances away from their family and community to receive specialist care. The authors of this paper are Wound Management Nurse Practitioners working as part of a multidisciplinary foot ulcer (MDFU) service in a metropolitan tertiary teaching hospital in WA. The team also consists of vascular surgeons, infectious disease (ID) physicians, endocrinologists, podiatrists and an orthotist, the team also has access to plastic and orthopaedic surgeons. The service is accredited with the National Association of Diabetes Centres as a Centre of Excellence for the Interdisciplinary

High Risk Foot Service. As well as providing a service to patients in the metropolitan area, the hospital also provides a service to a large geographical regional area including the Kimberley, the Pilbara and the Wheatbelt. As per the WA Aboriginal and Wellbeing Framework 2015–2030,¹⁰ the term Aboriginal will be used in this paper when referring to Aboriginal people in WA as recognition of the Aboriginal people being the original inhabitants of WA. Aboriginal and Torres Strait Islander may be referred to in the national context. No disrespect is intended to our Torres Strait Islander community.¹⁰ The following paper presents two case studies on Aboriginal patients from rural and remote locations in WA and the challenges faced by a wound management service (WMS) in the treatment of diabetic foot complications.

Case report

Patient one

Patient one is a 32-year-old Aboriginal male from a remote community in WA, 25kms from the closest regional centre. Past medical history included gastro-oesophageal reflux, poorly controlled type one diabetes mellitus (T1DM), pancreatic insufficiency, chronic anaemia of unknown cause and hypertension. He presented to a regional hospital with a severe left foot infection resulting from a hot water burn eight days previously, which he was treating with bush medicine supplied by his grandmother. He was commenced on intravenous (IV) antibiotics and a computed tomography (CT) scan revealed a collection extending from the left extensor digitorum longus muscle in the calf to the extensor digitorum tendons in the midfoot. He was transferred to a metropolitan tertiary hospital and admitted under the care of the MDFU service.

The vascular service performed extensive debridement of the abscess in theatre extending from the left dorsal foot into the antero-lateral calf resulting in two wounds. As there was suspicion of a joint infection and ongoing pain post-operatively, a bone and white blood cell scan was performed. This revealed a soft tissue infection and gas formation extending through the myofascial plane in the lateral left calf concerning for necrotising fasciitis with no evidence of osteomyelitis (OM) or septic arthritis. Intraoperative tissue microscopy, culture and sensitivity (MC&S) cultured *Streptococcus agalactiae* and he was treated with IV antibiotics by the ID team. Blood cultures were negative. He had a sensory neuropathy and palpable pedal pulses.

In the seven days following debridement, the wound improved with evidence of granulation tissue in the wound bed, however, tendon was visible in both wounds. The clinical signs of infection resolved. Biodegradable temporising matrix (BTM) was applied to the wound bed in theatre one week post initial debridement (Figure 1) and negative pressure wound therapy (NPWT) was applied to ensure the BTM remained immobile. His inpatient stay extended a further three weeks to address health issues, such as hyperglycaemia, chronic kidney

disease, haematuria, normocytic anaemia and *Helicobacter pylori*. He was referred to the Aboriginal Liaison Officer (ALO) to support him during his extended admission and the MDFU service ensured he was involved in decision making regarding his care. He was discharged with an antimicrobial dressing covering the BTM and appropriate footwear as directed by the podiatrist. The course of antibiotics for the foot infection were already complete, however he remained on treatment for *Helicobacter pylori*.

On discharge the patient elected to stay at an Aboriginal hostel in the metropolitan area for three weeks to facilitate close wound assessment, delamination of the BTM and assessment for the suitability of a split skin graft by the WMS as an outpatient. Following delamination of the BTM towards the end of the three weeks, he missed an appointment and was unable to be contacted by the WMS. Fortunately he presented to the outpatient clinic at his local regional hospital on his return to the area. Nursing staff were able to send photographic images of his wound to the WMS ensuring ongoing wound assessment and management by the WMS and MDFU service. He elected to stay in the regional town closest to his community with a relative as there are no wound care facilities in his community. As the patient was unable to attend telehealth appointments, his care was



Figure 1. Post application of BTM left foot and leg wounds

handed over to the local podiatrist, with nursing staff at the hospital outpatient clinic facilitating wound care. His wounds were healing well at time of discharge (Figure 2).

Patient two

Patient two is a 54-year-old Aboriginal female who resides in a remote community 80kms from the closest regional town. She has a past medical history of a malignant peripheral nerve sheath tumour of her right hip treated with radiotherapy, rheumatic heart disease, type two diabetes mellites (T2DM), *Helicobacter pylori* infection and sensory neuropathy. She lost her shoes and developed a blister on her right plantar heel. As the patient was unable to visualise the blister or feel pain in her foot due to sensory neuropathy and poor eyesight, she was unaware the blister had developed into a wound and had deteriorated. She was experiencing right ankle and groin pain which was believed to be related to her hip, as well as gout and was treated by a General Practitioner with prednisolone. An ultrasound of her right leg was ordered to investigate deep vein thrombosis, which was excluded. There was no reference in her medical



Figure 2. Wound healing continues in regional centre post delamination of BTM

records as to whether her feet were assessed. A week later she was transferred by ambulance from her community to the closest regional hospital, febrile with increasing leg pain. She was admitted to hospital with infected heel ulcers (Figure 3) and treated with IV antibiotics. Following photographic review of her wounds by the WMS at the metropolitan tertiary hospital, she was transferred to a larger regional hospital via the Royal Flying Doctor Service (RFDS). On arrival she was hypotensive requiring treatment in the high dependency unit. Her blood cultures were negative, and wound swabs cultured *Staphylococcus aureus*, *Arcanobacterium haemolyticum* and mixed organisms for which antibiotics were administered. A foot Xray revealed foreign bodies in her heel (Figure 4). After discussion with the MDFU service at the tertiary hospital she was transferred by RFDS to the metropolitan area.

A CT scan on arrival revealed a fluid collection containing gas over the right calcaneum tracking medially and superiorly into the subcutaneous tissue. There was no evidence of OM. A large amount of necrotic tissue and gravel was debrided from the right heel in theatre the following day. The soft tissue debridement did not extend to the calcaneum (Figure 5). She had palpable pedal pulses. Two days post-surgery NPWT was applied to her wound as directed by the WMS and she was treated collaboratively by the MDFU service throughout her admission. As she was switched to oral antibiotics four days post-surgery as per the ID service, and her wound was



Figure 3. Images of right heel ulcers pre-admission to tertiary hospital

granulating with no signs of ongoing infection, the patient was ready to be discharged by day seven. The patient was referred to the ALO for support and was involved in decision-making throughout her admission. Due to lack of wound management services in her local community it was decided, in consultation with the patient, that she would stay in the tertiary hospital for a further week.

Over the next week the patient's wound continued to heal and she was transferred to the local regional hospital closest to her home via RFDS. Although staff at the regional hospital have been trained in the application of NPWT, the workforce is transient, and confirmation had to be made by the WMS the staff were able to apply the dressing correctly. As the hospital does not always have the required supplies



Figure 4. X-ray of right heel with gravel and dressing material

to facilitate NPWT, the metropolitan hospital was required to send supplies with the patient to enable enough time for them to order and receive stock. The patient remained an inpatient at the regional hospital for a week with NPWT after which she was reviewed by the WMS via telehealth. The photographic images sent to the WMS were of poor quality, so it was difficult to perform an accurate wound assessment and provide advice (Figure 6). She was reviewed the following day by the visiting podiatrist who was able to perform a wound assessment and send better quality images to the WMS. As the wound had decreased in depth and after discussion with the patient, who was eager to leave hospital, the NPWT was ceased. An antimicrobial dressing was applied and the patient was discharged from hospital. She was able to stay with her daughter in town and visit the hospital outpatient clinic to receive regular wound care. As there are no wound management services in her community she was required to stay with her daughter until the wound was fully healed. As her wound was healing well, she was discharged from the WMS with regular review by the visiting podiatrist, who can contact the WMS if further review and assistance is required.

Discussion

While numerous challenges exist in providing care to Aboriginal



Figure 5. Post debridement of right heel wounds

patients with diabetic foot complications from rural and remote areas,¹¹⁻¹³ in WA three reoccurring issues experienced by the WMS in this group of patients are highlighted in the case studies. These include late presentation to receive care, lack of resources and clinicians experienced in the care of the high-risk foot and the challenges of a telehealth service in rural and remote areas.

In the occurrence of a foot ulcer, current international guidelines outline the importance of immediate assessment and intervention with a consistent strategy and standardised protocol.^{14,15} Engagement by Aboriginal and Torres Strait Islanders with general preventative foot care is low,⁷ with many seeking help when complications have progressed to an advanced stage leading to higher rates of hospitalisation.⁷ This was demonstrated by both case study patients, whose foot wounds had progressed to a level requiring transfer to a tertiary hospital for extensive debridement and treatment by the MDFU service. It is recognised in the literature, the severity and duration of a diabetic foot ulcer increases with the length of time it takes to receive care¹⁶ and late presentation by Aboriginal patients in WA from rural and remote areas is a phenomenon regularly witnessed by the WMS. Anecdotally this can result in extensive surgical debridement or minor amputation being required to save a limb or life, making management of the wound more challenging and potentially reducing the quality of life of the patient.¹⁷ While there are many factors associated with late presentation documented in the literature, common themes include fear of lower limb amputation or death previously experienced by family members, physical access to clinics due to operating hours, remoteness and transport issues; lack of culturally safe foot care services² and distrust of western medicine.¹⁸ Reasons for late presentation are many and complex, however, it is important to recognise contributing factors to aid in the delivery of holistic and culturally-safe wound management to Aboriginal patients both in hospital and the community.¹⁹

It is recommended in the Australian evidence-based guidelines for diabetes-related foot disease that Australian health professionals from all disciplines caring for people at risk of or with diabetic foot disease should implement these guidelines to help reduce the large national burden of diabetic foot disease in Australia.²⁰ As WA has a shortage of podiatrists in rural areas,²¹ Aboriginal people with diabetic



Figure 6. Example of poor-quality photographic image of right foot received by Telehealth service

foot disease rely on a variety of health care disciplines to monitor and treat complications. A study by Schoen et al⁹ concluded that without training, generalist healthcare professionals' knowledge of the diabetic foot is low, which is something that is observed anecdotally by the WMS. The WMS is frequently receives telephone or email requests for assistance from practitioners in rural areas for wound management of foot ulcers, however it is often unrecognised that the patient is displaying clinical signs of infection and/or ischaemia requiring urgent specialist treatment, as demonstrated in the second case study. Once the WMS is contacted it is imperative to perform an accurate assessment via photographic images, along with clinical information gained from the patient and medical staff to determine, in collaboration with the MDFU service, if the patient requires transfer to a tertiary hospital for treatment. Anecdotally this can be difficult as staff do not always have the required skills to assess the wound and the foot,⁹ photographic images can be misleading and patients may be transferred to the metropolitan area unnecessarily.

Once an Aboriginal patient from a rural or remote area has undergone treatment for a diabetic foot complication in the tertiary hospital where the WMS are employed, facilitating discharge from a wound management point of view can be complex. Many of the patients live in remote communities where their only access to medical care is a nursing post, where the staff have limited experience with high-risk foot patients. Therefore patients are not discharged until the wound is on a healing trajectory and other health issues are addressed. This may lead to a lengthy inpatient admission with the patients often becoming homesick and requesting discharge.¹⁸ In collaboration with the patient, a balance must be achieved between facilitating timely discharge to enable patients to return to their family and community as soon as possible, while ensuring the health services in the rural or remote area they are returning to are able to facilitate ongoing wound management. Patients may opt to remain in the metropolitan area, as in case study one, for a period to receive care or they may reside in a larger regional centre, either as an inpatient or outpatient, if their community does not have the facilities available to perform wound assessment and dressing changes. The climate a patient is returning to is a consideration as the wet season and flooding can leave patients unable to reach medical facilities. Access to services including podiatrists,²¹ staff experienced in wound management and availability of dressing products are considered as part of ongoing wound management. One of the NPs from the WMS travels to rural areas to upskill staff in wound management. This has many benefits including empowering staff with increased knowledge in assessment and wound management, building a rapport with staff and providing them with a contact when assistance is required. However, as staff are transient it is difficult to maintain skill levels in regional areas.²²

Telehealth has been found to be of value in managing people with diabetic foot complications in rural and remote areas¹¹ with reported benefits for Aboriginal people. This includes being able to remain and return to country, increased family involvement and a decreased need to travel.²³ To increase access to healthcare, telehealth is utilised^{19,24} by the WMS and the MDFU service on discharge to monitor progress and ensure continued treatment. Anecdotally, poor quality images, non-attendance and availability of venue and staff make telehealth a challenge.²⁴ These issues are addressed by supporting regional staff as to clinical information required for an accurate assessment and quality of images, as well as being flexible with appointment times. If patients are unable to attend telehealth appointments, regional staff send photographic images via a secure method to the service and receive advice about wound management. The WMS endeavours to offer a culturally-safe telehealth service to Aboriginal patients by developing trust and rapport with the patients while they are in hospital, displaying knowledge of their culture and community, using culturally appropriate communication skills and displaying empathy towards them.¹⁹ Aboriginal liaison officers are utilised in the tertiary setting, as well as in the community to support patients.¹⁹

Conclusion

Although it is challenging caring for Aboriginal patients from rural and remote regions in WA with diabetic foot complications, the WMS aim to deliver an inclusive, culturally safe service that is supportive of both patients and staff in the region. Working in collaboration with a multidisciplinary team specialising in the high-risk foot is imperative, as well as having knowledge of Aboriginal culture, issues relating to poor health outcomes in this group of patients, knowledge of available services including podiatry, skills and equipment, developing relations with staff in regional health services and having an appreciation of the vast and remote landscape in WA. Collectively this assists in the delivery of a high standard of wound care to improve the health outcomes of Aboriginal patients with diabetic foot complications and decrease the risk of lower limb amputation.

Acknowledgements

Sarah Tomlinson, Regional Senior Podiatrist, WA Country Health Service – Kimberley Regional High Risk Foot Service

Medical Multimedia Design, Royal Perth Hospital

Conflict of interest

The authors declare no conflicts of interest.

Ethics Statement

An ethics statement is not applicable. The patients in these case studies have provided written consent for the use of images.

Funding

The authors received no funding for this article

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