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Malignant Otitis Externa in Central Australia: A 15-Year Retrospective Review Between 2009 and 2024

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ABSTRACT

We performed a 15-year retrospective audit of all cases of malignant otitis externa (MOE) referred to Alice Springs Hospital in Central Australia from 2009 to 2024, the largest Australian series of MOE. Data on demographics, risk factors, microbiological culture results, management and outcomes were collected, identifying 64 cases of MOE, with the incidence increasing over time. The incidence of MOE was associated with Indigenous status and the presence of diabetes mellitus and chronic kidney disease. *Pseudomonas*, *Staphylococcus aureus* and fungal pathogens predominate as causal agents. Complications and mortality were common.

JEL Classification: Indigenous health, Social determinants of health, Endocrine system diseases, Infectious diseases, Otorhinolaryngologic diseases, General medicine

1 | Introduction

Malignant otitis externa (MOE) is a severe, progressive infection of the external auditory canal spreading to the temporal bone and skull base. Research in Australia, particularly in remote populations, is scarce. Two previous studies of MOE in Australia have occurred—a single-centre New South Wales cohort of 24 cases [1] and a Northern Territory review of 9 cases [2].

Central Australia, a geographically vast area with a dispersed and decentralised population, has a significantly increased burden of infectious disease compared with other Australian regions [3]. The Central and Barkly regions of the Northern Territory compose about 60% of the land mass of the Northern Territory, with a population of approximately 48,000, of whom 18,500 people live remotely. We aimed to summarise the epidemiology of MOE in this region, which has not previously been described.

2 | Methods

We undertook a 15-year retrospective audit of all cases of MOE managed at Alice Springs Hospital, which provides tertiary-level care for the Central and Barkly regions of the Northern Territory, auditing all separations coded as 'H60.2—Malignant Otitis Externa' between 1 May 2009 and 30 April 2024. Episodes relating to the same patient were grouped to remove duplication, with manual chart review to confirm that the diagnosis of MOE was appropriate. Data on demographics, risk factors, microbiological culture results, management and outcomes were collected. We reported our study in accordance with the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) guidelines (Supporting Information). Further methodological detail can be found in the Supporting Information. Total population data for the region studied were obtained from the Australian Bureau of Statistics (Supporting Information, Table S3).

TABLE 1 | Demographics, risk factors, microbiology culture results, antimicrobial therapy, surgery, complications and outcomes.

	Number
Total	64
Demographics	
Median age at diagnosis (years) (interquartile range [IQR])	56 (49–62)
Female sex	34
Aboriginal and/or Torres Strait Islander	64
Modified Monash Model remoteness	
6 (remote)	12
7 (very remote)	52
Risk factors	
Diabetes mellitus	63
Chronic kidney disease	55
End-stage renal disease	37
Median time on dialysis (years) (IQR)	6.0 (3.0–9.0)
Chronic suppurative otitis media	37
Immunosuppressed (renal transplant)	1
HTLV-1	28/57
Currently smoke	23/35
Alcohol use disorder	29/39
Microbiology	
Any positive microbiology results	61
Pseudomonas aeruginosa	42
Staphylococcus aureus	12
Other bacterial	18
Fungal culture positive (total)	20
Scedosporium spp.	6
Apergillus spp.	1
Candida spp.	11
Yeast not otherwise specified	1
Fungal elements seen only	1
Antimicrobial therapy	
Any systemic antimicrobial therapy	63
Antipseudomonal (total)	61
Cefepime	2
Ceftazidime	23
Ciprofloxacin	33
Meropenem	6
Piperacillin–tazobactam	38
Ticarcillin–clavulanate	5
Other systemic antibiotic (total)	23
Amoxicillin–clavulanate	8
Clindamycin	2
Vancomycin	13
Other antibiotic	7
Antifungal (total)	14
Amphotericin	2
Anidulafungin	1
Fluconazole	2
Posaconazole	2
Voriconazole	10
Other antifungal	1
Surgery	28
Biopsy/polypectomy	25
Debridement	2
Mastoidectomy	2
Complications	22
Intracranial complications	11
Cranial nerve palsies (total)	17
Facial	14
Facial and lower cranial	1
Lower cranial	2
Outcomes	
Infection cured	44/59
Relapse post-treatment	11/52
Died related to MOE	9
Outpatient follow-up	34

Note: Denominators have been included in cases where data were not available for all patients.
Abbreviations: HTLV-1, human T-lymphotropic virus-1; IQR, interquartile range; MOE, malignant otitis externa.

Indigenous oversight, engagement, governance and review were undertaken with the Alice Springs Hospital Aboriginal Engagement and Strategy Unit, who reviewed the original study design and protocol, provided feedback and assent and were involved in governance throughout the period of data collection and dissemination of findings. Ethics approval was granted by the Human Research Ethics Committee of Northern Territory Health and Menzies School of Health Research (HREC 2024-4902).

3 | Results

The patient episode search returned 179 episodes. Following deduplication, 67 patients were identified. Three patients incorrectly coded as having MOE were excluded, leaving 64 patients. Data are summarised in Table 1. Where there was missing data, individual denominators delineating the number of patients for whom data were available have been included for clarity.

The median age at diagnosis was 56 years (interquartile range, 49–62 years), with 34/64 female patients. All cases occurred in Aboriginal and/or Torres Strait Islander patients. Fifty-two patients lived very remotely (Modified Monash Model [4] = 7), 63/64 had diabetes mellitus, 55/64 had chronic kidney disease, 28/57 had an infection with human T-lymphotropic virus-1 (HTLV-1), 37/64 had chronic suppurative otitis media, 23/35 smoked at the time of diagnosis, and 29/39 had alcohol misuse disorder.

The incidence of MOE over the study period was 9.08 per 100,000 person years (2.10–19.3; 95% confidence interval [CI], 6.86–11.30) (Supporting Information, Table S1, Figure S1), and remote incidence was 18.35 per 100,000 person years (0–38.7; 95% CI, 13.36–23.34) (Supporting Information, Table S2, Figure S2). Total incidence and incidence in very remote patients increased over the study period.

Positive microbiology results were present in 61/64 of cases, of which 42/61 were positive for *Pseudomonas aeruginosa*, 12/61 for *Staphylococcus aureus* and 20/61 for fungal species, including six *Scedosporium* species.

Surgery was performed in 28/64 patients, and 63/64 received systemic antimicrobial therapy, of which 61/63 received antipseudomonal therapy, 23/63 received other systemic antibiotic therapy and 14/63 received antifungal therapy. Intracranial complications occurred in 11/64, and cranial nerve palsies in 17/64. Clinical cure was achieved in 44/59 patients, 11/52 of patients had a relapse after treatment, and 9 died due to MOE.

4 | Discussion

At the date of publication, this is the largest study of MOE in Australia. Overseas data suggest an MOE incidence of about 0.22 cases per 100,000 person years [5], whereas our data suggest the incidence in remote Central Australia may be 100-fold higher. Additionally, patients in our study had a notably lower median age, at 56 versus 73 years [6]. Rates of pseudomonal and fungal infection in our cohort were similar to other Australian data [1, 2]. *Scedosporium* is highlighted as an important fungal pathogen in MOE. Mortality related to MOE was lower in our study compared with historical NT data [2]. Rates of cranial nerve palsy were similar to overseas data [7].

All patients who presented with MOE in our study were Indigenous. Although a large proportion of people identify as Indigenous in Central Australia (41.2% in total, 80.0% in remote communities) [8], this highlights the different health experiences of Indigenous and non-Indigenous Australians, which is particularly marked in Central Australia. Diabetes and chronic kidney disease were also near universal in our patient cohort.

Among the patients tested, HTLV-1 infection was common. An association between MOE and HTLV-1 infection has not been previously described. Although rates of HTLV-1 infection in remote Central Australia can be extremely high, approaching 40% in some remote communities [9], this finding is noteworthy and further research is required.

This study is limited by its retrospective, observational design, and caution is advised in interpreting associations, particularly in the context of many interdependent confounding factors and areas of incomplete data availability. The study period also included the coronavirus disease 2019 pandemic, which, while Central Australia was relatively unaffected by lockdowns and other barriers to healthcare access, may have exerted an effect. It is also possible that some cases of MOE were unrecorded due to patients not accessing healthcare services or declining transfer to Alice Springs Hospital. Despite these limitations, we believe that we have relatively complete epidemiological capture of MOE within the Central and Barkly regions of the NT.

5 | Conclusion

In Central Australia, MOE is disproportionally frequent and is associated with Indigenous status, diabetes mellitus and chronic kidney disease. *Pseudomonas*, *S. aureus* and fungal pathogens were most frequently identified, and intracranial complications, cranial nerve palsies, relapse and death were common.

Author Contributions

George P. Drewett was responsible for conceptualisation, writing the original draft, methodology, investigation, data curation, statistical analysis and co-supervision of the project. Mini Jacob contributed to investigation, data curation and review of the manuscript. Belle Culhane contributed to investigation, data curation and review of the manuscript. Amy Booth contributed to investigation, data curation and review of the manuscript. Connor Wright contributed to review of the manuscript. Sajan Thomas contributed to conceptualisation, investigation, data curation and review of the manuscript. Anjali Abraham contributed to conceptualisation, investigation, data curation, review of the manuscript and co-supervision of the project.

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Disclosure

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Conflicts of Interest

The authors declare no conflicts of interest.

Data Availability Statement

Primary data are available on request to corresponding author.

References

1. R. Chin, P. Roche, E. Sigston, and N. Valance, "Malignant Otitis Externa: An Australian Case Series," *Surgeon* 10, no. 5 (2012): 273–277.

2. T. L. Loh, L. Renger, S. Latis, and H. Patel, "Malignant Otitis Externa in Australian Aboriginal Patients: A 9-Year Retrospective Analysis From the Northern Territory," *Australian Journal of Rural Health* 27, no. 1 (2019): 78–82.

3. S. A. J. Harch, E. MacMorran, S. Y. C. Tong, et al., "High Burden of Complicated Skin and Soft Tissue Infections in the Indigenous Population of Central Australia due to Dominant Panton Valentine Leucocidin Clones ST93-MRSA and CC121-MSSA," *BMC Infectious Diseases* 17, no. 1 (2017): 405.

4. Australian Government Department of Health Disability and Ageing, "Modified Monash Model 2025," accessed November 2, 2025, https://www.health.gov.au/topics/rural-health-workforce/classifications/mmm?language=en.

5. Y. F. Cheng, T. H. Yang, C. S. Wu, Y. W. Kao, B. C. Shia, and H. C. Lin, "A Population-Based Time Trend Study in the Incidence of Malignant Otitis Externa," *Clinical Otolaryngology* 44, no. 5 (2019): 851–855.

6. S. Stern Shavit, E. Soudry, Y. Hamzany, and B. Nageris, "Malignant External Otitis: Factors Predicting Patient Outcomes," *American Journal of Otolaryngology* 37, no. 5 (2016): 425–430.

7. A. Zonnour, R. Shahnazar, A. Jamshidi, et al., "Cranial Nerve Palsy Prevalence and Associated Factors in Patients With Malignant Otitis Externa," *Laryngoscope Investigative Otolaryngology* 8, no. 2 (2023): 538–545.

8. B. De Vincentiis, S. Guthridge, J.-Y. Su, and K. Johnston, *Story of Our Children and Young People, Central Australia 2021* (Menzies School of Health Research, 2021), accessed April 22, 2025, https://cmc.nt.gov.au/media/docs/generational-change/story-of-our-young-people-2021/2021/Central-Australia-Story-2021.pdf.

9. L. Einsiedel, H. Pham, M. R. Talukder, et al., "Very High Prevalence of Infection With the Human T Cell Leukaemia Virus Type 1c in Remote Australian Aboriginal Communities: Results of a Large Cross-Sectional Community Survey," *PLoS Neglected Tropical Diseases* 15, no. 12 (2021): e0009915.

Supporting Information

Additional supporting information can be found online in the Supporting Information section. **Data S1:** mja270166-sup-0001-supinfo.pdf.