

Are you listening? The inaugural Australian Otitis Media (OMOZ) workshop — towards a better understanding of otitis media

Lea-Ann S Kirkham, Selma P Wiertsema, Heidi C Smith-Vaughan, Ruth B Thornton, Robyn L Marsh, Deborah Lehmann, Amanda J Leach, Peter S Morris and Peter C Richmond

"Hearing health is a mainstream health issue which touches the lives of most Australians in one way or another, yet as a public health issue it is not ranked as a national health priority."¹

The inaugural Australian Otitis Media (OMOZ) workshop, Darwin, 25–26 May 2010, was well timed. The workshop — held in the same month that the Australian Senate tabled its report, *Hear us: inquiry into hearing health in Australia*¹ — brought together 70 of Australia's leading otitis media (OM) researchers. The workshop reinforced that OM is a major concern in Australia, identified important research advances, and highlighted future research areas and strategies for long-term interventions. As emphasised in the Senate report, findings from conferences on hearing health should be made publicly available. The purpose of our report, therefore, is to share the main findings from the OMOZ workshop with the broader community of OM researchers, health care professionals and policy leaders.

Why otitis media matters

OM, or inflammation of the middle ear, is a prevalent and costly disease. The associated fluid accumulation behind the tympanic membrane can lead to pain, tympanic membrane perforation, and hearing impairment. The prevalence of OM in Australian Indigenous children (about 80% by 12 months of age) is among the highest in the world.² Tympanic membrane perforation rates among Indigenous children (20%) exceed the threshold of 4% that the World Health Organization considers a "massive public health problem requiring immediate action".³ Conductive hearing loss in Indigenous Australians has been associated with language and speech development delay, poor educational and employment outcomes, and a heightened risk of criminal activity.¹ In 2008, the estimated costs of treating OM in Australia ranged from \$100 million to \$400 million.⁴

Clinically important advances in otitis media research

Delegates gained insight into important advances from laboratory-based research, environmental and epidemiological studies, intervention programs and clinical trials. It was highlighted that a multidisciplinary approach is required to better understand, prevent and manage OM.

Laboratory-based research

Researchers from the University of Western Australia (UWA) and Telethon Institute for Child Health Research (TICHR), Perth, WA, reported that bacteria (particularly non-typeable *Haemophilus influenzae* and *Streptococcus pneumoniae*) and respiratory viruses are more commonly found in the nasopharynx of OM-prone children than in healthy children. They also reported that bacteria persist in the middle ear of OM-prone children, both in biofilms and within cells. Such persistence may contribute to the chronic and recurrent nature of OM. Researchers from WA, Queensland and the North-

ern Territory highlighted the importance of investigating the interactions between bacteria and viruses in the pathogenesis of OM. Delegates acknowledged that further research is needed to determine the clinical significance of *Haemophilus haemolyticus*, *Alloiococcus otitidis* and polyoma viruses in OM.

Associate Professor Peter Richmond (School of Paediatrics and Child Health, UWA) noted that children vaccinated with pneumococcal conjugate vaccine were protected from life-threatening disease, but cautioned that children who have normal antibody responses may still experience OM. He reasoned that more appropriate assays are required to adequately assess antibody function. Professor Jennelle Kyd (Deputy Vice-Chancellor [Academic and Research], Central Queensland University [CQU], Rockhampton, Qld) emphasised that evaluation of vaccine effectiveness should include measurements of mucosal immunity.

Researchers from CQU and the University of Newcastle in New South Wales are using cell culture models to further our understanding of the interactions between external risk factors (eg, cigarette smoke), otopathogens and host immunity. Researchers from CQU have also developed animal models to enhance our understanding of OM pathogenesis, support OM vaccine development and optimise antigen delivery. A study of 1000 non-Indigenous families in WA led by Dr Sarra Jamieson (Division of Genetics and Health, TICHR) demonstrated that immunological genotypes were associated with OM susceptibility. Together, this led to the conclusion that further immunological studies in other populations and settings are warranted.

Environmental studies, intervention programs and clinical trials

Associate Professor Deborah Lehmann (Division of Population Sciences, TICHR) stressed that crowding at home is the strongest predictor of nasopharyngeal carriage of otopathogens in Indigenous children, whereas daycare attendance is the strongest predictor in non-Indigenous children. Delegates agreed with previous assertions that "reducing overcrowding is the key to fighting the disease".⁵ Lehmann reported that exposure to environmental tobacco smoke increases the risk of OM 1.6-fold, and that reducing exposure to tobacco smoke could reduce the risk of OM by up to 27%. The link between hygiene and OM generated much discussion. Delegates agreed that further evidence is required to optimise hygiene education and practices in order to improve ear and general health. Such evidence may be forthcoming from an ongoing intervention study (promoting regular ear screening, frequent hand washing and reduced smoke exposure) of Indigenous children in WA.

Debra Fernando (Sax Institute, Sydney, NSW) described the Study of Environment on Aboriginal Resilience and Child Health,

Keys to reducing the burden of otitis media (OM) in Australia

- **Prevention** — known risk factors for OM must be addressed. The costs and benefits of reducing the risk of severe disease should be quantified.
- **Intervention** — defined and evaluable interventions to prevent and treat OM are required. We must establish how, where and when to intervene.
- **Treatment** — children at high risk of severe OM should be identified early and treatment options should be enhanced.
- **Investigation** — ongoing laboratory research is essential to understand host-pathogen interactions and to develop and evaluate OM treatments and vaccines.
- **Participation** — involvement of Indigenous people in prioritisation, implementation and transfer of research is critical to sustainable improvements in ear health.
- **Communication** — research findings should be conveyed to the broader community, particularly health care service providers and policy leaders.



which is examining ear disease, mental health, housing and environmental factors in urban Indigenous children from NSW. Preliminary findings indicate that over a third of the cohort had some middle ear abnormality detected by otoscopy. Associate Professor Chris Perry (School of Health and Rehabilitation Sciences, University of Queensland, Brisbane, Qld) updated delegates on the Deadly Ears program that involves a team of ear, nose and throat surgeons, audiologists, speech pathologists, nurses and Indigenous health workers. They provide screening, surgery, rehabilitation and educational services to remote Indigenous communities in Queensland.

Associate Professor Amanda Leach (Child Health Division, Menzies School of Health Research [Menzies], Darwin, NT) described the PREV-IX_COMBO randomised controlled trial (ACTRN12610000544077; NCT01174849) that will compare the effect of two new pneumococcal conjugate vaccines (Prevenar13 [Wyeth] and Synflorix [GlaxoSmithKline]) and a combination schedule of these vaccines on immunogenicity, nasopharyngeal carriage and OM prevalence in Indigenous infants. Associate Professor Ross Andrews (Child Health Division, Menzies) noted that recruitment for the PneuMum study (NCT00714064) — assessing the effect of maternal pneumococcal vaccination on early-onset OM in Indigenous infants — is nearing completion. As highlighted by Associate Professor Peter Morris (Child Health Division, Menzies), trials such as PREV-IX_COMBO and PneuMum provide data for evidence-based guidelines that can be used to change policy and practice and, ultimately, to improve health outcomes.

Research priorities and recommendations

The OMOZ workshop enabled delegates to identify specific research priorities and recommendations, particularly those involving interagency participation, that could help reduce the burden of OM in Australia (Box).

Research priorities

- Further research into interventions to reduce ear disease in Indigenous communities is urgently required. The manner in

which studies are conducted is critical if research is to be sustainable and meaningful to Indigenous communities.

- Involvement of Indigenous people in research will allow important questions to be addressed and promote research skills within Indigenous communities.
- Research into ear health in urban Indigenous children is urgently required.
- Further studies are required to determine whether the incidence of OM can be reduced by modifying risk factors such as hygiene practices, breastfeeding duration, cigarette smoke exposure and household crowding.
- Diagnostic accuracy is required to ensure appropriate treatment.
- Laboratory and clinical protocols should be standardised for accurate interpretation and comparison of research findings.
- Bacterial and viral density and diversity studies are required to help explain the vast difference in risk of OM between Indigenous and non-Indigenous children.

Recommendations

- Research that strengthens the evidence for action (and the anticipated health benefits) must be clearly communicated to health care providers, policy leaders and the broader community.
- OM with tympanic membrane perforation for greater than 2 weeks' duration must be considered a chronic disease.
- To reduce the unacceptably high levels of OM in Indigenous children, broader initiatives are required. Interagency collaboration should focus on promoting an agreed set of short-, medium- and long-term strategies.
- An ear health and hearing taskforce led by Indigenous Australians (supported by researchers, policymakers, clinicians and public health workers) is needed. This taskforce should inform government agencies about options for improving ear health and hearing in Indigenous Australians until the problem of OM is solved.
- Long-term funding is crucial to enable the conduct of long-term research and intervention studies that are required to address the large and complex problem of OM in both Indigenous and non-Indigenous children.
- As OM in Indigenous children is often asymptomatic, health care professionals should be encouraged to examine Indigenous children's ears regularly.
- Immunisation data from the Australian Childhood Immunisation Register should be made available to facilitate evaluation of vaccine impact through data linkage.
- An OM research advisory board should be established to communicate research findings that have the greatest potential to influence policy and practice.
- Researchers should use the EarInfoNet website (<http://www.healthinfonet.ecu.edu.au/other-health-conditions/ear>) to share research findings with the community, promote standardisation of research methods, raise awareness of research expertise within Australia, and foster collaboration among researchers.

We are listening — are you?

The inaugural OMOZ workshop was timely and highly successful. It highlighted that OM is a major but unrecognised public health issue in Australia. Researchers are aware of the complexity of the condition, the gaps in knowledge about the pathogens and their

interaction with the host, the difficulty of accurate diagnosis, and the challenges of prevention and appropriate treatments. However, they are optimistic that with enhanced awareness and stronger collaborative efforts with health care providers, policy leaders and the community, the burden of OM in Australia can be reduced. We all need to listen ... and take action.

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Competing interests

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Author details

Lea-Ann S Kirkham, PhD, Research Fellow^{1*}

Selma P Wiertsema, PhD, Research Fellow^{1*}

Heidi C Smith-Vaughan, PhD, Senior Research Officer²

Ruth B Thornton, BSc(Hons), PhD candidate¹

Robyn L Marsh, BSc(Hons), PhD candidate²

Deborah Lehmann, MB BS, MSc, Principal Research Fellow³

Amanda J Leach, BAgSc(Hons), MAgSc, PhD, Associate Professor²

Peter S Morris, MB BS, FRACP, PhD, Associate Professor²

Peter C Richmond, MB BS, FRACP, Associate Professor¹

* Joint first authors.

1 School of Paediatrics and Child Health, University of Western Australia, Perth, WA.

2 Child Health Division, Menzies School of Health Research, Darwin, NT.

3 Centre for Child Health Research, Telethon Institute for Child Health Research, Perth, WA.

Correspondence: prichmond@meddent.uwa.edu.au

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