

Diagnosing ear infection using smartphone

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Low-cost custom-made video-otoscope that can be connected to a smartphone in diagnosing middle ear infections. Credit: Claude Laurent

Researchers at Umeå University in Sweden have developed a method that simplifies the diagnosis of ear infections (otitis media), something which annually affects half a billion children worldwide. The software-based method automatically analyses images from a digital otoscope and

enables highly accurate diagnoses. The method is described in the journal *EBioMedicine*.

"Because of lack of health personnel in many developing countries, ear infections are often misdiagnosed or not diagnosed at all. This may lead to hearing impairments, and even to life-threatening complications," says Claude Laurent, researcher at the Department of Clinical Sciences at Umeå University and co-author of the article. "Using this method, health personnel can diagnose middle ear infections with the same accuracy as [general practitioners](#) and paediatricians. Since the system is cloud-based, meaning that the [images](#) can be uploaded and automatically analysed, it provides rapid access to accurate and low-cost diagnoses in developing countries."

The researchers at Umeå University have collaborated with the University of Pretoria in South Africa in their effort to develop an image-processing technique to classify otitis media. The technique was recently described in the journal *EBioMedicine* - a new *Lancet* publication.

The software system consists of a cloud-based analysis of images of the eardrum taken using an otoscope, which is an instrument normally used in the medical examination of ears. Images of eardrums, taken with a digital otoscope connected to a smartphone, were compared to high-resolution images in an archive and automatically categorised according to predefined visual features associated with five diagnostic groups.

Tests showed that the automatically generated diagnoses based on images taken with a commercial video-otoscope had an accuracy of 80.6 per cent, while an accuracy of 78.7 per cent was achieved for images captured on-site with a low cost custom-made video-otoscope. This high accuracy can be compared with the 64-80 per cent [accuracy](#) of general practitioners and paediatricians using traditional otoscopes for diagnosis.

"This method has great potential to ensure accurate diagnoses of [ear infections](#) in countries where such opportunities are not available at present. Since the method is both easy and cheap to use, it enables rapid and reliable diagnoses of a very common childhood illness," says Claude Laurent.

More information: Hermanus C. Myburgh et al. Otitis Media Diagnosis for Developing Countries Using Tympanic Membrane Image-Analysis, *EBioMedicine* (2016). [DOI: 10.1016/j.ebiom.2016.02.017](https://doi.org/10.1016/j.ebiom.2016.02.017)

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