Use of wideband reflectance versus tympanometry in the detection of conductive hearing loss in children, secondary to otitis media

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Objective:

a. Characterize the pathology of otitis media (i.e., middle ear infections) in children.
b. Review current methods to diagnose otitis media in children in a clinical setting.
c. Examine wideband reflectance (WBR) in diagnosing otitis media in children.
d. Discuss barriers to adoption of WBR and the future direction of WBR in a clinical setting.

Methods:

Quantitative data was gathered through primary and secondary sources regarding the etiology of otitis media, current methods to diagnose otitis media, and wideband reflectance. All data was gathered relating to the population of pediatrics. Using this data, several conclusions were made regarding the future direction of wideband reflectance in a clinical setting.

Results:

The following advantages of using WBR to diagnose otitis media were observed:

- Larger frequency range with massive amount of data, which could lead to machine learning and automated diagnoses.
- Better test-retest reliability than tympanometry, in both pressured and ambient pressure conditions.
- Potential to detect hearing loss caused by middle ear effusion.
- Easier to test patients that do not tolerate a probe tip in the ear for a long period of time, specifically, pediatrics.

The following disadvantages were observed:

- Lack of education and training on use of wideband reflectance in a clinical setting.
- Limited availability or few models of wideband reflectance systems in the audiology device market.
    - This includes the high cost of a WBR system – as much as $18,000.
    - Could result in lack of improvement to current WBR systems.
- More complex measurement, requiring more elaborate calibration.

- Need for normative data across the lifespan and associated accurate and reliable interpretation.

Conclusions:

WBR has promise in the field of audiology, especially in testing children with conductive hearing loss secondary to otitis media. Using WBR could potentially shorten the time it takes to diagnose recurrent otitis media. However, current diagnostic measures used by audiologists and otolaryngologists are sufficient to detect middle ear effusion and resulting hearing loss. Intervention protocol would likely remain unchanged no matter the testing method.

In the end, WBR systems could be added to a clinic if otitis media is a significant part of their caseload or if it is important to differentially diagnose other pathologies they see in clinic, such as cholesteatoma, ossicular desynchrony, or otosclerosis. These circumstances could certainly justify the cost for the WBR system. For the time being, WBR does not pose urgency in implementation.