

# Evaluating the Diagnostic Performance of Occupational Noise Exposure assessment in ENT Consultations for Patients with Age-Related Hearing Loss: A Monocentric French Study

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## Background

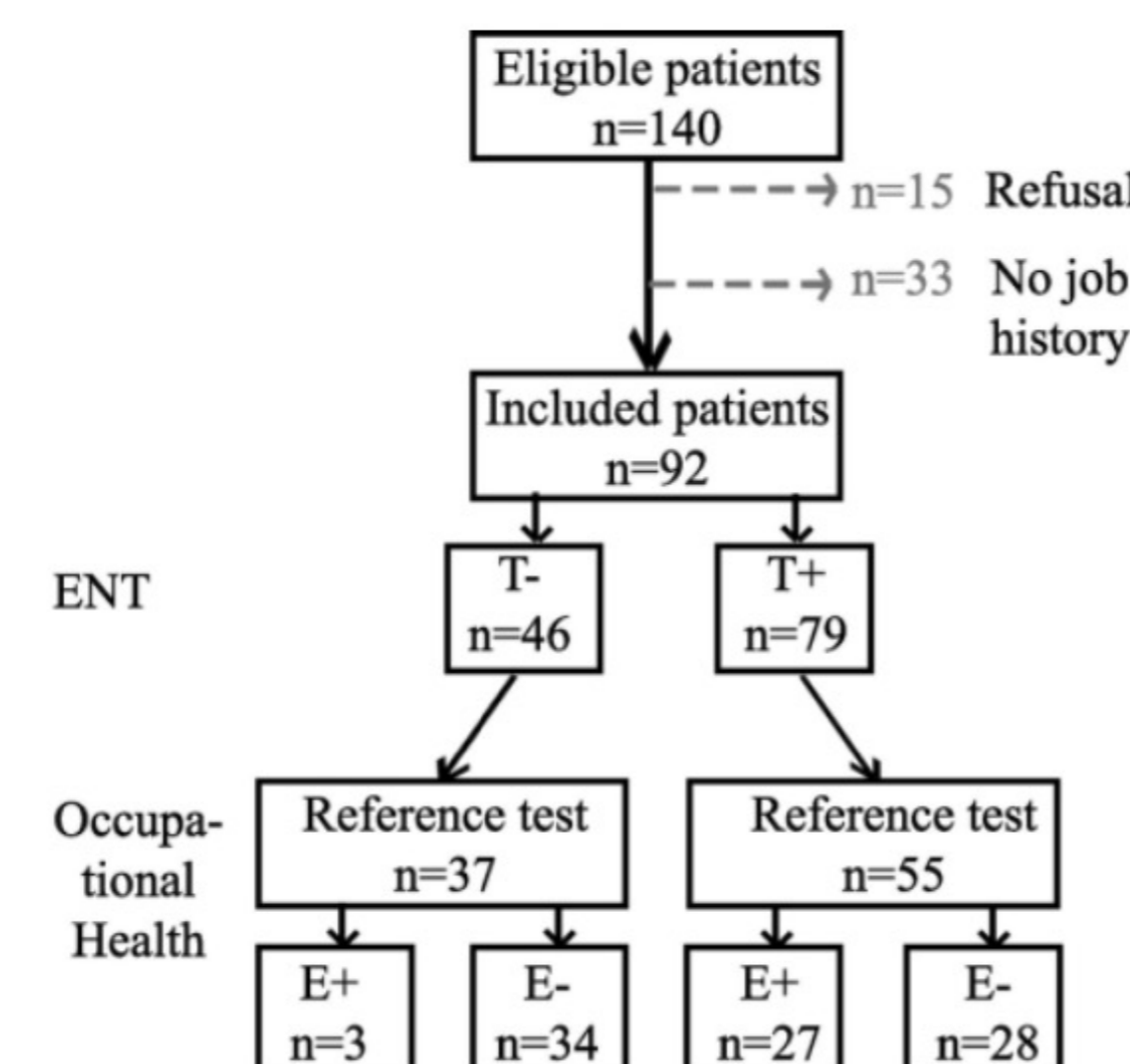
Presbycusis, or age-related hearing loss (ARHL), is on the rise due to global aging trends, and as so, poses significant public health and economical concerns (1). In practice, it is often difficult to **determine the boundary between ARHL, occupational noise-induced hearing loss and genetic disorders (2,3).**

## Purpose

We conducted a **diagnostic study** to evaluate ENT physicians' ability to detect significant occupational noise exposure during clinical hearing assessments

## Research Design

- Retrospective monocentric study performed between 2018 and 2022 in ENT department of Angers University Hospital, France.
- 92 participants aged between 40 and 80 years old with symmetrical sensorineural hearing loss.
- ENT physician performed audiometric test and asked about past work-related noise exposure. Occupational physician assessed blindly its imputability in hearing loss.
- Diagnostic analyses were conducted, as well as analyses of Z-scores based on ISO 7029 (4) standard for hearing threshold assessment.



## Références

- World Health Organization. World Report on Hearing; 2021. Accessed December 22, 2021.
- Boucher S, Tai FWJ, Delmaghani S, et al. Ultrarare heterozygous pathogenic variants of genes causing dominant forms of early-onset deafness underlie severe presbycusis.
- Bielefeld EC. Re-thinking noise-induced and age-related hearing losses. Aging Clin Exp Res. 2011;23(1):1-2.
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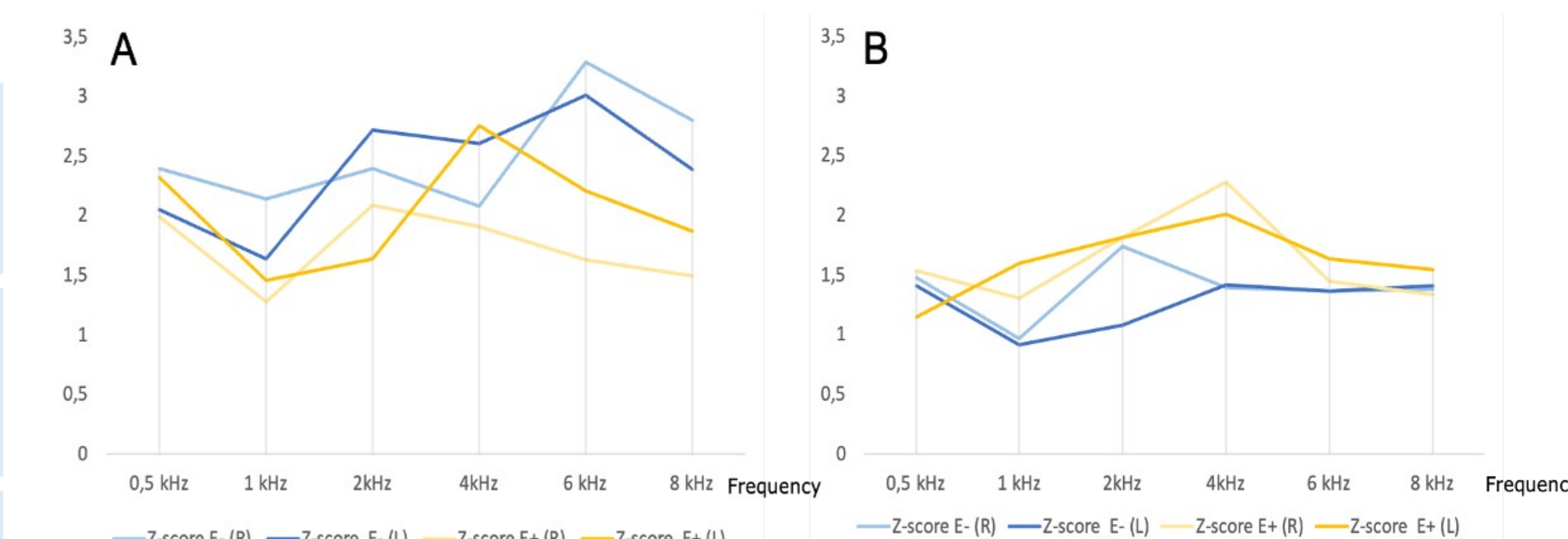
## Results

Reported noise exposure had a **sensitivity of 0.90** and a **specificity of 0.55**, with positive and negative predictive values of 0.49 and 0.92, respectively (balanced accuracy of 0.72) (**Table 1**).

In the **>60 years old subgroup**, indicators were higher, with a **sensitivity of 0.94**, specificity of 0.63, and **negative likelihood ratio of 0,09**. Exposed and unexposed groups, heterogenous in age and sex distribution, did not display significant difference in Z-score analysis, however, we found a trend of higher Z-scores in high frequencies among noise- exposed patients aged 60 years and over (**Figure 1**).

	Exposed to noise E+ (N=30)	Non exposed to noise E- (N=62)	
Declared Exposed T+ (N=55)	27	28	PPV = 0,49
Declared non exposed T- (N=37)	3	34	NPV = 0,92
	Se = 0,90	Spe = 0,55	Accuracy : 61/92 = 0,66

**Table 1: Confusion matrix**  
Se: sensitivity, Spe: Specificity, PPV: Positive Predictive Value, NPV: Negative Predictive Value, NLR: Negative Likelihood Ratio.



**Figure 1: Z-score for each frequency for patients aged 60 and below (A) and above 60 years (B).**  
E+/E-: Exposed/Non-Exposed; R: Right ear; L: Left ear; kHz: kiloHertz.

## Conclusion

**With a simple question question on noise exposure, an ENT practitioner's interview provides a good screening tool for detection of work-related hearing loss, particularly in a population aged over 60 years.**

Further studies are needed to find sensitive and specific criteria for imputable occupational noise exposure to distinguish the part of noise or age in ARHL. While based on age and sex, it is recommended to use Z-score with caution in heterogenous populations