

Spectrum effect and spectrum bias in the oscillometric ankle brachial index to diagnose peripheral arterial disease: Clinical implications

Herráiz-Adillo Á.

Cavero-Redondo I.

Álvarez-Bueno C.

Bidner J.

Martínez-Vizcaíno V.

Notario-Pacheco B.

Background and aims: The diagnostic performance of the oscillometric ankle brachial index (ABI) to detect peripheral arterial disease (PAD) varies among populations, suggesting a spectrum effect. When this heterogeneity modifies post-test probabilities, a spectrum bias arises. This study evaluates the presence and influence of spectrum effect and spectrum bias on test performance and clinical decisions. **Methods:** Oscillometric and Doppler ABI were compared in two settings: Primary-Care (333 legs) and Vascular-Service (41 legs). Spectrum effect was assessed using stratification and logistic regression, while spectrum bias was assessed through graphical and statistical tests based on predictive values and likelihood ratios, respectively. **Results:** Across subgroups, sensitivity ranged from 61.5% to 90.9%, and specificity from 81.8% to 99.1%. Logistic regression confirmed a spectrum effect in setting, diabetes, smoking status and age (univariate), and setting and diabetes (multivariate model). The positive likelihood ratio ranged from 5.0 to 89.1 in subgroups, leading to a spectrum bias in diabetic, smoking (both subgroups) and age (both subgroups). Therefore, a positive test ruled in differently the disease across subgroups, with a high rate of false positives in diabetic, smoking and >75-year-old patients. The negative likelihood ratio ranged from 0.09 to 0.39 in subgroups, with significant spectrum bias in Primary-Care patients, non-diabetics and smokers. Thus, in these subgroups, a negative test ruled out the disease with less certainty. **Conclusions:** Spectrum effect and spectrum bias were found in oscillometric ABI to detect PAD, potentially affecting clinical decisions, especially for positive tests. Information about

spectrum variables and the application of specific subgroups indicators are necessary. © 2018

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Ankle-brachial index

Oscillometry

Peripheral artery disease

Spectrum bias

Spectrum effect

age

aged

ankle brachial index

Article

cardiovascular risk

clinical decision making

clinical evaluation

cross-sectional study

diabetes mellitus

diagnostic accuracy

diagnostic test accuracy study

Doppler flowmetry

dyslipidemia

false positive result

female

gender

human

hypertension

logistic regression analysis

major clinical study

male

multicenter study

multivariate analysis

obesity

oscillometry

peripheral occlusive artery disease

physical parameters

predictive value

primary medical care

priority journal

prospective study

sensitivity and specificity

smoking

spectrum bias

spectrum effect

statistical bias

univariate analysis

algorithm

brachial artery

diagnostic imaging

Doppler ultrasonography

middle aged

oscillometry

peripheral occlusive artery disease

regression analysis

signal processing

statistical bias

statistics

very elderly

Aged

Aged, 80 and over

Algorithms

Ankle Brachial Index

Bias

Brachial Artery

Cross-Sectional Studies

Female

Humans

Male

Middle Aged

Multivariate Analysis

Oscillometry

Peripheral Arterial Disease

Predictive Value of Tests

Regression Analysis

Sensitivity and Specificity

Signal Processing, Computer-Assisted

Smoking

Statistics as Topic

Ultrasonography, Doppler