Comparing Methods for Identifying an Intermediate Range of Test Result
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**INTRODUCTION**
- Diagnostic tests rarely discriminate perfectly between patients with and without a disease, leaving a subset for whom disease status cannot be established.
- It is argued that the frequently adopted binary framework for reporting diagnostic accuracy results is inadequate due to its inability to recognise the uncertainty inherent in diagnostic practice.\(^1\)
- Despite being recommended in the STARD statement, there is currently no standardised method for identifying an intermediate range of values on a quantitative test scale.
- Two existing methods were identified in the literature, both of which have been rarely cited or implemented in diagnostic research.\(^2\)

**THE ‘GREY ZONE’ METHOD**
Coste and Pouchot’s ‘grey zone’ method is based on the concept of ‘desired’ post-test probabilities, applying Bayesian theory to derive likelihood ratio intermediate range limits\(^2\) e.g. to achieve LRs corresponding to PPV=0.9 and NPV=0.1.

**DATA**
- 701 children with suspected serious bacterial infection were consecutively recruited in a UK paediatric assessment unit.
- Index tests: white blood cell count (WBC), procalcitonin (PCT) and C-reactive protein (CRP).
- Reference standard: cases of ‘serious bacterial infection’ were agreed by a panel of clinicians.

**EVALUATION**
- No solution if ‘desired’ accuracy level is beyond the discriminatory capacity of the test.
- Likelihood ratio curves very unstable and non-monotonic due to the sparseness of the data.

**THE TG-ROC METHOD**
Greiner’s ‘Two-Graph Receiver Operating Characteristic’ (TG-ROC) defines an intermediate range as values which fail to achieve 90% sensitivity and specificity\(^3\).

**EVALUATION**
- Method will always find IR limits, unless single threshold exceeds 90% Se and Sp.
- TG-ROC curves are smooth, making it easy to interpret.

**THE LIKELIHOOD RATIO METHOD**
We define intermediate results as those which hold very little diagnostic information: test values with LR - greater than 0.5 and LR + less than 2.

**EVALUATION**
- LRs encompass a reasonable % of the patients.
- Problem of unstable LR curves overcome.
- Still will not always provide a solution (although this will happen less frequently).

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\(^1\) Feinstein (1990). JBI Epi.