Chapter 1

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Individual agreement between two measurement systems is determined using the total deviation index (TDI) or the coverage probability (CP) criteria as proposed by Lin (2000) and Lin et al. (2002). We used a variance component model as proposed by Choudhary (2007). Using the bootstrap approach, Choudhary (2007), and generalized confidence intervals, we construct bounds on TDI and CP. A simulation study was conducted to assess whether the bounds maintain the stated type I error probability of the test. We also present a computational example to demonstrate the statistical methods described in the paper.

Assessment of individual agreements with repeated measurements based on Generalized Confidence intervals (Quiroz and Burdick, 2009).

- Bootstrap confidence intervals.
- Coverage probability (CP)
- Equivalence Studies
- Individual agreements

- Generalized Confidence intervals (GCI)
- Total deviation index (TDI)
- Variance components

Proposing an equivalence test for assessing individual agreement based on TDI and CP. The bounds used in the tests are constucted using a bootstrap approach and generalized confidence intervals (GCI).

Equivalence testing is an approach commonly used to determine the acceptability of a new method against a reference method.

Both the TDI and CP are attractive criteria as they are easy to interpret.

Bootstrap approach was later applied to mixed models with repeated measurements by Choudhary (2007)

T for test measurement, R for reference measurement

$\otimes$ is the Kroneckor Product operator.

$$\Sigma_{MS} = \begin{bmatrix} \sigma^2_{TS} & 0 \\ 0 & \sigma^2_{RS} \end{bmatrix}$$

1.1 Quiroz-Burdick PEFR Example

The data consist of two paired measurements on the same subject made with the large Wright peak flow meter and a mini Wright meter.

Paired differences of less than 101/min are considered of no practical clinical significance. That is to say, it would have no bearing on any decision related to a clinical matter.

A serious error would be declare that the mini-meter is as effective as the large meter when in fact it is not.

$$H_0 : \kappa_{0.90} \geq 10$$

$$H_A : \kappa_{0.90} < 10$$

Chapter 2

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Assessing equivalence of two assays using sensitivity and specificity. Quiroz J1, Burdick RK.

The equivalence of two assays is determined using the sensitivity and specificity relative to a gold standard. The equivalence-testing criterion is based on a misclassification rate proposed by Burdick et al. (2005) and the intersection-union test (IUT) method proposed by Berger (1982).

Using a variance components model and IUT methods, we construct bounds for the sensitivity and specificity relative to the gold standard assay based on generalized confidence intervals. We conduct a simulation study to assess whether the bounds maintain the stated test size.

We present a computational example to demonstrate the method described in the paper.

Bibliography

Quiroz, J. and R. K. Burdick (2009). Assessment of individual agreements with repeated measurements based on generalized confidence intervals. *Journal of Biopharmaceutical Statistics 19*(2), 345–359.