Automated checking for human errors in meta-analyses of diagnostic test accuracy

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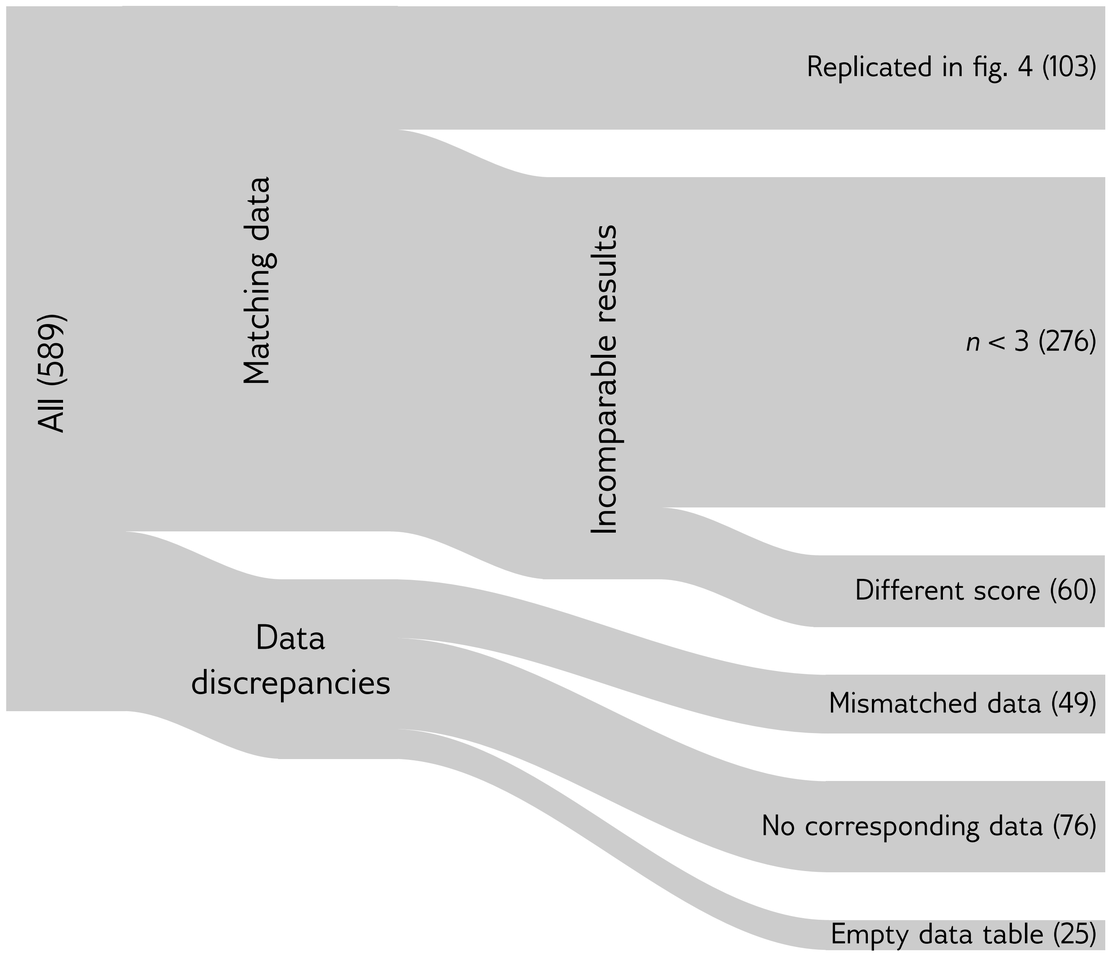
Manual Data Entry May Lead to Mistakes

Meta-analysis models for DTA systematic reviews are too complex to be implemented in RevMan, and review authors need to perform meta-analyses in external software [2]. This has been hypothesized to lead to mistakes [4].

Consistency Checks of Meta-Analyses

We recalculated meta-analyses in summary of findings tables in 63 DTA systematic reviews from the Cochrane Library using the Bivariate method, with the mada R package [1]. We compared the results to all meta-analyses reporting mean and confidence interval [3].
This will not produce exactly the same results, but can serve as a consistency check to highlight potential errors.

Data flow

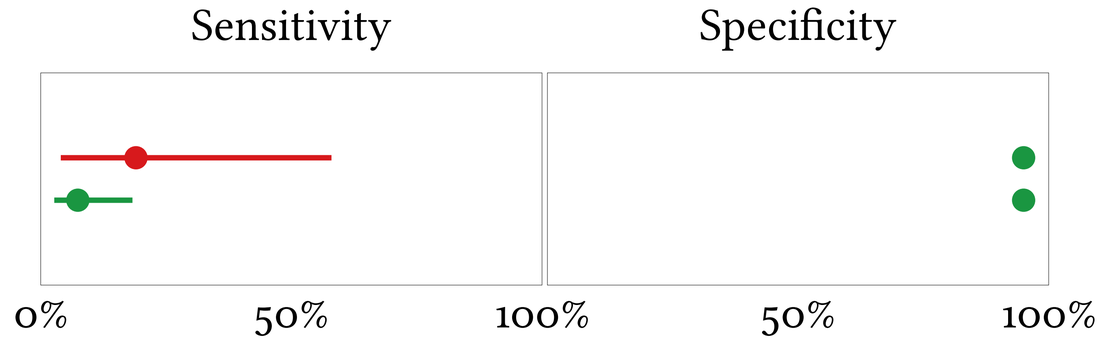


Large Discrepancies Suggest Errors

Results were generally consistent with the published meta-analyses. However, we found two errors among the large discrepancies, apparently due to the review authors copy-pasting the wrong results into RevMan. Both errors could have been identified with simple data consistency checks.

Identified Error 1

The review reported summary score for the wrong test

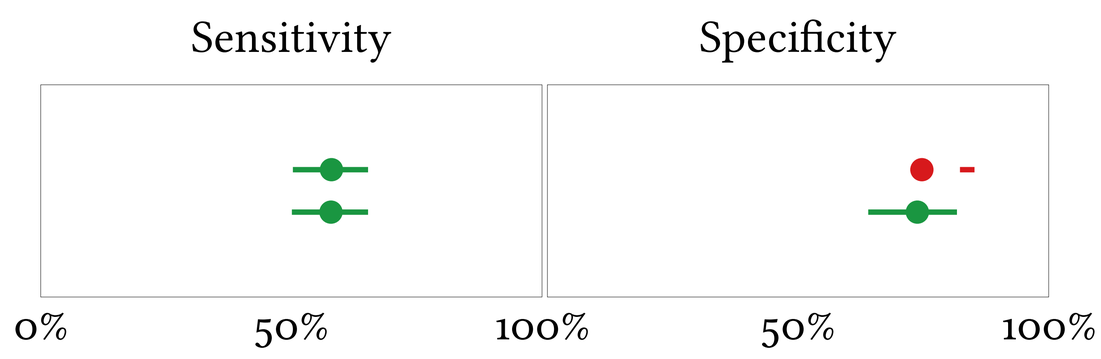


Possible Checks

- Replicated score is off by > 10 point
- Duplicate rows in summary of findings
- Wrong number of included studies
- Wrong number of participants

Identified Error 2

Data copied incorrectly into review:
74.7 [85.2, 82.3] should be 74.7 [65.2, 82.3]



Possible Checks

- Replicated score is off by > 10 point
- Inverted confidence interval
- Mean lies outside confidence interval

References

[1] Philipp Doebler and Heinz Holling. Meta-analysis of diagnostic accuracy with mada. 2015. Retrieved from https://cran.rproject.org/web/packages/mada/vignettes/mada.pdf.

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[4] Guy Tsafnat, Paul Glasziou, Miew Keen Choong, Adam Dunn, Filippo Galgani, and Enrico Coiera. Systematic review automation technologies. *Systematic reviews*, 3(1):74, 2014.

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