Comparing hospitals: Is case-mix adjustment needed for breast cancer surgery complications?

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BACKGROUND

Differences in patient and tumor characteristics (case-mix) can explain differences in hospital performance.

AIM

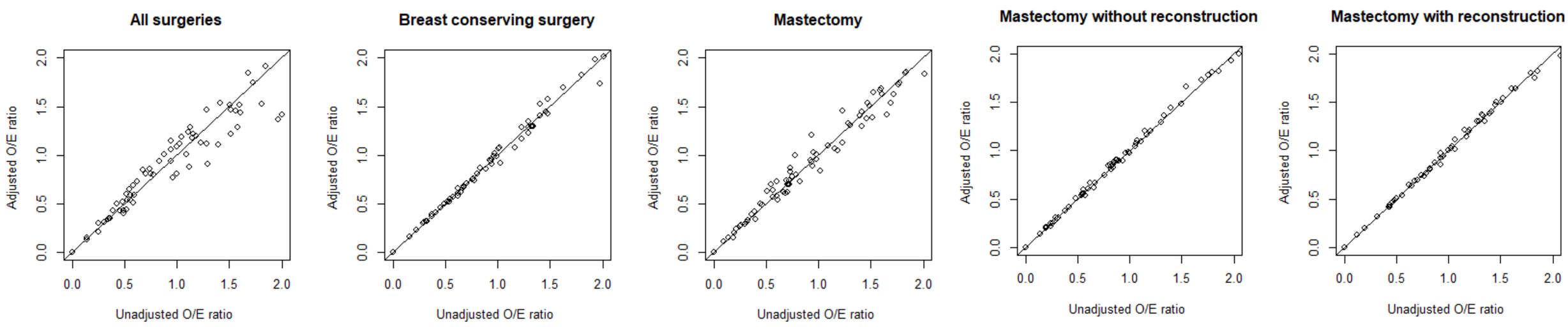
Development and validation of case-mix adjustment models for the Quality Indicator (QI) complications after breast cancer surgery

METHODS

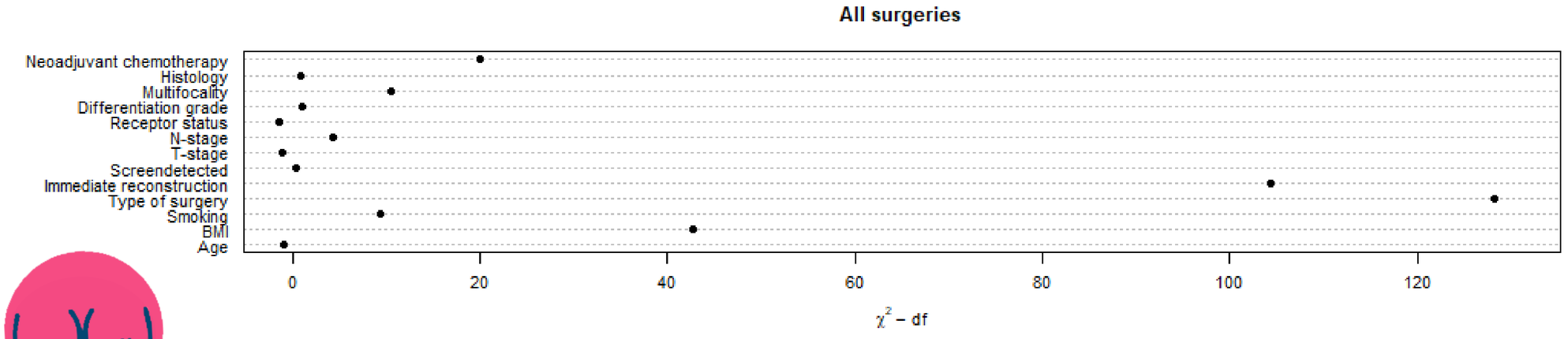
- Nationwide audit: all surgically treated breast cancer patients in the Netherlands (2021-2022, 72 hospitals).
- Outcome: High-impact complications (Clavien-Dindo grade ≥3), aligning with ICHOMs core outcome set breast cancer
- Multivariable logistic regression with backward selection ($p < 0.1$)
- Model performance assessed by AUC and corrected for optimism via bootstrap validation
- Observed-to-expected plots show differences between unadjusted, and case-mix adjusted hospital performance

RESULTS

Strong relations were seen due to the variables ‘type of surgery’ and ‘ direct reconstruction’ for all surgeries (AUC 0.70) and mastectomy (AUC 0.61). Stratification based on BCS (AUC 0.60), mastectomy with (AUC 0.53) and without reconstruction (AUC 0.56) eliminated the case-mix impact.



Observed-expected plots: each dot represents a hospital, with the X-axis showing O/E ratios before case-mix adjustment and the Y-axis after. Deviations from the diagonal indicate the effect of adjustment; if a dot lies exactly on the diagonal, there is no impact.



The left figure shows each case-mix variable's proportional contribution to the full model (before selecting significant variables) for "all surgeries“. y-axis: potential case-mix variables x-axis: Wald chi-square statistic adjusted for degrees of freedom.

CONCLUSION

- After stratification for surgery type, **patient- and tumour characteristics have a negligible effect on the hospital variation**, making adjustment for this QI unnecessary
- Using the Clavien-Dindo classification from the ICHOM core set can foster partnerships as ICHOM Learning Collaboratives to improve clinical practice

NEXT STEPS

- Further research should explore the reliability of this QI after stratification
- Refinement of the QI, increasing the potential to measure breast cancer care quality more effectively

Questions or comments?
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