

The Synthetic Control Method for Health-Care Programme Evaluation

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Rapid Evaluation in Health Care 2020 conference
30 January 2020



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Context

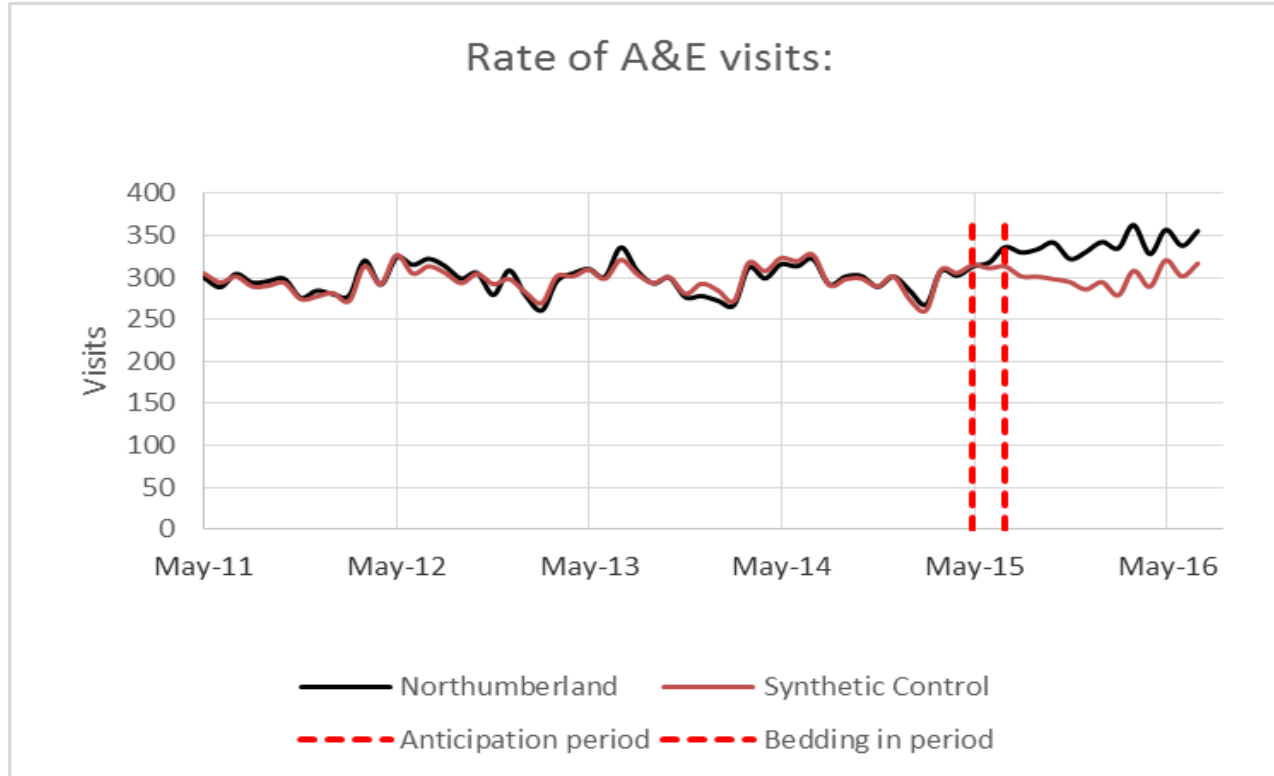
The Improvement Analytics Unit first applied the Synthetic Control Method^[1] (SCM) in 2017 to assess the impact on hospital activity of the re-designing of urgent and emergency care in the Northumberland CCG^[2]

- Population:** individuals registered with a Northumberland CCG GP
- Intervention:** the opening in June 2015 of the Northumbria Specialist Emergency Care Hospital and gradual conversion of 3 local A&E departments into urgent, non-emergency care hubs
- Comparator:** individuals registered with a GP not under the remit of Northumberland CCG
- Outcomes:**
 - A&E attendance rates
 - non- / elective admissions rates
 - % of A&E attendances lasting under 4hrs
 - % of A&E attendances converting into admissions
 - length of A&E waiting time
 - length of hospital stay for non- / elective admissions
 - ...

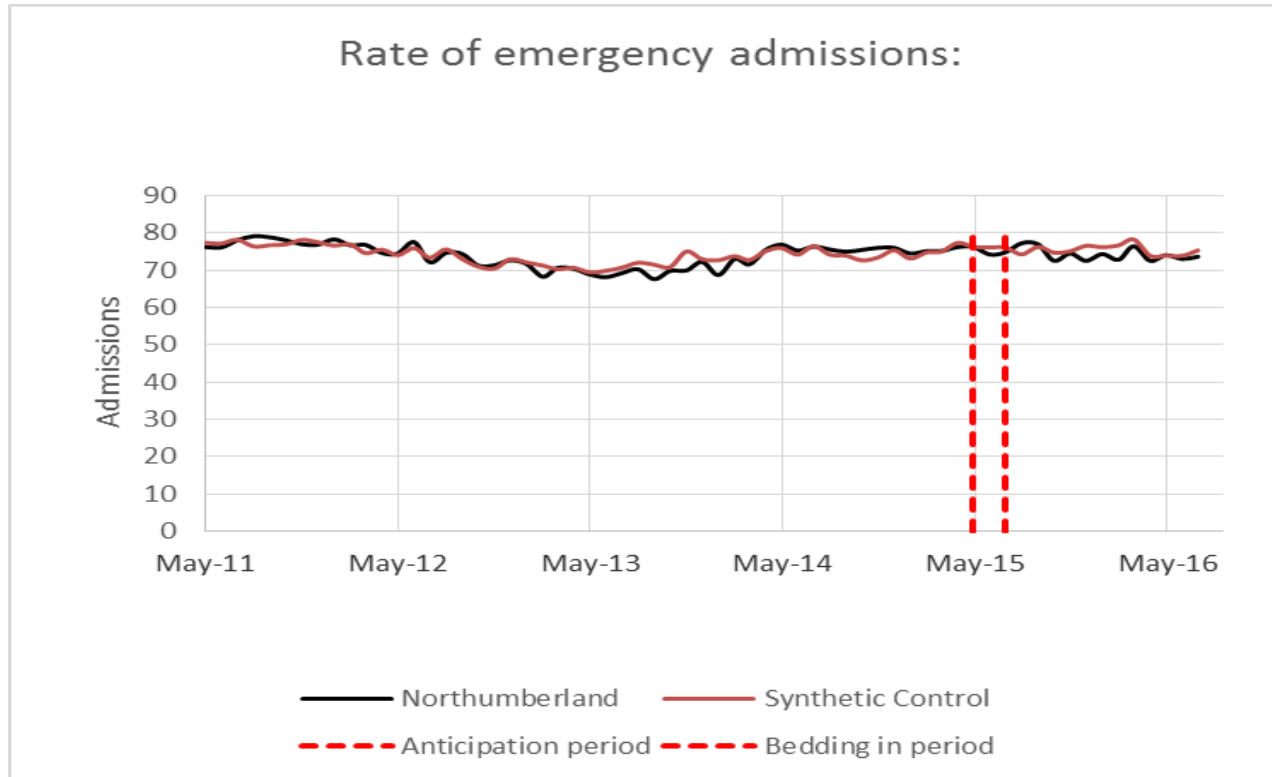
Method

- Forming a control group that is as similar as practical to that in receipt of the intervention is key to drawing meaningful and unbiased outcome comparisons
- Assume the case of a single treated unit (e.g. the Northumberland CCG)
- SCM weights available control units, so that their weighted average outcome trend (and any baseline covariates) before the intervention closely matches that shown by the treated unit
 - control units with more similar characteristics to the treated one will receive higher weight
- The impact of the intervention at any time after its embedding is estimated by subtracting the *synthetic outcome* (i.e. its weighted average across controls) from that observed from the treated unit

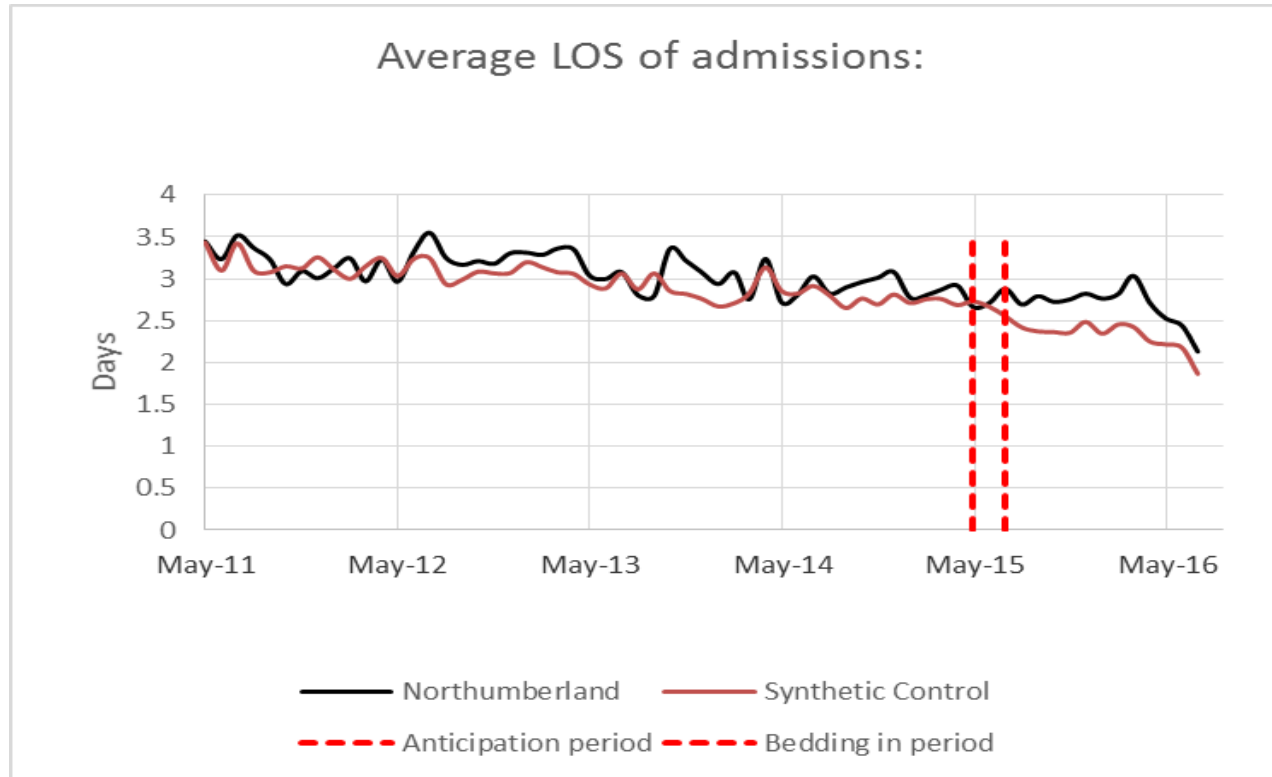
Results



Results (cont.)



Results (cont.)



Results (cont.)

- Following the intervention people under the Northumberland CCG remit, relative to those in the synthetic control CCG, saw a (plausibly) statistically significant
 - 13.6% increase in A&E attendance rates;
 - 10.5% reduction in average A&E waiting time;
 - 6.9% increase in the % of A&E attendances lasting under 4hrs
- Additional details can be found in the IAU case-study documentation^[2]

Remarks

- SCM is well suited to geographically / administratively delimited units
- By not relying on *parallel outcome trends* SCM accounts for time-varying effects of confounders
- The accuracy of SCM can be assessed via *placebo testing* (if only informally)
- A poor match over the pre-intervention period will lead to *biased* SCM estimates
- SCM yields more dependable results the longer the pre-intervention period and the less volatile the outcome trends
- SCM is widely available in popular analytical platforms (e.g. R, Stata, ...)
- Recent extensions^[3-5] have been proposed to accommodate multiple treated units as well as multiple (serially) correlated and / or over-dispersed outcomes

Bibliography

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Thank you

