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Implementing Simulated Treatment Comparison on a Clinical Project in R

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Agenda

1. Introducing ITC, MAIC & STC
2. STC Workflow
3. Lessons Learned
4. Summary

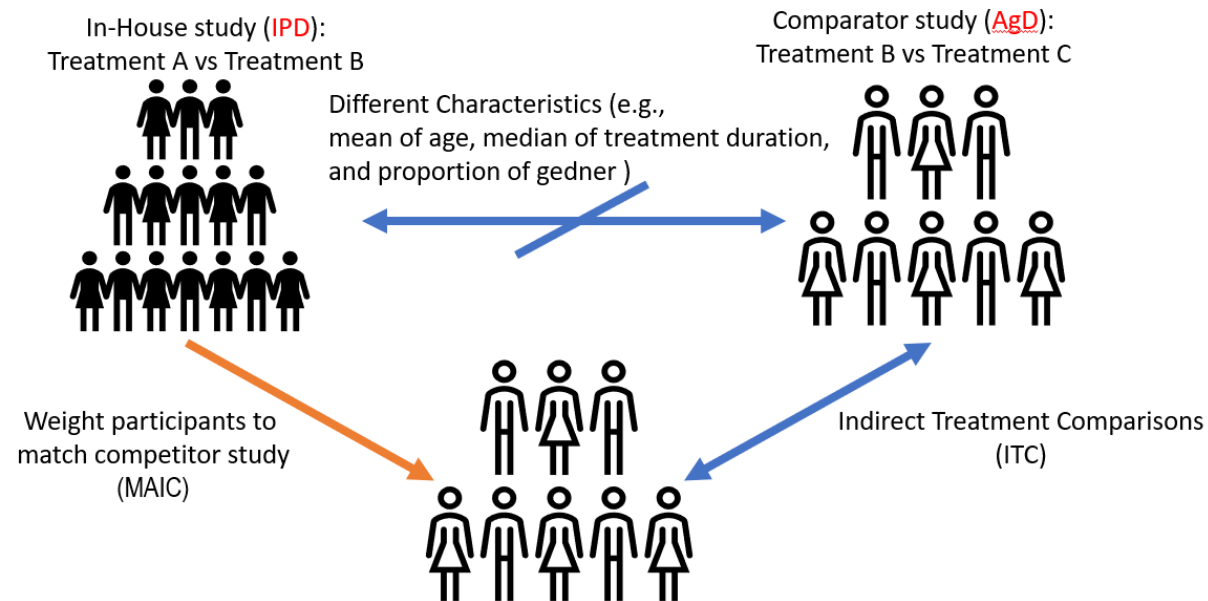
ITC, MAIC and STC

Indirect treatment comparisons (ITC) represent one of the foundational approaches for comparing the efficacy of different treatments when head-to-head trials are unavailable. Here we focus on two key ITC methods:

- Matching-adjusted indirect comparison (MAIC)
- Simulated treatment comparison (STC)

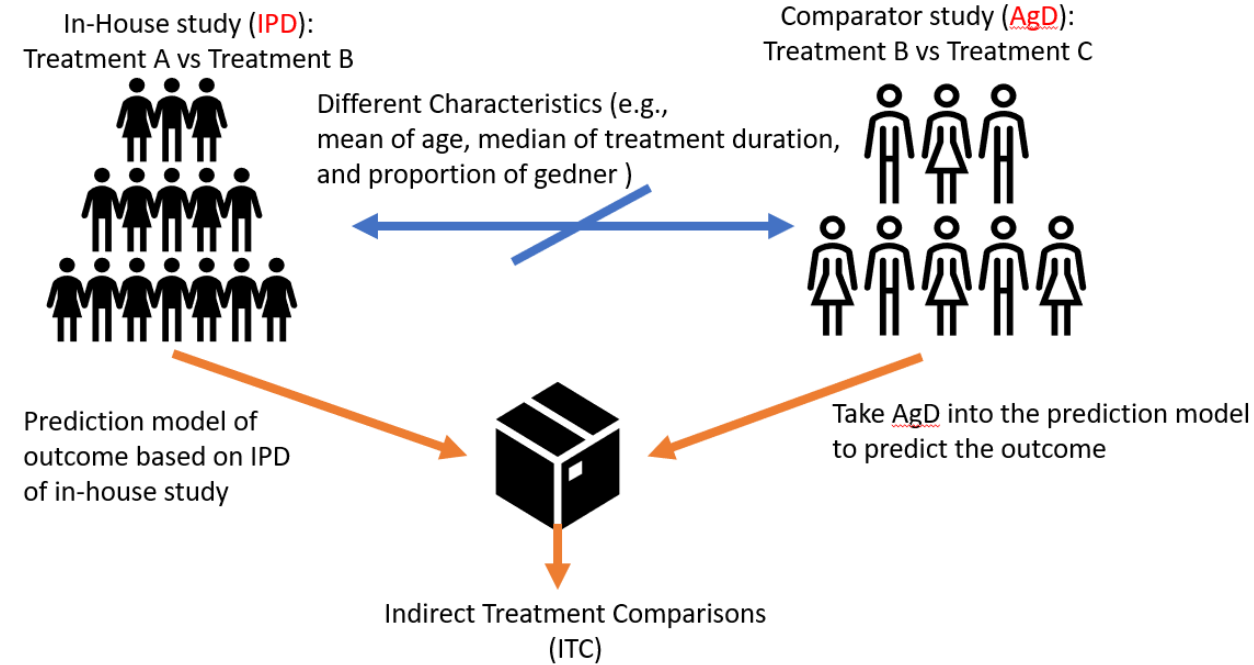
Comparison between MAIC and STC

MAIC

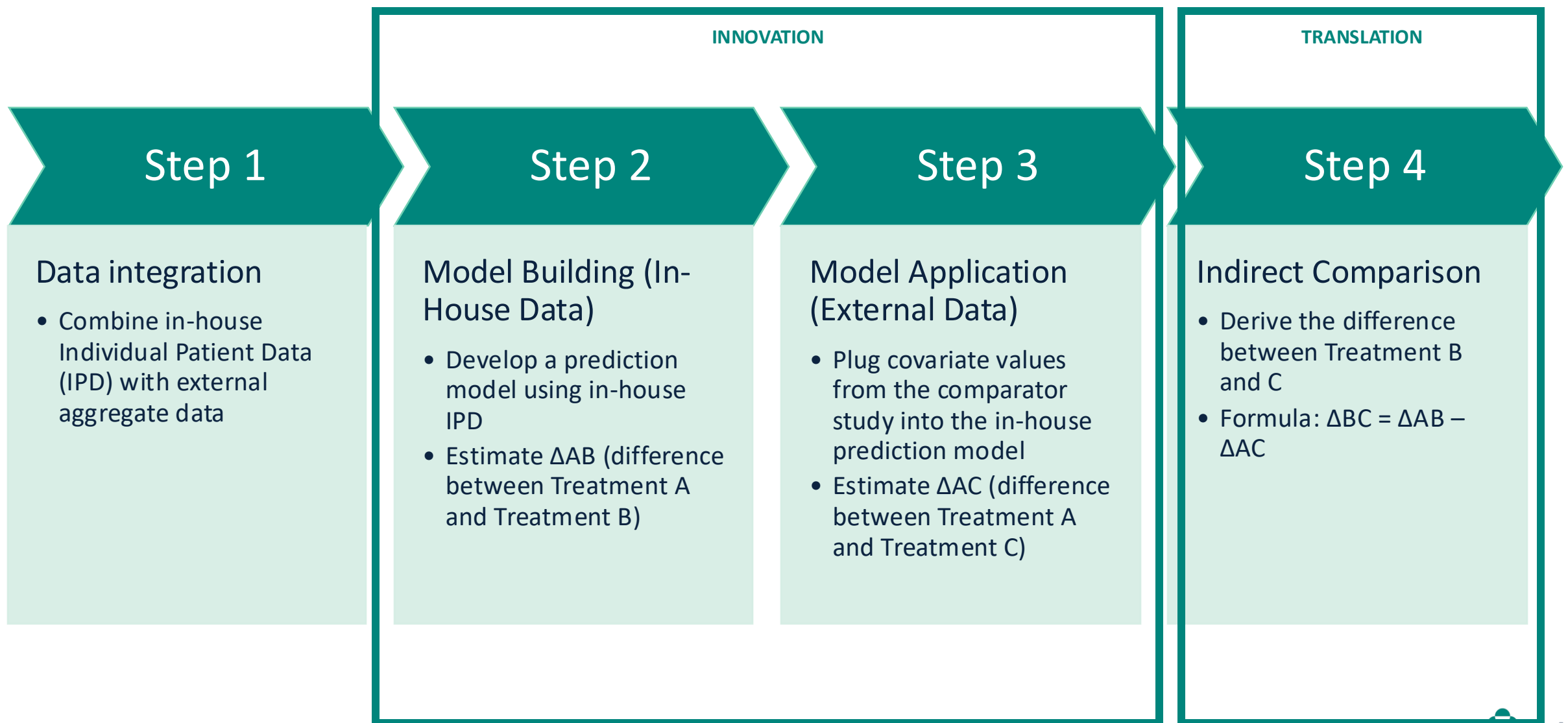


IPD: Individual patient data
AgD: Aggregate data

STC



The STC Workflow



Step 2: Model Building - Modelling Assumptions



Only include covariates which are in imbalance



No imputation of missing values, used complete cases only.



Centering of variables was considered, but not adopted.

Step 2: Model Building - Model Specification and Selection

Five Models Fitted

1. **No Prognostic Factors** (1 model)
2. **Individual Prognostic Factors** (3 models)
3. **All Prognostic Factors** (1 model)

Three Endpoints

1. **Binary Endpoints:** Logistic Model (GLM) using `glm(family=binomial)`.
2. **Continuous Endpoints:** Linear Model using `lm()`.
3. **Time-to-Event (TTE) Endpoints:** Cox Proportional Hazards Model using `survival::cosph()`.

Model Selection Criteria

Criterion Used:
Akaike Information Criterion (AIC)

Selection Method: Lowest AIC value

Step 2: Key Lessons

- Two major issues:
 - Model non-convergence
 - Incorrect confidence intervals
- Identified by:
 - Model output
 - Reference to MAIC output
- Solved by:
 - Quick and efficient collaboration beyond the project

Summary

- From a programming perspective, STC was a useful alternative to MAIC in our specific context, because it maximized the data we had available to work with, while fitting well into our existing skills set
- Most issues faced in this implementation of STCs were related to statistical methodology, identified through reference to complementary output and addressed by close collaboration between statisticians and programmers.



Thank you!

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