Online Advanced Methods for Cost-Effectiveness Analysis

Presentation 3: Populating models - effectiveness
3.2: Key concepts

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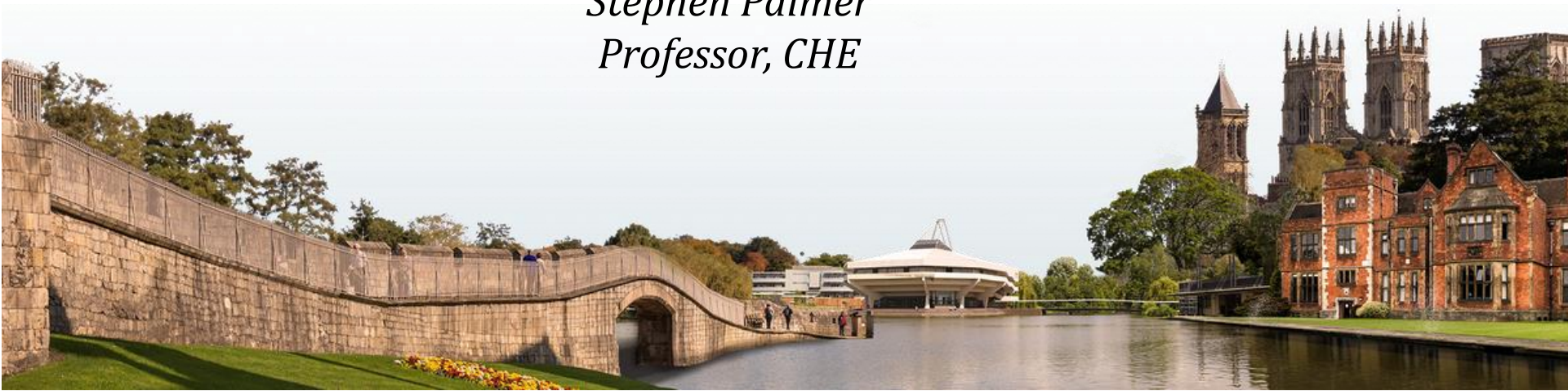

Objectives

- Appreciate the complementary roles of evidence synthesis and decision modelling.
- Understand the general principles of evidence synthesis including the role of observational data.

Why evidence synthesis and decision modelling?

- A single source is unlikely to provide evidence on final endpoints required for decision making (e.g. lifetime QALYs and costs) for all comparators
- Evidence synthesis and modelling allows:
  - Inclusion of all relevant comparators
  - Combining relevant sources of evidence
  - Linkage of short-term outcomes to longer term impact (extrapolation)
  - Generalisability to population/setting of interest
  - Assessment of how uncertainty in relationships and evidence translates to uncertainty in decision
  - Scientific and value judgments to be made explicit

Evidence synthesis to inform decision models

- Pooling results from multiple studies to inform parameter(s) inputs to decision model
  - Typically used for relative treatment effects
  - Can also be used for baseline outcomes (for reference treatment)
- Why pool?
  - To reduce problems of interpretation due to sampling variation
  - To facilitate synthesis of results from multiple studies
  - To quantify effect sizes and their uncertainty
- Evidence should be identified using systematic literature review
  - e.g. https://www.york.ac.uk/media/crd/Systematic_Reviews.pdf

General principles of evidence synthesis

1. Inclusion/exclusion criteria should reflect target population for decision
   - Population (subgroups), Intervention, Comparators, Outcomes
2. Relevance of data sources to decision problem must be discussed/explored
   - Differences in trial populations (severity, previous treatments etc.)
   - Differences in treatment regimens/doses
   - Differences in controls (Best supportive care, placebo, older ineffective treatments)
   - Differences in outcomes (definitions, measures, treatment switching)
   - Any adjustments made

General principles of evidence synthesis (cont)

3. Statistical heterogeneity should be taken into account
   - Assessing heterogeneity – Q statistics, I^2, between studies variance, compare fit of fixed and random effects models
   - Assess inconsistency in network meta-analysis
   - Subgroup-analysis, meta-regression
4. The origin and rationale for the parameter values used in the model should be described and justified
   - Clear description of data sources, rationale for selection
   - Description of synthesis methods (model and code, model fit)
   - Justification of assumptions made (and sensitivity analysis)
   - Results of synthesis
   - Source of baseline used to get absolute effects for decision model

Role of observational data

1. OK for defining the baseline
2. OK for mapping from shorter-term RCT outcomes to longer term clinical outcomes or QALYs (e.g. informing extrapolation of survival curves)
3. Not usually OK for estimating relative treatment effects

- Unless
  - No RCT, or if RCT data sparse
  - Potential bias should be taken into account and integrated into analysis by valid methods, including sensitivity analysis

Summary

- Evidence synthesis can provide important information on relative effectiveness (and potentially baseline outcomes)
- Potentially for all relevant compactors
- Bringing together multiple relevant data sources
- But
  - Is not the sole source of evidence considered important to a decision
  - Will not give estimates of costs or QALYs over an appropriate time horizon
- Decision modelling brings together all forms of evidence
  - Provides outputs required for decision making