Methodological Overreach

'Methodological overreach' refers to the inappropriate extension of a study's methodology beyond what the data or design can reliably support.

It occurs when researchers:

- Make claims that exceed the limitations of the study design (e.g., causal claims from observational data).
- Apply complex statistical or machine learning tools without adequate justification or validation.
- Generalize findings to populations or clinical settings not represented in the data.
- Use sophisticated methods (e.g., SHAP, deep learning) to add perceived value without improving scientific rigor.

Examples in clinical research

- Using a cross-sectional dataset to build a tool for **longitudinal prediction**.
- Claiming **preventive or therapeutic impact** from an observational model.
- Presenting **model performance metrics** (like AUC) as proof of clinical utility.

Consequences

- Misleading conclusions
- False sense of confidence in tools or interventions
- Poor translation into real-world clinical practice

'In summary:' methodological overreach undermines scientific integrity by overstating what a study can truly demonstrate.