Observational Health Data Sciences and Informatics

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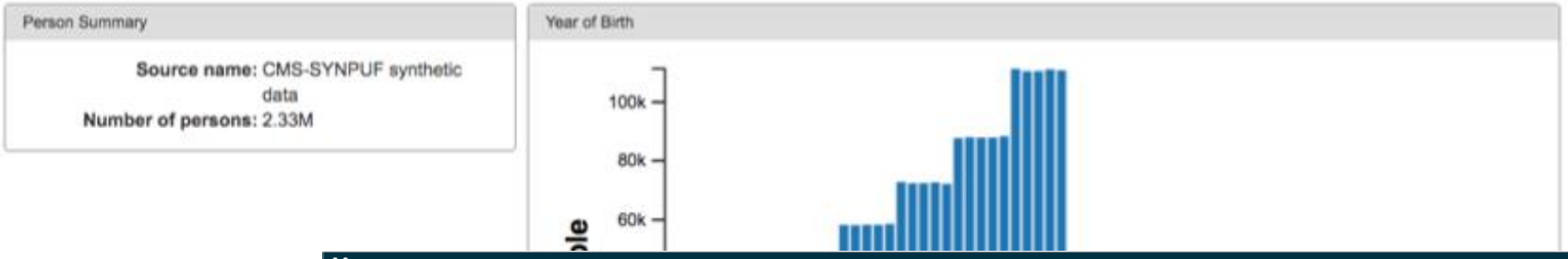
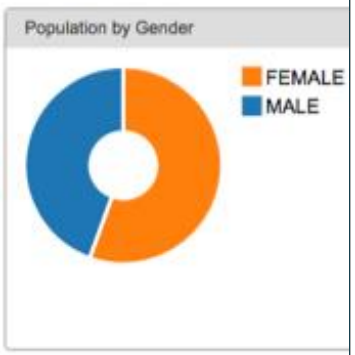
OHDSI

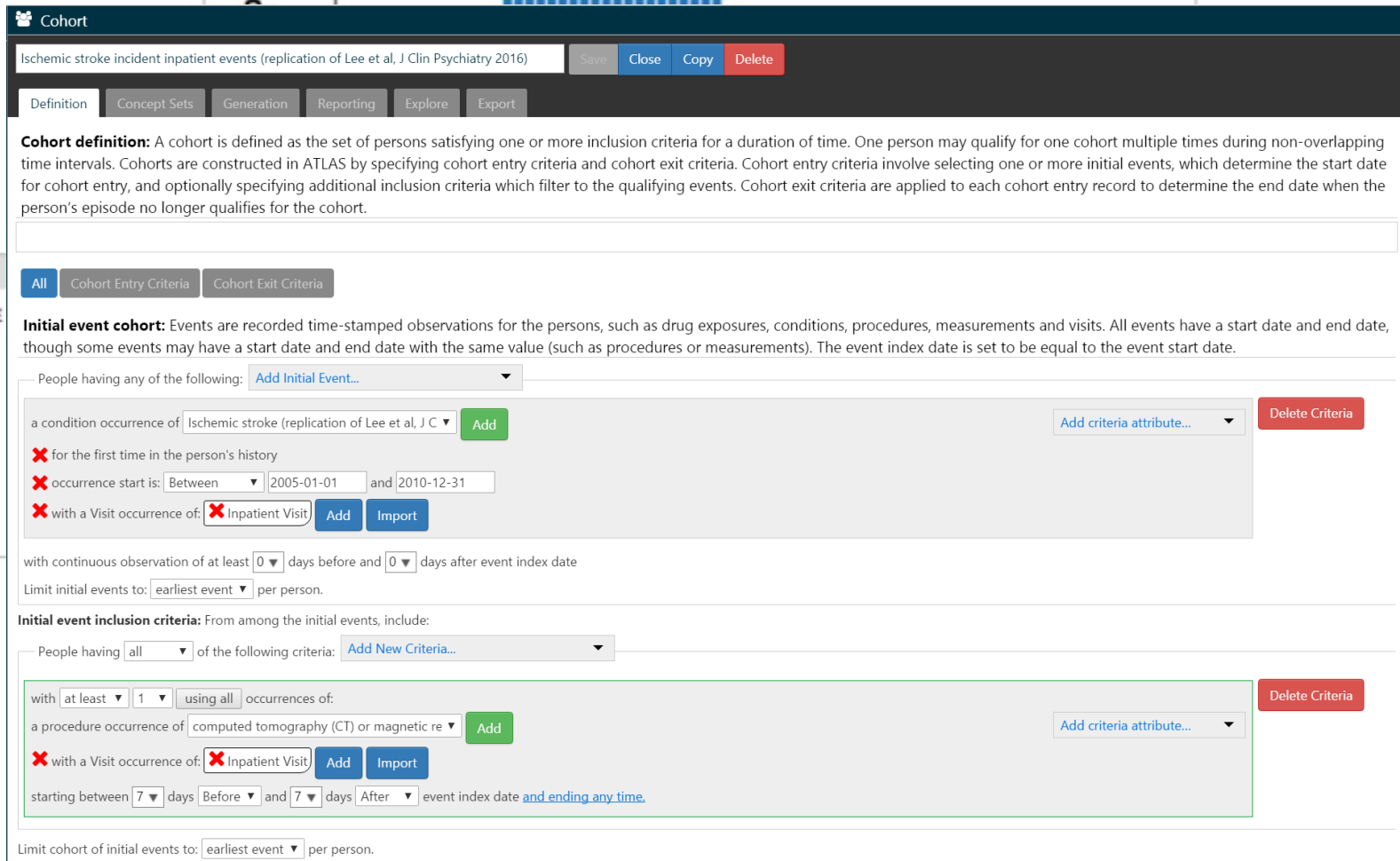
OBSERVATIONAL HEALTH DATA SCIENCES AND INFORMATICS

1. Tools
2. Methods
3. Data network

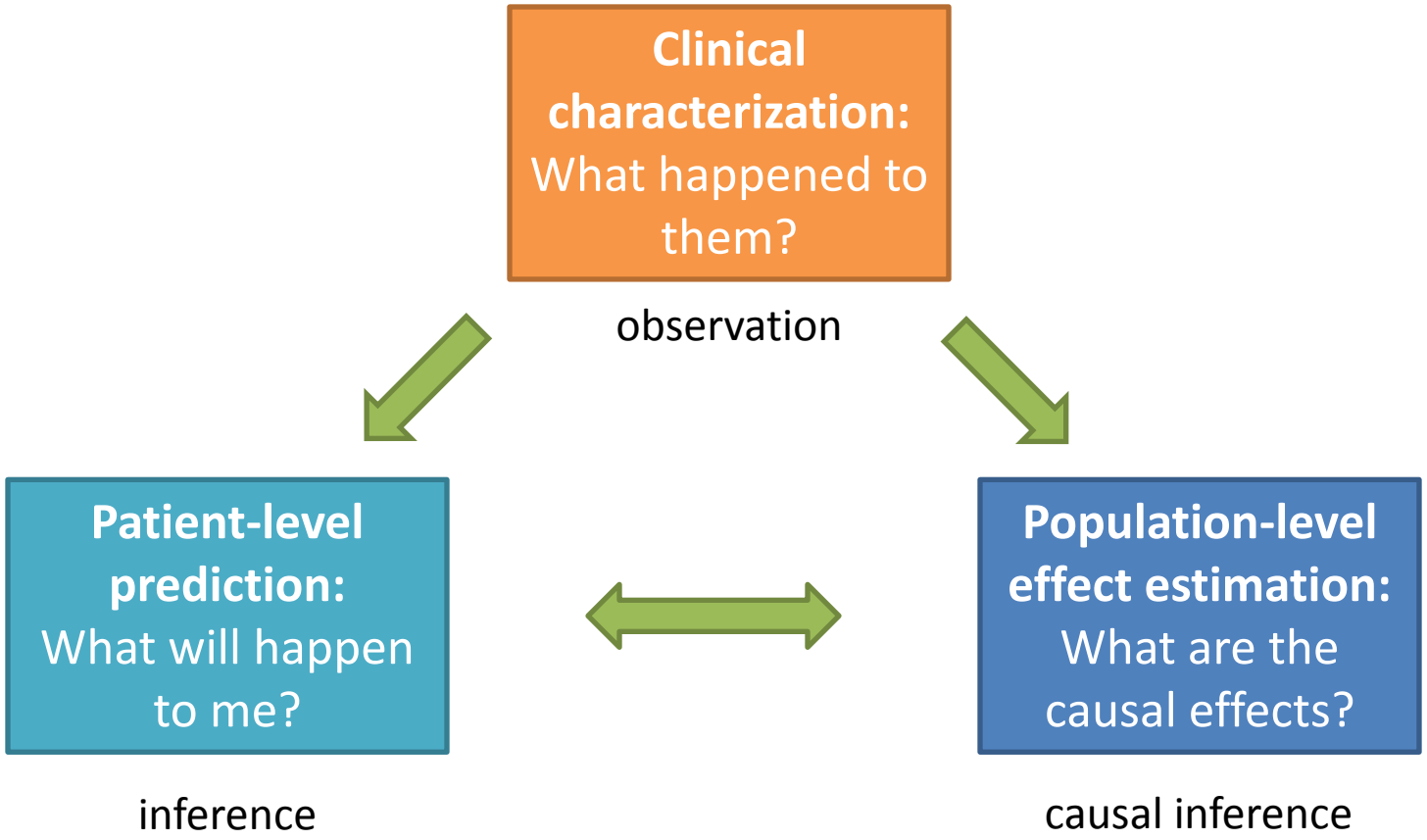
Tools – Achilles, Atlas

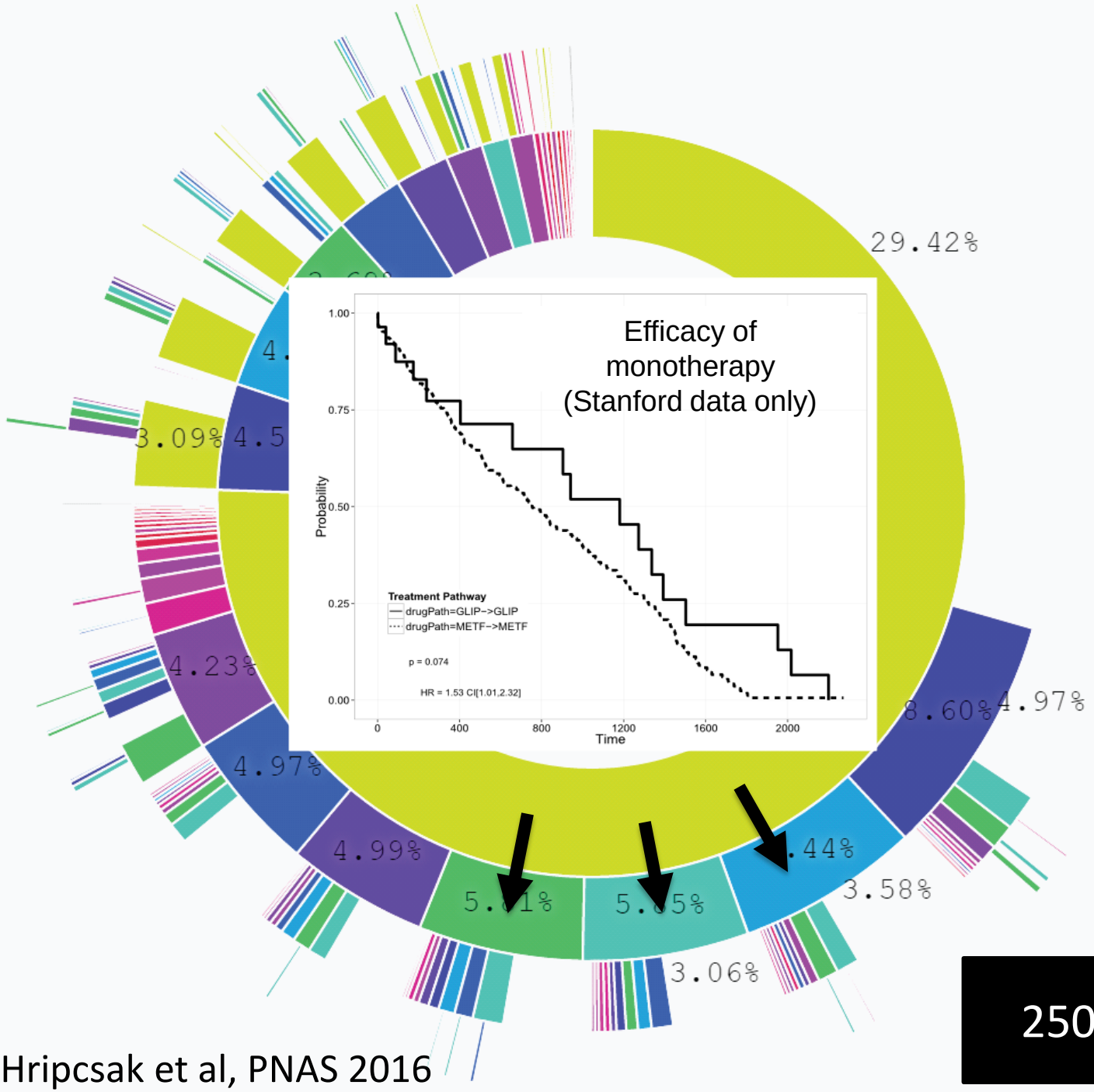






Complementary evidence to inform the patient journey





Metformin
pioglitazone
sitagliptin
Glipizide
glimepiride
Gliclazide
Glyburide
rosiglitazone
Insulin, Glargine, Human
exenatide
Insulin, Aspart, Human
liraglutide
saxagliptin
Insulin, Lispro, Human
Glucose
Insulin, Isophane, Human

250 million patients

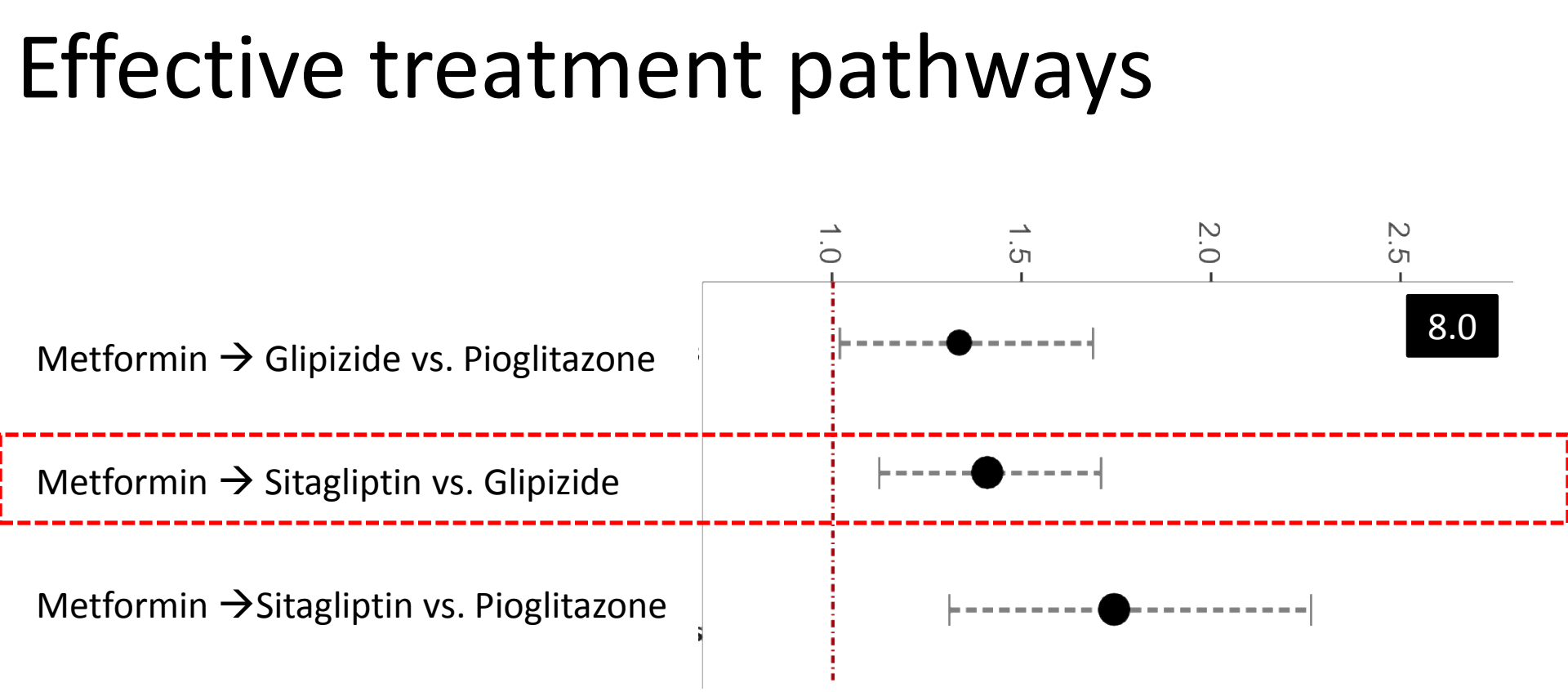
Hripcsak et al, PNAS 2016

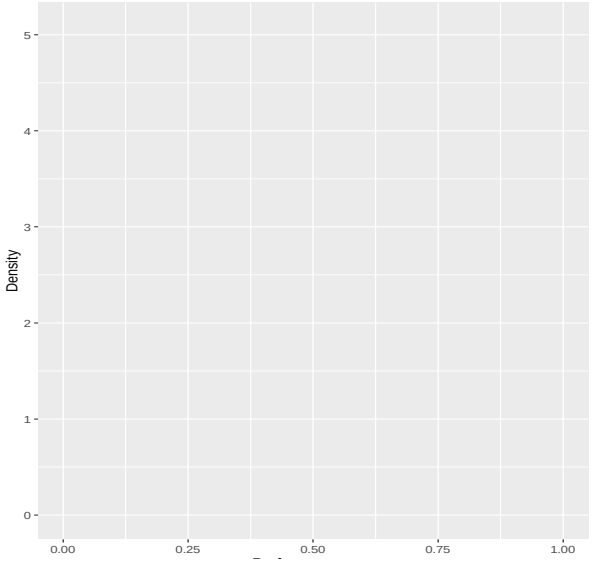
Effective treatment pathways

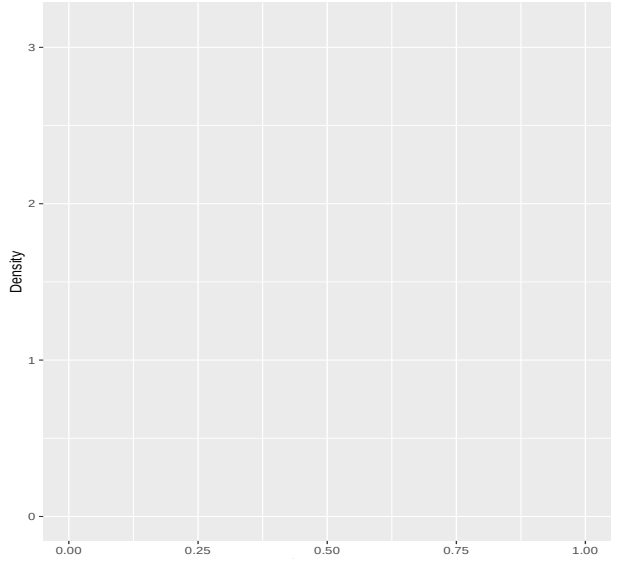
Metformin → Glipizide vs. Pioglitazone

Metformin → Sitagliptin vs. Glipizide

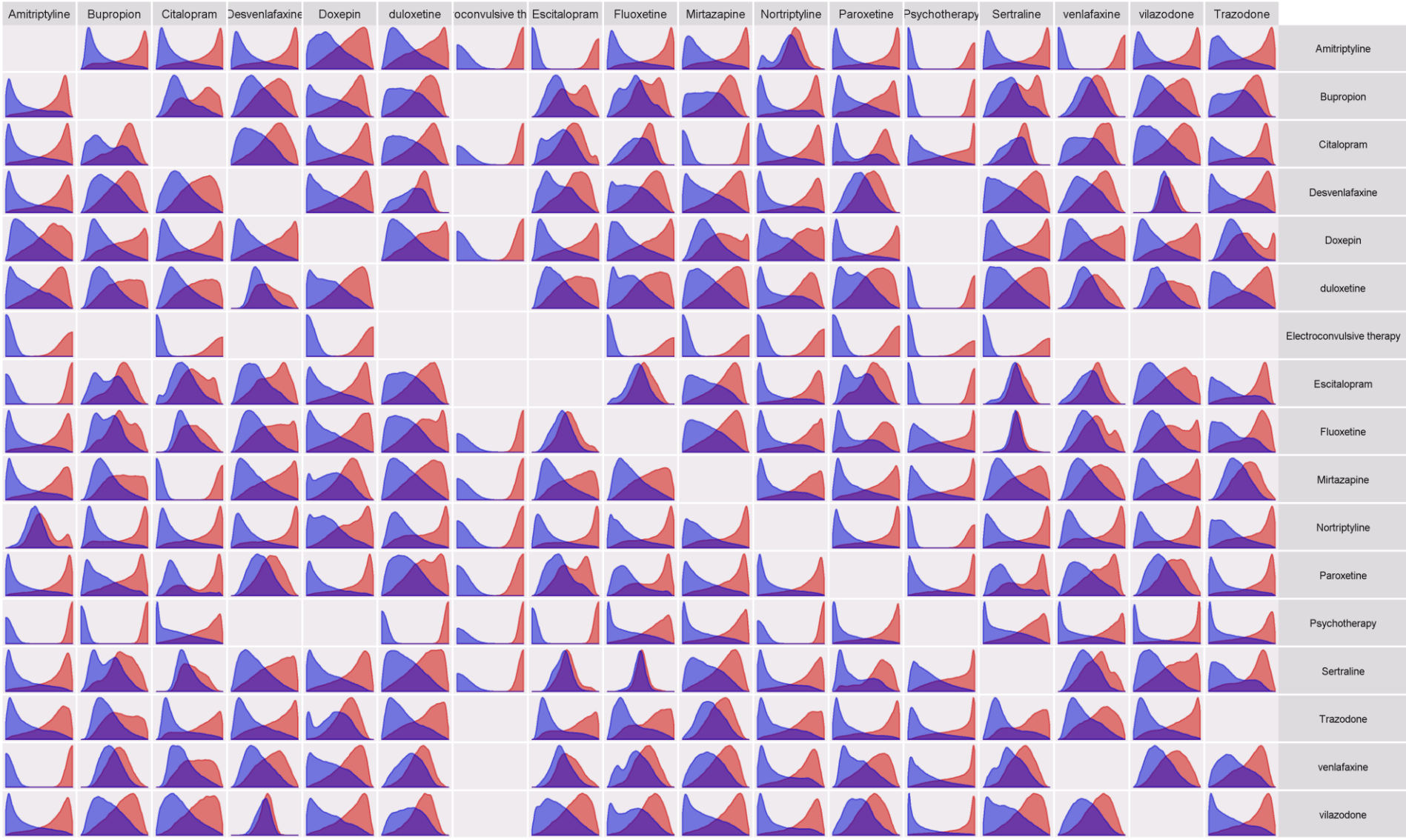
Metformin →Sitagliptin vs. Pioglitazone







Propensity models for all comparisons

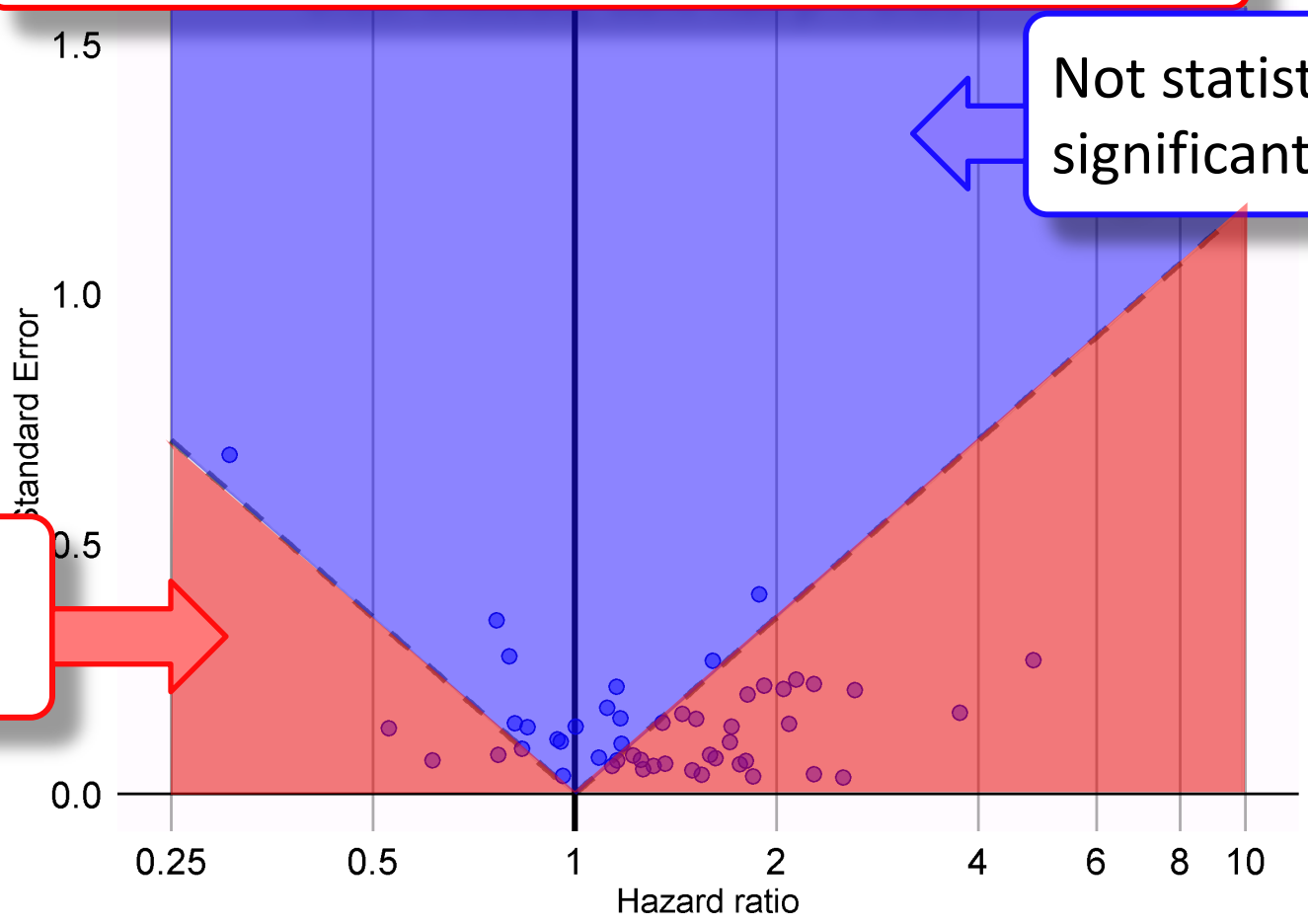


Calibration using negative controls

We would expect 5% of negative controls to have p < 0.05. Instead, 68% has p < 0.05!

Not statistically significant

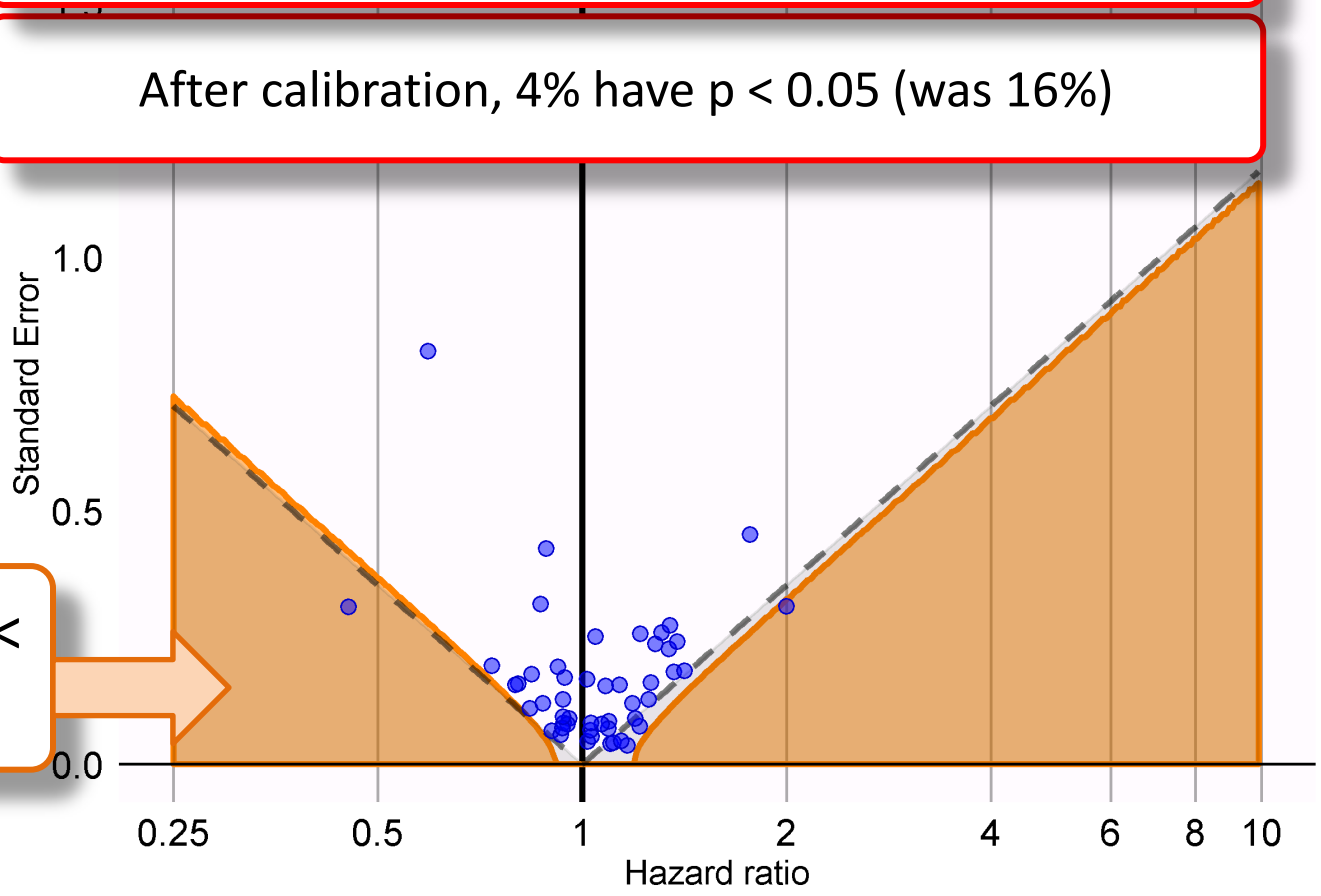
Statistically significant



Calibration using negative controls

When using the propensity score, 16% have p < 0.05

After calibration, 4% have p < 0.05 (was 16%)

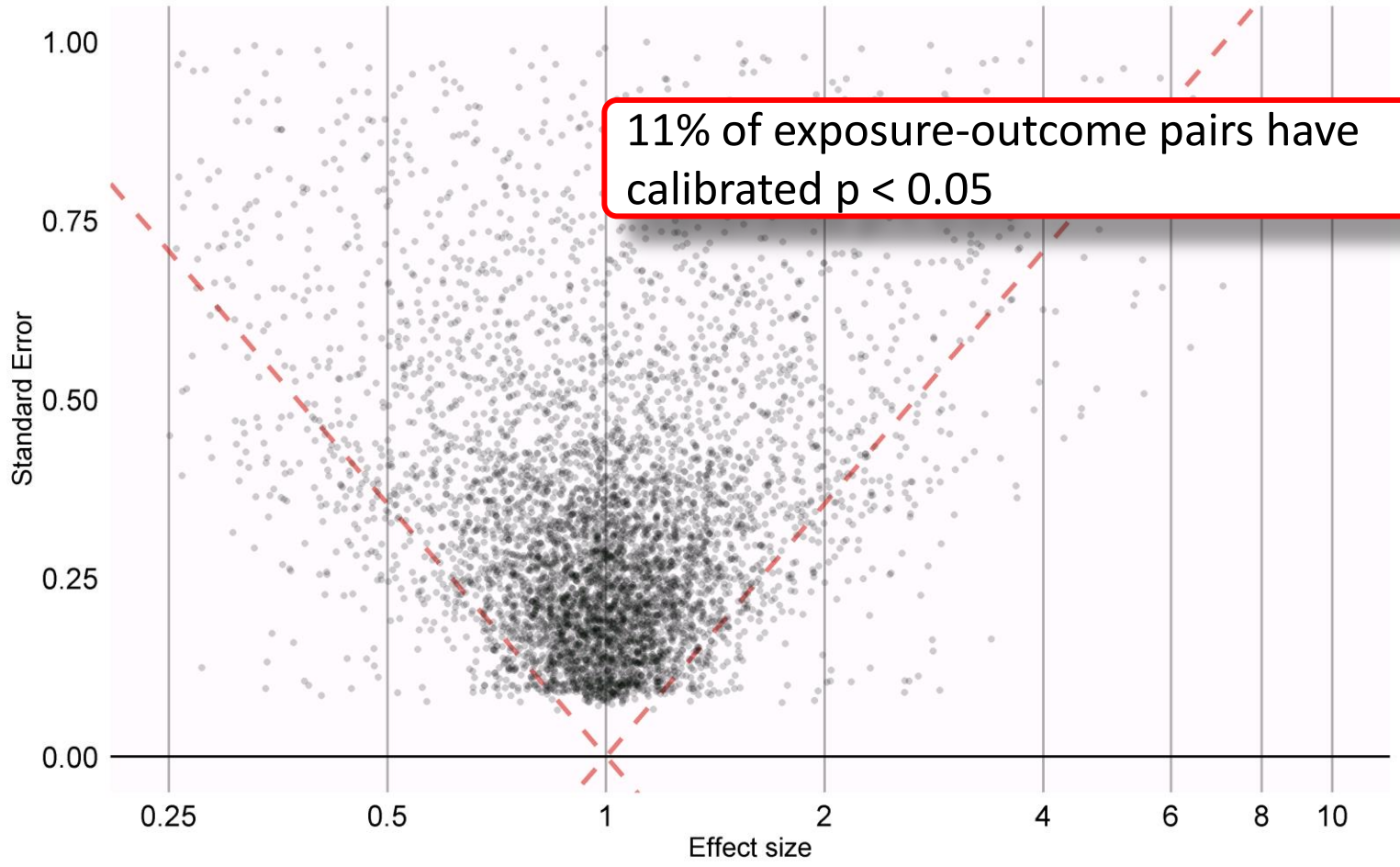


Calibrated p < 0.05

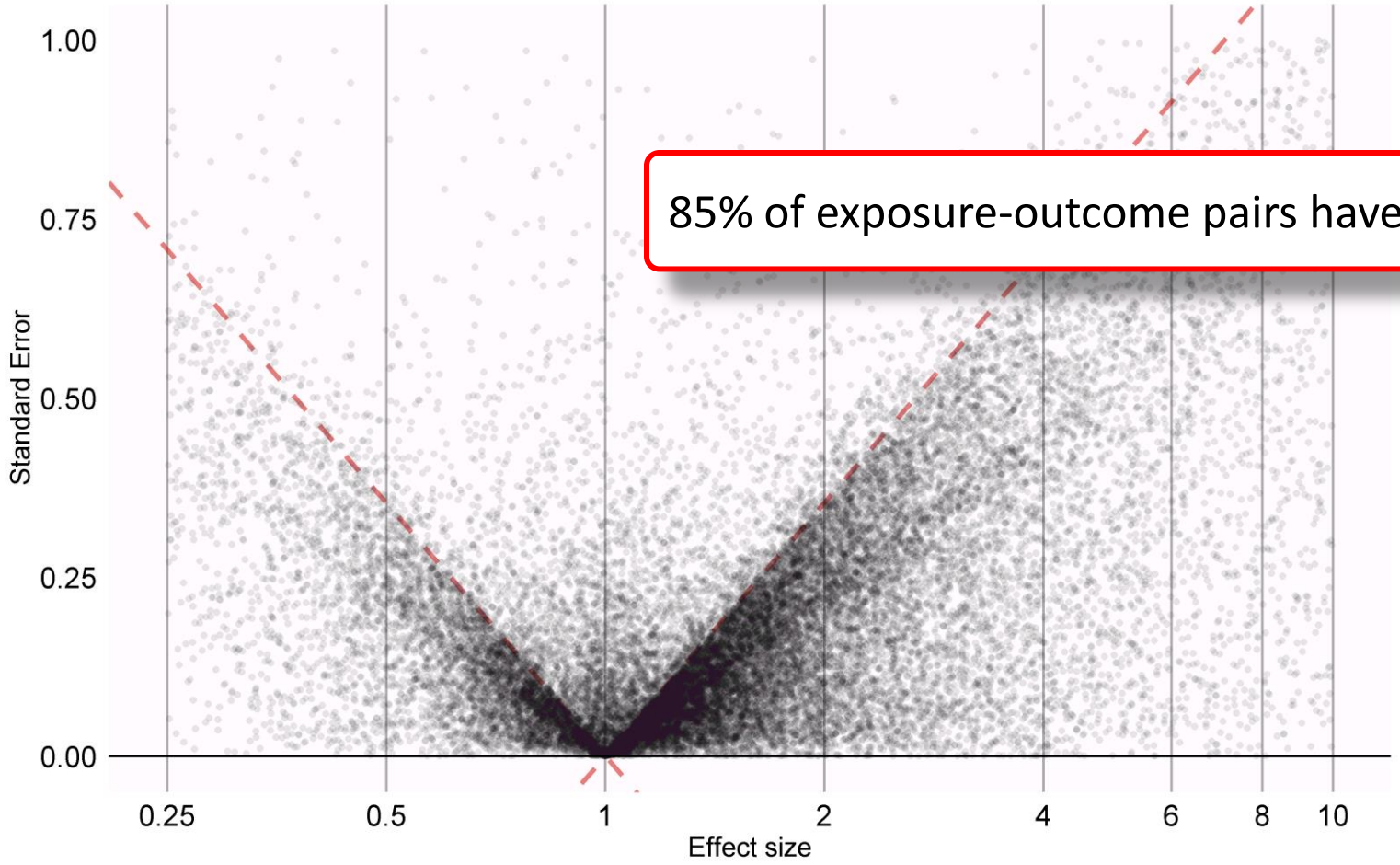
OHDSI recommendations (and tool support) for evidence generation

- ✓ Produce standard diagnostics
  - E.g. for cohort studies diagnose the propensity score distribution, covariate balance, etc.
- ✓ Include negative controls
  - Estimate the error when the null is true
- ✓ Create positive controls
  - Estimate the error when RR > 1
- ✓ Calibrate p-value and confidence intervals
  - Restoring nominal characteristics

Results from all x all comparision

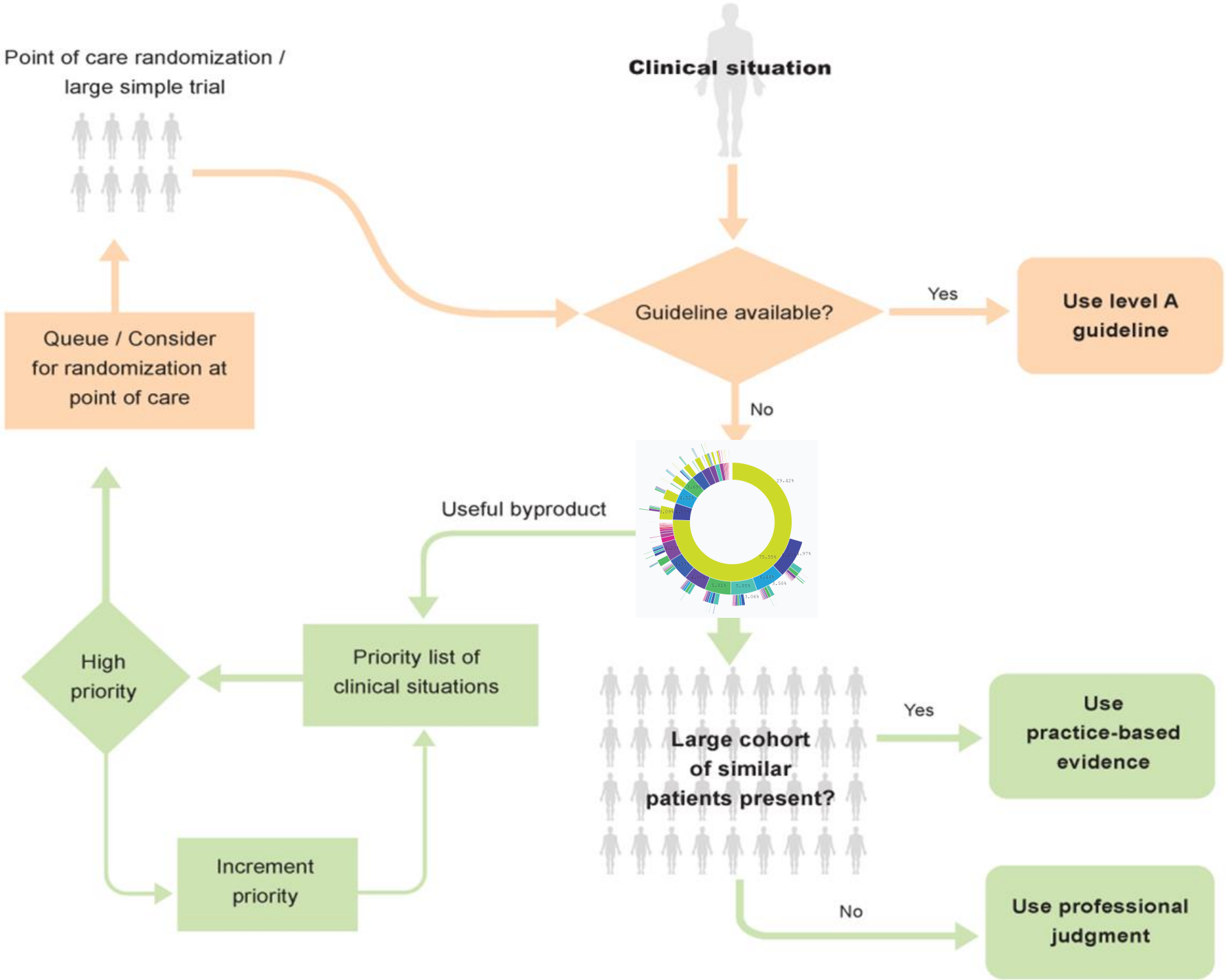


Observational research in literature (done one at a time)



85% of exposure-outcome pairs have $p < 0.05$

29,982 estimates
11,758 papers


Point of care randomization / large simple trial
Clinical situation
Guideline available?
Yes
Use level A guideline
No
Queue / Consider for randomization at point of care
Useful byproduct
High priority
Priority list of clinical situations
Large cohort of similar patients present?
Yes
Use practice-based evidence
Increment priority
No
Use professional judgment

George Hripcsak
David Madigan
Patrick Ryan
Martijn Shuemie

Christian Reich
Marc Suchard
Jon Duke