Visual Aid Tool to improve Decision Making in Acute Stroke Care

Objective: to provide a visual aid tool to guide clinicians caring for patients with an acute ischemic stroke in making decisions regarding endovascular therapy.

Methods: We created Cates’ plots derived from a recent pooled analysis comprising individual patient-data from 5 randomized trials of endovascular thrombectomy (EVT) compared to usual care (HERMES trials- Lancet Feb 18, 2016).

**Schematic interpretation of Cates’ plots**

- **Green faces**: Number of patients out of 100 with a favorable outcome not affected by a treatment (e.g. control group).
- **Yellow faces**: Number of additional patients who would benefit with the intervention (e.g. endovascular thrombectomy) compared to controls for every 100 treated patients.
- **Red faces**: Number of patients who would still have a bad outcome despite receiving the intervention.
In the control group 13 out of 100 patients would gain independence at 90 days (mRS 0-1), compared to 29 (95% CI 23 to 35) out of 100 for the intervention group.

In the control group 27 out of 100 patients would achieve independence at 90 days (mRS 0-2) compared to 49 (95% CI 43-56) out of 100 for the intervention group.

In the control group 8 out of 100 patients would achieve an NIHSS 0-2 at 24 hours compared to 25 (95% CI 18 to 34) out of 100 for the intervention group.

In the control group 21 out of 100 patients would achieve ENR at 24 hours compared to 54 (95% CI 45-63) out of 100 for the intervention group.

In the control group 26 out of 100 patients would achieve a mRS 0-2 at 90 days compared to 46 (95% CI 37 to 57) out of 100 for the intervention group.

Figure III. Subgroup analysis representing favorable outcomes (mRS 0-2) at 90 days by time to treatment

Control (26)
Added by the intervention (+20)

Control (26)
Added by the intervention (+15)

Figure IVa. Subgroup analysis representing the probability of a favorable outcome (mRS 0-2) at 90 days by NIHSS strata

Control group

Intervention group

NIH ≤10

NIH 11-15

NIH 16-20

NIH ≥21

Derived from Goyal M, Menon B, et al. Lancet Feb 19 (Figures S1 and S6)
Figure IVb. Subgroup analysis representing the probability of a favorable outcome (mRS 0-2) at 90 days by Age strata

Control group

Intervention group

Derived from Goyal M, Menon B, et al. Lancet Feb 19 (Figures S1 and S4)
Figure IVc. Subgroup analysis representing the probability of a favorable outcome (mRS 0-2) at 90 days by sex.
In the iv-tPA group 32 out of 100 patients would gain independence at 90 days (mRS 0-2), compared to 45 (95% CI 36 to 54) out of 100 for the active treatment group.

In the tPA group 34 out of 100 patients would achieve revascularization at 24 hours, compared to 77 (95% CI 71-82) out of 100 for the EVT + iv tPA treatment group.

Figure V. Cates’ plots representing the probability of a favorable outcome and revascularization in the meta-analysis of 8 trials.
For every 100 patients with an acute ischemic stroke, 35 would achieve independence at 90 days (mRS 0-1) in the placebo group compared to 43 (95% CI 39-46) in the intervention group (iv tPA).


Added by the intervention (+8)

For every 100 patients with an acute ischemic stroke, 13 would achieve independence at 90 days (mRS 0-1) in the control group (iv tPA) compared to 29 (95% CI 23-35) in the intervention group (endovascular thrombectomy).

Derived from Lees et al. Lancet 2010; 375: 1695-703
For every 100 patients with an acute ischemic stroke, 1 would develop an ICH in the placebo group compared to 5 (95% CI 3-8) in the intervention group (iv tPA).

Added by the intervention (+4)

For every 100 patients with an acute ischemic stroke, 5 would develop an ICH in the iv tPA group compared to 6 (95% CI 3-9) in the intervention group (EVT).

Added by the intervention (+1)

Derived from Lees et al. Lancet 2010; 375: 1695-703

Interpretation when comparing Cates plots derived from the pooled analysis of iv tPA trials (vs placebo) and EV thrombectomy (vs. usual care)

Functional independence (mRS 0-1 at 90 days)

For every 100 strokes, iv-tPA add **8 more patients** who would achieve a mRS 0-1 compared to placebo, whereas EV thrombectomy would add **16 more patients** achieving a mRS 0-1 compared to usual care (iv tPA).

ICH type 2

For every 100 strokes, iv-tPA add a significant **4 more patients** who develop ICH type 2 compared to placebo, whereas EV thrombectomy would add a non-significant increase (**1 more patient**) of ICH compared to usual care (iv tPA).

In conclusion, the results from these two pooled analyses revealed a greater improvement of EVT in the number of patients achieving independency at 90 days (with NO additional risk of ICH) compared to the observed benefits of iv-tPA vs. placebo.
Interpretation: The meta-analysis overestimates (+5) the number of patients achieving a favorable outcome (mRS 0-2) at 90 days in the control group and appears to underestimate (-9 pts) the benefits of EVT.