Meta-analysis

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Editorial

Meta-analysis

Meta-analysis is an important research tool that increases statistical power by combining results from studies that have similar related research hypotheses. The effect size results of individual studies are pooled by use of a variety of statistical techniques to determine a meta-effect, which is a more powerful measure of the true outcome. In addition to increased statistical power, other advantages are greater generalizability and increased ability to do multifactor analyses. Meta-analysis shifts the focus from an individual study's statistical significance to the true effect size.

Meta-analyses are performed by first asking a specific relevant question. A systematic literature search is performed based on specific criteria. These are then reviewed, and when inclusion/exclusion criteria are deemed similar, they are graded for quality. Study quality is based on design, follow-up, treatment and outcome assessments, blinding, and so on. The selected articles are then abstracted and the important dependent and independent variables are tabulated.

Statistical methods then assess the homogeneity of the data among the studies, which defines the meta-regression models. Practically speaking, in most surgical studies this will prove to be nonhomogeneous and the more rigorous random-effects model will be used. Further analyses include sensitivity testing and determination of publication bias.

Table 1
Baseline variables

	Experimental		Control	
	TDR/ RCT	TDR/ non-RCT	Fusion/ RCT	Fusion/ non-RCT
Demographic				
n				
Age				
Gender				
Smokers				
Surgical				
Prior surgery				
Levels				
Outcome variables				
Back pain VAS (0–100)				
ODI (0–100)				
EQ5D (version)				
EQVAS (version)				

Abbreviations: TDR, total disc replacement; RCT, randomized controlled trial; VAS, visual analog scale; ODI, Oswestry Disability Index; EQ5D, EuroQol measure; EQVAS, EuroQol visual analog scale.

Table 2
Outcomes

	Experimental		Control	
	Mean	(SD)	Mean	(SD)
One-year outcomes of key variables				
Back pain (VAS)				
Back pain improvement				
ODI (0–100)				
ODI improvement				
EQ5D				
EQ5D improvement				
Two-year outcomes of key variables				
Back pain (VAS)				
Back pain improvement				
ODI (0–100)				
ODI improvement				
EQ5D				
EQ5D improvement				

Abbreviations: VAS, visual analog scale; ODI, Oswestry Disability Index; EQ5D, EuroQol measure.

The editors of the SAS Journal encourage submission of quality meta-analyses. One limitation of meta-analysis is the absence of critical information from selected studies. Often, important data such as statistical deviations or the number of patients assessed at an intermediate time point are not available. In some cases the needed data appear in figures without actual values. To overcome these limitations and to encourage future meta-analysis research, the SAS Journal will require authors to create demographic and outcome tables in a standard format, as shown in Tables 1 and 2. Furthermore, clinical trials will be annotated with a flowchart that conforms to the CONSORT (Consolidated Standards of Reporting Trials) guidelines. We believe these requirements will improve the quality of our publication and increase the use of articles published in the SAS Journal in other research.

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