Dose-Response Probability Curves for Epidural Ropivacaine for Labour Analgesia

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Introduction: Quantal analysis techniques are commonly used to analyze dose-response data for epidural local anaesthetics in obstetrics and other subspecialties. Current methods such as probit, logit and up-down analysis utilize a single binary outcome to define a positive response eg. decrease in pain score to an absolute or proportional value below baseline. Usually dose estimates are determined for only 1 or 2 values that each relate to a certain proportion of patients responding (eg.ED\textsubscript{50}, ED\textsubscript{90}). This has limitations. For example, the chosen binary outcome may not be clinically relevant; clinicians may be interested in knowing doses corresponding to other proportions of patients responding. Accordingly, this presentation describes an alternative method of analysis that more fully describes the dose-response relationship for epidural ropivacaine.

Methods: The dataset for ropivacaine from a recently-published dose-response study\textsuperscript{1} were reanalyzed. 150 patients had received 1 of 6 doses ranging from 7-60mg, diluted to 20ml with saline for labour analgesia. Pain scores were recorded at baseline and at 5min intervals for 30min. First, we tabulated a series of endpoints defined by different percentage decreases in pain score at 15min from baseline (range: 5% to 95% with increments of 5 percentage points). Individual analyses were then performed for each endpoint. Initially, data were transformed to binary format by tallying the number of responders for each dose. Next, for each endpoint, probit analysis was used to determine the effective doses corresponding to probabilities of success ranging from 0.05 to 0.95 in increments of 0.05 probability units (ie. ED\textsubscript{5} to ED\textsubscript{95} were determined for each level of response). Data were analyzed using SPSS 15.0. Results were then displayed in a 3-D mesh graph using Sigmaplot 2001.

Results: The dose-response probability graph generated is shown in the figure.

Conclusion: Generation of dose-response probability curves is a novel method for displaying dose-response data, relating doses to probabilities of achieving different response magnitudes.