

# Looking back on your statistical tool

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In this issue, we bring attention to two specific articles. Each exhibit strong rhetoric, which is rare in the world of scientific journals, in which storytelling is generally considered to be trivial.

In the first article, Park et al. [1] stated that some previously reported confidence intervals for 95% thresholds estimated with the up-and-down sequential (UDS) design were so large that they demonstrated a fixed-concentration design. While the text comprises a matter-of-fact description, those are also intriguing to me to regard as their confession, in a sense. Park et al. is a leading group of authors of KJA articles in which the UDS design is described. One reviewer pointed out the weakness of the fixed-concentration (or fixed-dose) design (FCD) in that the FCD requires more subjects than does the UDS design. For our readers, I am summarizing a succinct aspect of the UDS design that has been described previously in other medical journals [2-4].

The dose (or concentration, even if omitted) of a median threshold is rapidly obtained with the UDS design, and its approximating speed depends on the estimation of the starting dose. The required sample size is smaller than that required for the FCD. Researchers are not compelled to calculate a minimum sample size when adopting the UDS design because it has a strict stopping rule. This is an advantage when studying a drug with unexplored properties.

Conversely, each dose used in the UDS design relies on that used previously. This violates the assumptions of statistical tests that are based on generalized linear modeling (GLM), such as logistic regression and probit regression. The researcher must analyze the UDS data using only the UDS approach, not by GLM. The UDS design necessitates convergence of the data about a median threshold, and the data become sparser as

they spread farther from the median. Any upper (90% or 95%) threshold calculated from the UDS data is then disputed, although readers often inquire about the upper threshold rather than the median threshold.

Please refer to the following text taken from the report by Park et al. [1].

“However, this method (ed. UDS design) was designed to repeat experiments nearly up to target concentration. Thus, the concentration-response curve covering the wide range of concentrations may be hard to plot. By applying a logistic regression model and increasing the number of patients, we were able to reduce 95% confidence intervals to one-tenth of the value reported by a study by using Dixon’s up-and-down method and plot the concentration-response curve with acceptable confidence intervals. (sic)”

According to this description, the authors clearly addressed the problem inherent in the UDS design.

The second article herein discussed is that by Choi et al. [5]. They stated:

“There are some possibilities of why studies related to RIWM (rocuronim-induced withdrawal movement) have been conducted by many medical staff in Korea. Korean medical staff may have finer powers of observation for RIWM, or have ... (sic)”

While some of the text related to this statement was deleted or de-emphasized at the request of the reviewers, the remaining sentences may still raise concerns. However, this is merely rhetoric. The expressions of frustration pertain not to somebody but to something. Re-evaluation and integration of the individual

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articles shows that this systematic summary was published with perfect timing.

The finely written abstract by Choi et al. [5] greets readers in a manner that contrasts with that of Beller et al. [6] 2011 scrutiny. Beller et al. [6] stated that abstracts of systematic reviews easily sink into the numeric-only labyrinth or exhibit statistical uncertainty, even for readers of average discipline. The authors described the size and direction of effect to help readers under-

stand the essence of the review.

The two above-described KJA articles managed to adequately address these difficulties. Changes in statistical tools are necessary whenever a researcher decides to delve deeply into such matters, increase the reliability of estimates, and strengthen their storytelling. I recommend that our readers peruse these two thought-provoking articles in this issue.

## References

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