Journal of Pediatric Surgery 55 (2020) 2248

Contents lists available at ScienceDirect

Journal of Pediatric Surgery

journal homepage: www.elsevier.com/locate/jpedsurg

Reply to Letter to the Editor

Reply to letter to the editor sample size analysis (Lander and Moni-Nwinia)

Dear Editor,

We thank Drs. Lander and Moni-Nwinia for their letter regarding our published manuscript [1]. Their letter focuses on statistical aspects related to the sample size calculation in our study. We commend the authors for their in-depth and detailed analysis of this aspect of our manuscript. We gather that for a teaching exercise the authors conducted a power calculation utilizing a mean length of hospital stay (LoS) of 4.4 days in one group and 5.5 days in the other group (SD 1.29). In this scenario we do agree with the authors; our own calculation also shows that 27 patients in each group would be needed ($1 - \beta = 0.80$; $\alpha = 0.05$). However, because LoS is a notoriously skewed variable (and this was the case for our 2009 pilot data), for our original power calculation we used the ln-transform of LoS. The mean of 5.41 (approximated to 5.5) ln (LoS) value is 1.71, with a standard deviation of 0.26. We apologize to the readers for a typo mistake in section 1.4.1: the sentence "*The mean of 541 pediatric patient LoS…*" should read "*The mean of 5.41 in pediatric patient LoS…*". Therefore, to detect a decrease of at least 20% in the geometric mean LoS (which equates to about 1.1 day decrease in arithmetic mean LoS), with significance 5% and power 80%, we needed to enroll a minimum of $n = 51$ children in each arm of the RCT.

We also agree with the authors' with concerns about type 2 errors. The frequency of type 2 errors, or lacking statistical power to demonstrate a difference between two treatment arms, is well-documented [2,3]. We recognize that "knowing the power after the fact" could potentially be useful, both in designing future studies and in interpreting existing results. When using post-hoc power, researchers assume that the true, or the population effect size, is equal to that seen in the study. Therefore, if the study result was not statistically significant at the observed sample size and effect size, a post-hoc power calculation, based on the observed effect size will be underpowered. It is arguable that the p value and post-hoc power based on an observed effect size might be mathematically redundant. Also due to the one-to-one relationship of the p value and the post-hoc power, there is no added value in reporting the post-hoc power [4].

Finally, it is worth remarking that post-hoc power analysis has also been criticized as it will produce a low post-hoc power result, which may be misinterpreted as the trial having inadequate power [5]. However, we do acknowledge that it might be useful in assisting the surgeon to recognize that "the absence of proof is not the proof of absence".

Maurizio Pacilli
Department of Paediatric Surgery & Surgical Simulation, Monash Children's Hospital, Melbourne, Australia
Department of Paediatrics, School of Clinical Sciences, Faculty of Medicine, Nursing and Health Sciences, Monash University, Melbourne, Australia
Department of Surgery, School of Clinical Sciences, Faculty of Medicine, Nursing and Health Sciences, Monash University, Melbourne, Australia

Peter Ferguson
Department of Paediatric Surgery & Surgical Simulation, Monash Children's Hospital, Melbourne, Australia

Ramesh Mark Nataraja
Department of Paediatric Surgery & Surgical Simulation, Monash Children's Hospital, Melbourne, Australia
Department of Paediatrics, School of Clinical Sciences, Faculty of Medicine, Nursing and Health Sciences, Monash University, Melbourne, Australia
Department of Surgery, School of Clinical Sciences, Faculty of Medicine, Nursing and Health Sciences, Monash University, Melbourne, Australia
*Corresponding author at: Consultant Paediatric Surgeon & Associate Professor, Monash Children's Hospital & Monash University, Department of Paediatric Surgery, 246 Clayton Road, Clayton, Melbourne, Australia, 3168. Tel.: +61 3 9594 6998; fax: +61 3 9594 6008.
E-mail address: ram.nataraja@monashhealth.org.

https://doi.org/10.1016/j.jpedsurg.2020.06.002

References

[1] Nataraja RM, Panabokke G, Chang AD, et al. Does peritoneal lavage influence the rate of complications following pediatric laparoscopic appendicectomy in children with complicated appendicitis? A prospective randomized clinical trial. J Pediatr Surg. 2019;54(12):2524–7.
[2] Ko CY, Sack J, Chang JT, et al. Reporting randomized, controlled trials. Diseases Colon Rectum. 2002;45(4):443–7.
[3] Solomon MJ, Laxamana A, Devore L, et al. Randomized controlled trials in surgery. Surgery. 1994;115(6):707–12.
[4] Hoenig J, Heisey D. The abuse of power: the pervasive fallacy of power calculations for data analysis. Am Stat. 2001;55:19–24.
[5] Levine M, Ensom MH. Post hoc power analysis: an idea whose time has passed? Pharmacotherapy. 2001;21(4):405–9.