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Editorial

Evidence-Based Medicine in Orthopedic

John Christian Parsaoran Butarbutar*

Orthopedic Department, Faculty of Medicine, Universitas Pelita Harapan, Siloam Hospitals Lippo Village, Indonesia

***Corresponding Author:** John Christian Parsaoran Butarbutar, Orthopedic Department, Faculty of Medicine, Universitas Pelita Harapan, Siloam Hospitals Lippo Village, Indonesia.

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Orthopedic surgery is a vastly evolving field with an increasing number of publications introducing new implants and innovations each year.

Systematic reviews and metanalysis are also booming as it is accepted as the highest level of evidence hierarchy in prestigious orthopedic journal.

Orthopedic surgeons have been challenged by this large number of new publications to appraise this expansion and the increasing number of surgeons depending on systematic reviews as their primary sources. This is not without problems due to the fact that many surgeons do not have formal training in advanced statistics to critically interpret these results. The quality of systematic reviews can only be as good as the primary studies included. There is an increasing concern regarding the low quality of orthopedic primary studies as they may not hold significant clinical applications, which in the end will affect the quality of their systematic reviews and meta-analysis [1-4].

In the past, surgeons used to gain their knowledge more from expert opinions, usually based on case series performed by prominent skillful surgeons with long-term follow-up. The surgeon would then combine this knowledge with his own experience to decide how it would influence his clinical practices considerably. Although many times it will successfully introduce new knowledge with good clinical implications, it was not without a high-risk bias.

Since the emergence of evidence-based medicine in the nineteen nineties with the hierarchies of evidence, the medical field has been using stronger quality evidence with a reproducible algorithm in their research. The easier nature of drug vs placebo trials makes the medical community decades ahead in producing a high level of evidence in their treatment in comparison to the field of surgery. Pioneering in orthopedic publication, The Journal of Bone and Joint Surgery American chapter started to put Level of Evidence on their publication started back in 2003. Soon, this was followed by other influential orthopedic journals. This demand caused an increasing number of randomized controlled trials (RCT), and systematic reviews on those RCTs, to produce the highest level of evidence in the hierarchy. As a fact, the well-performed RCTs have been proven to influence orthopedic clinical practice, such as the significant decline in the numbers of arthroscopic lavage in osteoarthritic knee and subacromial decompression for shoulder impingement after some RCT results showed they had no different outcomes compare to sham surgeries that were published [5-7].

However, RCT in orthopedic can be problematic. Blind studies many times are impossible, for example comparing open surgery and minimally invasive technique. Sham surgery is very often unethical when obvious effective treatment is already available. Many orthopedic interventions are permanent, in comparison to drug trials that are more commonly reversible. They are also more costly, and may not be covered by insurance companies. Patient recruitment was low, many ended up with less than 50% of the intended target, making the study underpowered to detect the difference in the treatments offered. This low recruitment even forced some RCT to cease. Bunzli et al published in 2018 that of ten sham surgery that they found in the orthopedic field, none of them are major

procedures, and only one is free of bias [8]. As consequence, poorly performed RCT and meta-analysis can give rise to an incorrect conclusion thus may be misleading clinical practice policy.

Even if they were done well with sufficient power, a good quality RCT with good internal validity usually has less external validity, meaning that the techniques might not quite be reproducible if they had been done by other groups of surgeons due to different skill and learning curve that were always needed to perform new techniques. This thus raised the question of the effectiveness of traditional RCTs, despite all the efforts and funding, to impact orthopedic daily practices. Some suggested that this type of study should be reserved for crucial topics only.

The other downsides of orthopedic publications prioritizing higher quality studies in their limited space to increase their impact factor were that traditional case studies and series, with their accompanied expert's opinion, were marginalized in prestigious orthopedic publications, although they were known to be important towards generating new hypothesis and awareness of rare conditions in the surgery field.

There were several efforts to overcome this gap of evidence. Registry-based randomized controlled trials that were done by several groups of surgeons with multicenter settings had gained increased interest in orthopedic publication. These real-world trials, although increased the heterogenicity of the studies with less or no blinding, will provide more external validity, power of the study, and longer follow-up, which will increase their influence in orthopedic clinical practice. Clinical cohort studies with longer follow-up and statistical adjustment for confounding factors are also another alternative source of high-quality evidence especially when RCTs are impossible to perform. Some publications now dedicate journals to case reports, and case series, with or without combined expert opinion back-to-back with the related primary studies.

In conclusion, this progress in evidence-based medicine with all its benefits and downsides should encourage orthopedic surgeons to equip themselves with more understanding of advanced statistic principles, to be able to critically appraise and interpret the results of RCT's, systematic reviews, and meta-analyses and to combine them with their surgical experience before they decide how much of that new knowledge will change their daily practices.

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