



Brief Communication

Surgeon Level of Expertise in Adult Reconstruction: A Brief Communication Regarding the Need for Reporting the Level of Expertise

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ABSTRACT

The purpose of the current brief communication is to establish a discussion regarding level of expertise (LOE) documentation in future arthroplasty clinical studies and to document the trend in adoption of LOE among arthroplasty publications to date. A review of *Arthroplasty Today*, *Journal of Arthroplasty (JOA)*, *Journal of Bone and Joint Surgery (JBJS)*, and *International Orthopedics (IO)* databases for original studies published between April 2016 and July 2020 was performed. A total of 105 articles were identified and evaluated in *Arthroplasty Today*, 1011 in *JOA*, 127 in *JBJS*, and 383 in *IO*. Of 1011 articles identified in *JOA*, only one manuscript (1/1011; 0.1%), by Uluyardimci et.al, included the LOE of the surgeon(s) involved in the study. No articles in *Arthroplasty Today* (0/125; 0%), *JBJS* (0/127; 0%), or *IO* (0/383; 0%) reported the LOE according to Tang's recommendations during the same period. Documenting LOE may provide readers with additional information for incorporation of novel techniques into their practices as well as identify procedures that require a baseline LOE for effective performance. Further evaluation of LOE criteria may improve the reliability of the numeric scale, while widespread adoption of this scale will allow future outcome analysis by LOE.

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In 2009, Tang [2] proposed a new metric for published clinical studies, reporting a surgeon's level of expertise (LOE). The concept of surgeon LOE has been documented in various ways in prior literature; however, no consensus regarding documentation has been proposed. The proposal arose in light of the following question: "If a beginner surgeon reported poor outcomes using a technique published by an expert in the field, would it be possible to discern whether it was the technique that led to the poor outcomes or the execution by the beginner surgeon that led to the poor outcomes?"

Joint Arthroplasty is inundated with an influx of new technology, surgical techniques, and implants. Within the last decade, joint reconstruction surgeons have been introduced to robotics and

more wide-spread adoption of many different approaches that include, minimally invasive and muscles-sparing techniques. Several studies have previously reported the effects of surgical experience on outcomes. Kim et al. [3] reported how surgical experience resulted in increased accuracy and consistency achieving the center of hip rotation after total hip arthroplasty. In addition, Callanan et al. [4] reported how surgeon volume correlated with cup position, and Schraknepper et al. [5] demonstrated worse outcomes with lower caseload surgeons in uni-compartmental knee arthroplasty.

The integrity, reliability, and validity of results reported in clinical research is at the core of advancing medicine through novel scientific concepts and approaches. To maintain this high level of integrity, journals have implemented several factors for their readership to easily identify the quality and validity of a study. One measure is the level of evidence. Level of evidence, often reported at the end of the abstract, is assigned to studies based on the

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Table 1
Levels of expertise of the surgeon.

Level	Category	Criteria
1	Nonspecialist	A surgeon who is in training or is a general practitioner.
2	Specialist—less experienced	A surgeon who has completed training, is a specialist in the subspecialty, but has not yet acquired in-depth knowledge or high-volume experience in use of the technique(s). Experience can be judged on shorter duration of practice (<5 years).
3	Specialist—experienced	A surgeon who has sufficient experience in use of the technique(s). Surgeon has practiced for longer duration (>5 years)
4	Specialist—highly experienced	A surgeon who possesses in-depth knowledge and experience in use of the technique(s). Surgeon has performed or involved as leading participant in scholastic studies relevant to the technique(s).
5	Expert	A surgeon who possesses in-depth knowledge and experience in use of the technique(s). Surgeon has significantly advanced knowledge or treatments related to the disorder or technique(s) being investigated.

Reproduced from Tang and Giddins (2016) [7].

methodological design and quality of their study, validity, and applicability to patient care [6]. This allows readership to generalize the strength of recommendations provided in the article. This has been widely incorporated among research globally and provides a guide for implementation of recommendations into practice.

A potential confounding variable in the evaluation of published literature in surgical disciplines is the surgeon's LOE. The LOE was initially presented by Tang [2] in 2009 and published by Tang and Giddins [7] in 2016 as a 5-level grading scale, ranging from nonspecialist (level 1) to expert opinion (level 5) (Tables 1 and 2). Since the original proposal, extensive published literature have adopted the Tang classification for their published literature [8]. In response, the editorial board of the *Journal of Hand Surgery* (European Volume; JHS(E)) established a panel of senior surgeons to help integrate LOE into future published articles, per Tang's recommendations [7]. Massel et al. [8] reported that the JHS(E) has

published 115 articles with documented LOE (115/563; 20.4%), with a gradual increase in number and percent of publications documenting LOE between 2015 to present [8].

The purpose of the current brief communication is to establish a discussion regarding LOE documentation in future arthroplasty clinical studies and to document the trend in adoption of surgeon LOE among arthroplasty publications to date. A review of *Arthroplasty Today*, *Journal of Arthroplasty (JOA)*, *Journal of Bone & Joint Surgery (JBJS)*, and *International Orthopedics (IO)* databases for original studies published between April 2016 and July 2020 was performed. These journals were chosen as they are a source of high-quality arthroplasty literature. Studies without surgical interventions, cadaver, or biomechanical studies were excluded. All original articles included in the final cohort were examined for LOE based on the studies by Tang [2] or Tang and Giddins [7]. A total of 105 articles were identified and evaluated in *Arthroplasty Today*, 1011 in *JOA*, 127 in *JBJS*, and 383 in *IO*. A citation cross-reference to Tang [2] and Tang and Giddins [7] citations was performed. Of 1011 articles identified in *JOA*, only one article (1/1011; 0.1%), by Uluyardimci et al. included the LOE of the surgeon(s) involved in the study [1]. No articles in *Arthroplasty Today* (0/125; 0%), *JBJS* (0/127; 0%), or *IO* (0/383; 0%) reported the LOE according to Tang's recommendations during the same period (Fig. 1).

The arthroplasty community has recognized that a measure of expertise is beneficial to readers for evaluating specific techniques and perioperative outcomes. The concept of a learning curve is frequently mentioned when reporting data regarding new techniques. For example, de Steiger et al. [9] describe the surgical learning curve for the direct anterior approach and report that the rate of revision normalizes after 50 cases. A learning curve may provide insight into the average procedures required before perioperative outcomes begin to normalize, however still does not provide a means for a surgeon to evaluate their LOE compared with the reporting surgeon. Learning curves can also be variable, for example, a surgeon with 10 years of experience performing multiple approaches to the hip may have a very different learning curve for a direct anterior approach to the hip than a surgeon who is newly graduated from fellowship with minimal anterior experience. These issues make using a learning curve as a substitute for LOE less than satisfactory.

The Tang grading scale attempts to standardize the reporting process to improve a reader's ability to compare outcomes and adopt techniques presented by surgeons at different LOE. Of note,

Table 2
Implementation of 5-level grading scale.

Key question	Answer
Who is to be scaled?	The documented expertise levels are those of the surgeons performing the procedure (or conducting the treatment), rather than those of the senior authors of the study. The expertise levels should also relate to the specific techniques under investigation, not to the surgeons' overall expertise.
Where in a manuscript should this information be reported?	The levels of expertise of the surgeons who performed a procedure should be reported succinctly under 'Methods'.
How to scale a resident working under the supervision of an attending surgeon?	If a resident performed the entire procedure, the procedure is considered as being completed by surgeon of level 1 expertise (surgeons in training). If the parts of a procedure considered most important to the outcome were performed by a senior (attending or consultant) surgeon, this procedure is classified according to the experience of that senior surgeon.
Which criteria define somebody as having had scholastic studies?	A surgeon who has published an original publication relevant to the disorder or technique is considered as having contributed a relevant academic study.
How to define experts and developers of a technique?	Two kinds of surgeons can be classified as level 5 (expert): (a) surgeons who have contributed to knowledge or treatments related to the disorder being investigated through important publications in peer reviewed journal(s) or less significantly book chapters or invited lectures. The surgeons are usually senior, Well-known authorities on the subject; and (b) surgeons who developed the technique or critical parts of the technique in the report. Those classified under (b) may be junior surgeons if they have developed the technique under investigation; they may have a low level of expertise in performing procedures other than the reported technique.

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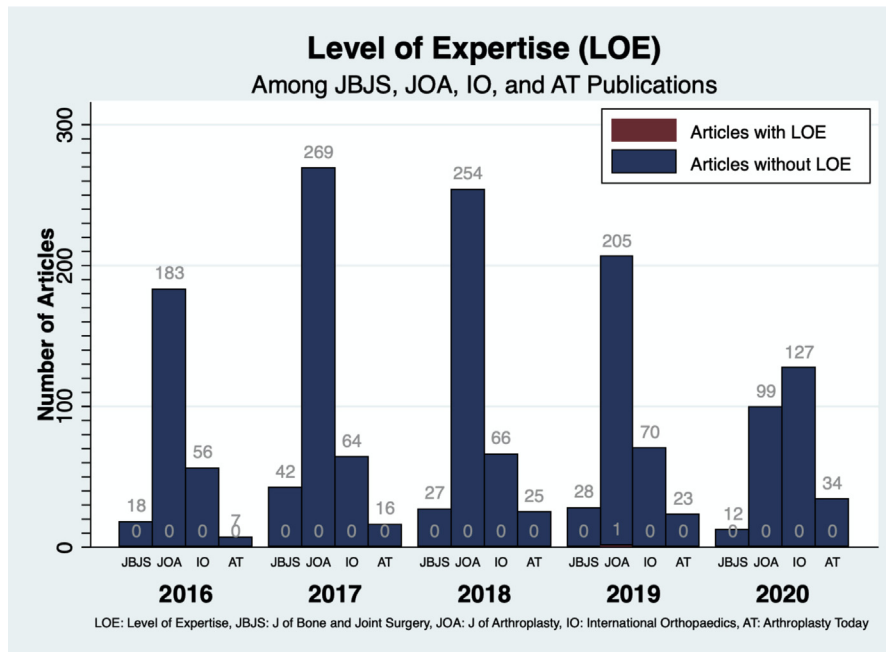


Figure 1. Bar graph demonstrating the number of articles published with and without reported level of expertise (LOE) among *Arthroplasty Today*, the *Journal of Bone & Joint Surgery*, *Journal of Arthroplasty*, and *International Orthopaedics* per year.

according to the current LOE scale, a LOE is reported per technique or surgical approach rather than specific for the surgeon. For example, a surgeon who has a level V expertise for the posterolateral approach to the hip may have a different LOE for the anterior approach depending on the number of procedures and the duration for which the surgeon has performed the anterior approach.

Beyond the utility for an individual surgeon, reporting of LOE is beneficial and desired for the academic community as a whole when comparing studies. The concept of studies needing to have a LOE associated has been validated by Bednarska et al. [10] who examined preferences among 276 orthopedic surgeons and demonstrated that for a novel study, orthopedic surgeons preferred expertise-based trial design compared with standard randomized controlled trial design.

In conclusion, the authors of the current editorial recommend consideration from the *Arthroplasty Today*, JOA readership, and arthroplasty community at large to include the Tang classification in their articles. We recommend including the LOE when reporting outcomes of a specific technique, approach, implant, or novel technology. The adoption of LOE criteria and documentation method may result in a more standardized interpretation of technique and outcomes, while providing additional insight into the technical difficulty, generalizability, and reproducibility of the procedure being assessed. The documentation may provide readers with additional information for incorporation of novel techniques into their practices, while also helping to identify procedures that may require a baseline LOE for effective performance and adequate outcomes. While the current grading scale is not perfect, we believe it to be a framework for additional discussion, alteration, and eventual adoption. Further discussion regarding the optimal inclusion criteria within the adopted surgeon LOE is important to consider, as the existing criteria by Tang et al. inadequately attempt to quantify the proficiency and experience of a surgeon. The ideal score would be one that combines, and properly balances, the weight of surgical training and certification in combination with

volume and difficulty of cases performed by a surgeon. We hope this editorial brings to light and prompts a discussion in the arthroplasty community about the optimal iteration of LOE as well as aid in taking steps toward adoption of LOE reporting by the major arthroplasty journals. We recommend a thorough evaluation of Tang's criteria across all orthopedic subspecialties including adult reconstruction to improve the reliability of the numeric score. Widespread adoption of the scale will allow future outcome analysis based on LOE.

Conflict of Interests

V. H. Hernandez is a paid consultant for Stryker, Consensus, and Pfizer; is a AAHKS International Committee (voting member); and is a JBJS CME Editor.

For full disclosure statements refer to <https://doi.org/10.1016/j.artd.2020.12.011>.

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