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How to Perform a High-Quality Peer Review for Spine Literature: A Practical Guide for New Reviewers

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Research findings in manuscript submissions can often be opaque. For example, a new technique may improve radiographic measurements without improving patients' lives. An apparent advantage of one operation over another may actually reflect differences in the patients selected for treatment compared with those excluded. Peer reviewers help make these findings more transparent by uncovering what a manuscript supports, how strongly the study supports it, and what uncertainty remains.

For scholarly journals like the *International Journal of Spine Surgery* (*IJSS*), the reviewer's task is to assess whether the methods support the conclusions and provide constructive guidance. Reviewers recommend a disposition, and editors consider their feedback before making the publication decision.[1,2] The present guide offers an educational workflow for new reviewers, who need not master every statistical method but should recognize consequential uncertainties and request additional expertise when needed.

ESTABLISH SUITABILITY AND RESPONSIBILITIES

Before accepting a review invitation, consider your expertise, availability, and potential conflicts of interest. Disclose relevant conflicts to the editor, maintain confidentiality, and obtain editorial permission before involving a colleague or trainee. Assess the work without allowing personal preferences or competing interests to influence the review.[2]

For *IJSS*, consider what the manuscript contributes to spine care or research. Useful contributions include new findings, independent validation, negative results, longer follow-up, and evidence from understudied populations. Novelty alone does not establish value. Clinical studies should address outcomes or decisions relevant to patients and clinicians; laboratory and methodological studies should be judged within their scientific scope.

Check that essential files are available and that the manuscript is sufficiently clear to assess. Notify the editor if missing material or contradictory reporting prevents review. Minor formatting errors should not obstruct scientific assessment, and reviewers are not expected to reconstruct or repair the submission.

READ WITH PURPOSE

After accepting a review invitation and establishing suitability, it is time to review. The following 3 passes provide a practical starting framework:

1. Understand the study. Identify the question, design, population, principal outcomes, findings, and contribution. Read the relevant background and references.
2. Assess validity. Examine the methods, results, tables, figures, and supplements. Determine whether the design answers the question and whether the findings support the claims.
3. Prepare the review. Prioritize concerns, distinguish essential revisions from optional suggestions, and formulate a recommendation consistent with your assessment.

ASSESS CREDIBILITY AND INTERNAL CONSISTENCY

Give the methods and results the greatest attention. Use the checklist provided in the Table when conducting the scientific review, recording material problems with page, line, table, or figure references.

Table. Checklist for peer reviewers.

Checklist Item	Minimum Expectation
Research question and contribution	The objective is explicit. The introduction explains the clinical or scientific relevance and what the study adds to existing knowledge.
Consistency across the manuscript	Sample sizes, primary outcomes, follow-up, complications, and principal statistical results agree across the abstract, main text, tables, figures, and supplements.
Methods–results alignment	The methods describe how the principal reported outcomes were measured and analyzed. Prespecified outcomes are reported, or their omission is explained. Units, time points, and statistical measures are clearly labeled.
Study population and denominators	Numbers screened, excluded, enrolled, treated, and analyzed reconcile. Group totals match the overall sample where groups are mutually exclusive. Patients, procedures, levels, and observations are clearly distinguished.
Arithmetic and percentages	Counts, totals, and percentages agree with their stated denominators, allowing for rounding. Overlapping categories, multiple events per patient, or changing denominators are explained.
Follow-up and missing data	Numbers assessed at each relevant time point are reported. Losses, exclusions, and missing observations are accounted for, and analysis denominators are identifiable.
Tables and figures	Each table and figure is present, cited in the text, and numbered consecutively by first appearance within its own series. Citations match the correct item. Titles, legends, panel labels, units, and abbreviations permit interpretation.
References	Citations and reference-list entries match. Numbering follows first citation, including citations in tables and legends as applicable. Entries are complete, consistently formatted, and numbered. Spot-check references supporting the central claims.
Ethics and transparency	Applicable ethics approval or exemption, consent statements, registration information, funding, and conflict of interest disclosures are provided. Refer missing information to the editor.
Conclusions and readability	The main conclusion is traceable to the reported results. The manuscript is readable enough to assess without reconstructing missing methods, guessing denominators, or resolving contradictory versions of the findings.

Outcomes and Statistics

Identify the primary outcome and whether it was prespecified. Assess effect sizes and confidence intervals alongside statistical significance and clinical importance. When a minimal clinically important difference is used, consider whether its derivation and application fit the population, measure, and analysis.[3] A nonsignificant result does not establish equivalence, and association alone does not establish causation.

Examine confounders, missing data, subgroup analyses, and whether repeated observations are handled appropriately. Judge the follow-up timeframe against the outcome and claim: early complications, fusion status, functional improvement, and durability require different observation periods. Consider the extent, reasons, and group differences in attrition rather than relying on a single percentage threshold. If the statistical analyses are beyond your grasp, request statistical review by including such a comment to the editor.

Questions Specific to Spine Research

Although many sources exist regarding how to review scholarly research, spine research deserves some specific considerations:

- Fusion and deformity: Are imaging methods, assessment times, and criteria explicit and reliable? Where alignment is central, are image acquisition and measurements appropriate? Distinguish radiographic findings from demonstrated clinical benefit.
- Adverse events: Are events consistently defined and captured with the severity, consequences, revision and reoperation rates, and observation period clearly reported?
- Robotics, navigation, and minimally invasive surgery: Are case selection, learning curves, surgeon experience, and treatment-era differences addressed? Do measured outcomes support claims of patient benefit?
- Implants, biologics, and sponsored studies: Are comparative claims justified? Are financial relationships and the sponsor's role in design, data access, analysis, writing, and publication decisions transparent? Assess potential bias through the methods and reporting without assuming motives.
- Biomechanics and economic studies: Do laboratory conclusions remain within testing limits? Do economic analyses distinguish costs, charges, and reimbursements and state the perspective and time horizon?

Reporting Guidelines

Myriad guidelines exist for authors to help write and structure their studies. Reviewers should also refer to such tools during the review process. For example, use CONSORT 2025 for randomized trials,[4] STROBE for observational studies,[5] and PRISMA 2020 for systematic reviews, with relevant extensions where applicable.[6] However, complete reporting does not guarantee sound methods. Examine allocation and analysis populations in trials; assess selection, confounding, and

measurement in observational studies; and search completeness, eligibility, risk of bias, and the justification for pooling in systematic reviews.

DISTINGUISH MAJOR CONCERNS FROM MINOR CORRECTIONS

A major concern could materially change confidence in a study's findings or interpretation; such concerns may be an inappropriate comparison, consequential missing outcomes, or a conclusion that overstates the evidence. In contrast, a minor concern improves clarity without changing interpretation, such as an undefined abbreviation or a mislabeled axis.

Distinguish missing information from a limitation of the study itself. Unreported eligibility criteria may be clarified, whereas selection bias may persist despite clearer reporting or statistical adjustment. Consider whether a feasible revision can resolve the concern, whether the claim should be narrowed, or whether the central inference remains unsupported.

Material contradictions should be referred to the editor with a specific explanation and an indication of whether clarification could resolve them. Raise suspected integrity concerns confidentially, highlighting the alarming content with evidence that supports your allegations.

WRITE COMMENTS AUTHORS CAN ACT ON

Begin your feedback with a short summary that highlights meaningful strengths of the submission. Major and minor comments should be listed separately. Each substantive comment should identify the concern, explain why it matters, and request a feasible response. For example: "The follow-up supports early outcomes but not long-term durability. Please narrow the conclusions or provide longer follow-up outcomes if available."

Keep requests proportionate to the study's purpose. Do not demand a different study, insist on your preferred technique, or request citations solely to promote your own work.[2] Identify language problems when they affect understanding; avoid turning the review into a copyediting exercise.

Hypothetical Example

A retrospective study compares minimally invasive and open lumbar fusion. Disability scores favor the minimally invasive group at 1 year, but the open group includes more revision procedures and greater baseline disability. Follow-up completion is unreported, and the authors claim superiority. Constructive comments from the reviewer are as follows:

Opening summary: "This study addresses a relevant clinical comparison and includes patient-reported outcomes. Interpretation requires clarification of baseline differences and follow-up completeness."

Major comment 1: "The groups differ in revision status and baseline disability. Please explain treatment selection and how these differences were addressed analytically. If further adjustment is not feasible, qualify the comparison and discuss residual confounding."

Major comment 2: "Please report the numbers eligible and assessed at 1 year in each group, reasons for missing assessments when known, and the handling of missing data. Differential follow-up could influence the observed difference."

Major comment 3: "Please revise the superiority claim to reflect the observational design and remaining uncertainty. The observed association does not establish that the approach caused the difference."

Recommendation to the editor: "Major revision is reasonable if follow-up can be clarified, baseline differences addressed, and conclusions aligned with the evidence. If the available data cannot support a meaningful comparison, reassess whether a narrower descriptive contribution remains worthwhile."

RECOMMEND A DECISION AND ASSESS THE REVISION

Base the recommendation on the seriousness and resolvability of concerns:

- Accept when no substantive concerns remain.
- Minor revision when limited corrections are needed without materially changing interpretation.
- Major revision when important concerns exist but are potentially resolvable. (An invitation to revise does not guarantee acceptance.)
- Reject when fundamental limitations prevent a supportable contribution or the manuscript is unsuitable for the journal.

List scientific criticisms requiring a response visible in the comments to the authors, and reserve sensitive integrity concerns and editorial context for confidential comments to the editor.[1,2] At the *IJSS*, a typical manuscript is reviewed by 2 experts in the given topic area. The editor will review the manuscript and consider the reviewers' feedback before submitting their decision,

which may differ from one or more of the reviewers' recommendations.

Generally, reviewers are invited to review revised drafts of submissions. Reviewers should compare the author's response letter with the revised manuscript to determine whether major concerns were resolved or answered with a scientifically justified explanation. However, reviewers should avoid introducing unrelated requirements unless a newly recognized issue materially affects validity.

Use a Simple Review Template

- Summary and strengths: State the question, main finding, and useful contribution.
- Major comments: Number concerns affecting validity or interpretation, with reasons and feasible requests.
- Minor comments: List specific corrections that improve clarity.
- Confidential comments to the editor: Give the recommendation and rationale, relevant conflicts, and sensitive integrity concerns.

Before submitting a review, confirm that each criticism is relevant to the manuscript, that essential requests are distinguished from optional suggestions, and that the recommendation follows from the comments. Ultimately, authors should be able to understand what needs to change and why.

CONCLUSION

A useful peer review explains what the evidence supports, identifies consequential uncertainty, and gives authors a clear path to improvement. As a reviewer, ask whether the question matters, the findings are credible, and the conclusions are justified, and apply those judgments consistently and communicate them respectfully.

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