

Tools to Improve Scientific Research



Abstract: The mission of *Arthroscopy* is to provide authoritative, current, peer-reviewed clinical and basic science information regarding arthroscopic and related surgery. In addition, with a goal of improving the quality of the scientific research published in our journal and others, we develop and publish research pearls, statistical guides, article checklists and templates, and related tools. In sum, this effort allows our cadre of editors, reviewers, authors, and readers to strive to improve in our ability to create and critically analyze medical literature of the greatest merit. Our ultimate ambition is to publish more perfect articles with conclusions on which readers can rely.

The mission of the *Arthroscopy* journal is to be the world's most authoritative and most current source of peer-reviewed clinical and basic science information regarding arthroscopic and related surgery.

As Editors, we strive to present a platform conducive to publishing the perfect paper—reporting the results of a methodologically flawless study—in order to impact clinical practice and future research. This month, as we reach the end of 2018, we complete a concerted, 2-year project dedicated to enhancing the quality of our published literature. To achieve this goal, we developed and published research pearls, statistical guides, article checklists and templates, and related tools to aid our editors, reviewers, authors, and readers in creating and comprehending the ever more complicated medical literature. It is a literature which now ranges from original articles to expert opinions, systematic reviews and meta-analyses, and big-data studies, and from simple surveys to complex economic analyses, just to scratch the surface.

Statistical Pearls: How to Interpret Data

In 2017 we published several Research Pearls encapsulating “The Significance of Statistics and the Perils of Pooling.”¹ Here, the important topics of clinical versus statistical significance,² predictive modeling,³ and the pearls and pitfalls of meta-analyses and systematic reviews⁴ were explored. Although these topics may seem esoteric in nature, statistics represent an essential basis necessary to interpret scientific research results and thus achieve correct conclusions. While few of us are statisticians, all clinicians and scientists rely on

“stats” when seeking “the facts.” And while statistics can seem unexciting, our Research Pearls actually did elicit a lively Letter to the Editor⁵ and author response.⁶

We wrap up our Research Pearls with a second editorial in the current issue,⁷ where we continue our efforts to stamp out the noxious synthesis (improper pooling) of heterogeneous, high-risk-of-bias, low-level-of-evidence data. Our analysis indicates that exploration, rather than pooling, of such data can yield “valuable information” when more properly investigated.

Checklists and Templates: How to Organize and Analyze Research Publication

To improve the quality of our published articles, we rely on both dedicated authors and our selfless team of volunteer peer-reviewers. We now provide both with additional tools in the form of Checklists and Templates. Our Templates are organized as two main types of investigations: (1) [original scientific articles](#), and (2) [systematic reviews including meta-analyses](#). To facilitate regular and frequent use of the densely populated Templates, we have abridged each with the [Original Article Checklist](#) and [Systematic Review and Meta-analysis Checklist](#). These convenient “cover sheets” summarize the most significant elements of the Templates. Both the Checklists and Templates emulate the format of an *Arthroscopy* article for convenient application. The *Arthroscopy* journal Original Article Checklist and Template are provided at the end of this article in print and online as supplemental material, and all four documents are available at www.arthroscopyjournal.org, where they are accessible from the dropdown menu Checklists & Templates.

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The Study Design: How to Plan the Study

In addition to providing tools for interpreting data and organizing and writing manuscripts, we also hope to inform study design. Our Checklists and Templates may be so applied. In addition, in this month's issue we publish a Research Pearl providing a general guide to designing a comparative clinical study, "New Invention Versus 'Gold Standard': A Hands-on Research Pearl on Study Design and Statistical Concerns."⁸ In this article, Associate Editors Jüri Kartus and Mark Cote aid researchers in both planning a prospective trial and developing proper statistical methods; the authors provide context by illustrating their article using a specific study as an example.

Also in this issue, we expand our effort to improve the scientific methods of experts attempting to develop a clinical consensus. Associate Editors Erik Hohmann and Mark Cote and Assistant Editor Jeff Brand publish, "Expert Consensus Based Evidence Using The Delphi Method."⁹ Expert consensus (Level V evidence) is necessary when higher level of evidence published literature is controversial or inconclusive. Hohmann et al. illustrate a stepwise approach that allows a panel of experts to achieve a concurrent opinion in a systematic manner, the Delphi Method.

Level of Evidence: How to Rank Studies

Finally, Associate Editors Erik Hohmann, Michael Feldman, Mark Cote, Associate Editor *emeritus* Tim Hunt, and Assistant Editor Jeff Brand publish, "How Do We Establish the Level of Evidence?"¹⁰ In summary, it is necessary to first determine the type of study and then assign a level based on a hierarchy of evidence. Unfortunately, the assigned hierarchical level is not the sole determinant of the quality of a study. Nevertheless, studies of higher levels of evidence should eventually result in improved reliability of our medical literature.

The Conclusion

Our ultimate ambition is to publish more perfect papers with conclusions on which readers can rely. Our published research pearls and related tools can aid our

ability to create and critically analyze arthroscopic and related literature of the utmost quality.

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