Clin Orthop Relat Res (2013) 471:1739–1740
DOI 10.1007/s11999-013-2984-9

Clinical Orthopaedics and Related Research®
A Publication of The Association of Bone and Joint Surgeons®

EDITORIAL

Editorial

Reporting Statistics in Abstracts in *Clinical Orthopaedics and Related Research*®

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Received: 29 March 2013 / Accepted: 4 April 2013 / Published online: 11 April 2013

Statistical analyses are an important part of experimental and clinical studies. These analyses must be carefully performed, and clearly described. Authors should present enough information about these analyses to allow readers to evaluate the analyses, determine their appropriateness, and, with that information in mind, assess the validity of each study's results. It is somewhat paradoxical that many errors in this area involve basic — rather than advanced — statistics [5].

Most journals begin articles with abstracts that summarize the key elements of each study. Abstracts should present enough statistical information for the reader to determine the robustness of each study's main findings. Readers often make their initial assessment of a study based solely on the contents of the abstract. Health professionals in some geographic regions may not have access to the full study, and therefore might need to make some healthcare decisions based upon the contents of abstracts. Statistical findings in abstracts may also aid the retrieval of relevant reports from electronic databases [3, 4, 8].

Many different kinds of studies published in *Clinical Orthopaedics and Related Research*® call for different statistical analyses. Even studies of the same type may be correctly analyzed with different statistical approaches. Nevertheless, some general principles apply to most study designs and analyses. Going forward, these principles will define our minimal requirements for statistical results to be reported in abstracts of papers published in *CORR*®.

Abstracts of scientific articles in *CORR*® must:

(1) indicate the number of patients or samples analyzed;
(2) provide a measure of data spread for key descriptive analyses;
(3) demonstrate, using a suitable approach, the key conclusion(s) drawn was/were unlikely the result of chance;
(4) describe the confidence in the key finding(s), and when they were relevant; and
(5) present a measure of effect size for the key findings.

Generally, details on how researchers performed statistical analyses are not needed in abstracts unless they are critical to the reader's understanding or interpretation of the findings. However, the results of these analyses belong in the abstracts.

The next few sections summarize our recommendations for the statistical elements that belong in the abstracts of our most common study types.

Observational Studies

Observational studies make up the majority of studies reported in orthopaedic surgery [7]. For these reports, we

The authors certify that they have no funding or commercial associations (eg, consultancies, stock ownership, equity interest, patent/licensing arrangements, etc.) that might pose a conflict of interest in connection with the submitted article.
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prefer a relevant measure of association (eg, an odds ratio or a hazard ratio) along with confidence intervals. If confidence intervals are reported, there is no additional need to add p values, as they do not carry additional information [6]. In some cases, reporting a p value may be acceptable, though if alternatives exist they should be explored. One must keep in mind that p values only convey part of the story, and many potential readers may misinterpret or attach too much importance to them [1, 2].

Randomized Clinical Trials

The CONsolidated Standards of Reporting Trials (CONSORT) Group issued an extension of the CONSORT statement providing a list of essential items to include when reporting the main results of a randomized trial in a journal or conference abstract [3]. Since *CORR*® endorses the CONSORT statement for reporting of randomized trials, we ask authors to comply with the CONSORT for abstract guidelines. Key items listed in these guidelines include indicating the number of patients randomized and analyzed, presenting primary outcome results for each group, describing the corresponding estimated effect size and its precision, as well listing important adverse events and/or side effects.

Meta-analyses

The abstract should include the number of trials and the total number of patients, as well as the pooled estimate of (at least) the primary treatment effect, along with the confidence interval for the primary analysis (whether odds ratio, risk ratio, mean difference or standardized mean difference). Results of the assessment of heterogeneity, risk of bias and publication bias are generally important issues in meta-analysis and should be reported in the paper, but (for reasons of space) they remain optional for reporting in the abstract. Those issues should be reported in the abstract if they are important to the study's message. In those situations, a short statement on these points usually is sufficient.

Basic Science Studies

Basic science studies are too diverse to allow for blanket recommendations, but if statistical analyses have been carried out in the paper, their findings belong in the abstract. This is particularly true if the researchers computed measures of association (eg, odds ratios), or performed tests of significance. In those cases, the recommendations for observational studies should apply. Otherwise, a measure of data spread may be included in the abstract.

Conclusions

Good statistical analysis begins with good study design. One cannot salvage a poorly designed study through the crafty application of statistics after the study has been completed, and one should not try to do so. Regrettably, too many authors consider statistical approaches only after the study is done. We strongly recommend that investigators consult colleagues with expertise in statistics, informatics, or epidemiology (as indicated) in the early phases of study design.

These recommendations represent our guidance regarding the elements that belong in the abstract of a well-written paper. Exceptions will occur, and we understand this. However, we do expect that these guidelines will apply to the large majority of manuscripts submitted to *CORR*®, and we thank our authors in advance for adhering to them.

Acknowledgments The authors gratefully acknowledge Matthew B. Dobbs MD, Paul A. Lotke MD, and Clare M. Rimnac PhD for their critical reviews and thoughtful suggestions on this manuscript.

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