

Bibliographic Metrics at *JACC: Cardiovascular Imaging*

An Opportunity for Audit and Reflection

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Over the last 2 years, the Impact Factor of *iJACC* has averaged 5.52, meaning that original articles published in the Journal are cited by other papers an average of at least 5.5 times. This parameter is an imperfect marker of the quality of a journal for a variety of reasons. As the citation of topics is nonuniform, comparisons between specialties are problematic (1). Even within a given specialty, new journals compete within varying levels of density of new and established journals in their field. Further, articles may be well or poorly cited depending on whether they are published in a high-, medium-, or low-impact journal (2). Nonetheless, while Impact Factor is an oversimplified marker of quality (3), the recent provision of a bibliographic metric for the first time since the inception of *iJACC* is a landmark that provides an opportunity for audit and reflection.

The goal of *iJACC* is to provide a forum for communication about the relevant advances in imaging, particularly when this involves consideration of merits of more than one modality. We have sought to bring the international cardiovascular imaging community together. Our data show that we are truly a global journal and analyses of the bibliographic data show that this has been a source of considerable strength for us; 50% of our submissions and 40% of acceptances have been from outside the United States. Overseas papers contributed significantly to citations; nearly one-third of the highest cited papers were from outside the United States. One-third of our elite reviewers and one-fifth of our editorialists were from overseas.

Bringing cutting edge, original science to publication has been at the core of our philosophy, and bibliographic data analysis shows that we achieved this in large measure. Original science papers formed the bulk of our highest cited articles, only 1 of the top 25 cited papers was a review article. Since reviews are commonly thought to be more citable than original papers, and since original papers far outnumbered reviews, our impact results suggest that we have been successful in attracting top quality, original, research contributions from authors around the world.

iJACC has made a substantial effort to maintain a balance between the needs and proven roles of different imaging modalities, and has a uniform decision process for papers in all modalities. Although we seek to provide a forum for publications involving all imaging modalities, inevitably the distribution of papers has been somewhat unequal, reflecting the number of submissions from modalities of different maturity. Of more than 1,600 submitted papers over the first 2 years, 25% were primarily related to echocardiography, 20% to magnetic resonance imaging (MRI), 15% to computed tomography (CT), 10% to invasive imaging, and 20% to a miscellaneous group including health services research and reviews. The remaining submissions were on nuclear cardiology topics, leading to a relative paucity of published papers in this field. Our initial concern that the newer imaging fields, with more opportunities for newer and novel discoveries might inadvertently receive an easier passage than more established modalities including echocardiography and nuclear imaging has not been realized. Acceptance rates did not differ significantly when stratified by modality, ranging between 10% (CT) to 20% (MRI, nuclear cardiology, and health services re-

search), with echocardiography and invasive imaging being in between (15%). Overall, these acceptance rates are lower than most authors would prefer and we are working actively to make sure high quality papers get an optimum chance of acceptance. The primary modality in the highest-cited papers was echocardiography (30%), followed by CT (25%), coronary imaging (20%), nuclear (15%), and MRI (10%). While *JACC* attracted a broadly diversified portfolio of high impact articles representing the entire breadth of cardiovascular imaging, the Editors will continue to make considerable efforts to foster the growth of every imaging modality.

The announcement of the Impact Factor also provides an opportunity to better understand the effectiveness of the review and editorial process. Each paper has been reviewed and scored by 2 (and not infrequently 3) reviewers, the Associate Editor, the Editor, and discussed extensively during our weekly editorial meetings. In order to evaluate this process, we sought to characterize the nature of the acceptances and rejections, starting in 2007 (for papers subsequently published in 2008), in order to have sufficient follow-up to examine their subsequent impact. For example, of the earliest acceptances, the 2 reviewers and Editors reached a concordant decision in favor of publication in 84% of these papers. The average number of citations in these accepted papers was 18.1 ± 18.6 (true-positives). Five papers were cited fewer times than the average *JACC* Impact Factor (false-positives), giving us a sensitivity of 80% for predicting papers likely to be highly valued by the field. Among the earliest rejections in the same period, the reviewers and Editors reached a concordant decision in favor of rejection in 72% of these papers. The greatest differences

in score between accepted and rejected papers were in the realms of priority and methodology. More than two-thirds of these papers (68%) have subsequently been published. Of these rejections, 48% were accepted by subspecialty imaging journals, 12% were published in general cardiology journals, and 32% still remain unpublished; 2 papers were modified, resubmitted with an appeal and eventually accepted by *JACC*. The average citation for the rejected papers was 2.8. Of the first 25 rejected papers, only 2 were cited more times than the average *JACC* paper (false-negatives), giving our review process a specificity of 91% (true-negatives) for identifying science that is less likely, on average, to move the field forward significantly.

Impact Factor is often considered to be a subject of primary interest for the authors, because in many countries, Impact Factor is an important criterion for grant awards and academic promotions (4). However, citations are also a post hoc measure of editorial success in achieving the goal of publishing novel, relevant, correct, and interesting papers—and therefore relevant to the Journal's quality control process. Inherently, a paper that is subsequently cited is a marker of work that is relevant and topical in its field, useful to other researchers and the development of the scientific evidence base.

Rather than to simply employ it as a competitive yard-stick, we firmly believe that the achievement of an Impact Factor should be viewed as an opportunity for the editorial team to reflect on our review process, to recommit ourselves to attracting the most important advances and robust evidence, and to thank our reviewers for their passion and commitment—nothing else could justify the time and attention of our readers.

REFERENCES

1. Fu LD, Aphinyanaphongs Y, Wang L, Aliferis CF. A comparison of evaluation metrics for biomedical journals, articles, and websites in terms of sensitivity to topic. *J Biomed Inform.* 2011 Mar 17 [E-pub ahead of print].
2. Falagas ME, Kouranos VD, Michalopoulos A, Rodopoulou SP, Batsiou MA, Karageorgopoulos DE. Comparison of the distribution of citations received by articles published in high, moderate, and low impact factor journals in clinical medicine. *Intern Med J* 2010;40:587-91.
3. Rizkallah J, Sin DD. Integrative approach to quality assessment of medical journals using impact factor, eigenfactor, and article influence scores. *PLoS One* 2010;5:e10204.
4. Favaloro EJ. The journal impact factor: don't expect its demise any time soon. *Clin Chem Lab Med* 2009;47:1319-24.