Acute Cardiovascular Care Association: A unique platform for multi-disciplinary exchange

The mission of ACCA is to improve the quality of care and outcome of patients with acute cardiovascular diseases, encompassing the complete care of patients from first medical contact until patient stabilization.

ACCA is the first and unique platform of scientific exchange in the field where a multi-disciplinary team can share knowledge and enhance educational skills towards one single goal.

Learn more about the association and its educational initiatives: www.escardio.org/ACCA.

Access Masterclass resources

All scientific resources are available on the ACCA web site. https://www.escardio.org/Sub-specialty-communities/Acute-Cardiovascular-

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Journal Metrics, a series of 4 articles

Journal Metrics I

David Crotty PhD introduces metrics: the different methods for measuring and ranking journals

Journal metrics play a large role in the academic career advancement and funding process. While it is universally acknowledged that the best way to evaluate the work of a researcher is by building a deep understanding of that work and its context in the field, in practice, this is simply not possible to achieve at any sort of scale. Instead we look for numerical indicators of research ‘impact’, a loosely defined concept that varies from field to field.

Scale is an important factor in the use of journal metrics. When a tenure track position or grant funding is offered, the resulting stack of applications can be daunting. Reading a single paper from each applicant would be a full-time job, let alone building a deep appreciation for their body of work as it relates to the big picture. Evaluation is often done by those without domain-specific knowledge. Administrators, grant officers, and librarians cannot be expected to analyse high-level research. Researchers are often asked to serve on search committees for departments different from their own.

Metrics are essentially a shortcut meant to alleviate these problems of scale and expertise, quick methodologies meant to give one a handle on the quality of work done by an individual or described in an article. At best, these should be seen as approximations, starting points for building that deeper knowledge, but unfortunately, the use of journal metrics has taken on something of a life of its own, and the means are now frequently mistaken for the ends.

When we use a metric, we need to be careful that we really understand what’s being measured and what it’s telling us. While metrics are valuable and can provide useful information, each metric has its own flaws and biases. A measurement like the Impact Factor is performed at a journal level, so the worst article in that journal has the same Impact Factor as the best. The h-index, as another example, favours older researchers over younger ones. We must take great care to ensure that the stories we are telling with metrics are accurate.

And perhaps most importantly, we must understand that we are asking qualitative questions: is this work any good; is this discovery important; does this researcher make original and significant contributions? As scientists, we strive for objectivity, but is that possible to achieve when asking for a subjective opinion about someone’s work?
We live in the era of Google, where much of our lives is algorithmically processed and numerically ranked. But we should not lose sight of the value of human judgement and the role it inevitably must play in these sorts of decisions. Turning everything over to the algorithms and formulae is an abdication of responsibility.

In subsequent articles, we will dig into the Impact Factor in depth, how does it work and what are its flaws; we will look at other journal metrics and what they can tell us; and see what can be learned from ‘Altmetrics’, which measure attention and interest, rather than quality.

The Impact Factor

David Crotty PhD continues the discussion of Journal Metrics with the Impact Factor, a journal-level metric

The Impact Factor (IF, also frequently referred to as the Journal Impact Factor, or JIF) was created in the early 1960s by Eugene Garfield (Garfield, E. 2006. The History and Meaning of the Journal Impact Factor, JAMA, vol. 295, Issue 1, pp 90–93) as a tool for evaluating journals, namely to help librarians make informed subscription decisions. Used in that context, it is an effective, if flawed metric.

Unfortunately, over the years the IF has become widely misused as the one metric through which many research assessments are judged. It is worth looking at the IF, understanding how it is generated and what flaws it presents.

The Impact Factor is a ratio based on citation.

\[
\text{The number of citations in year } X \text{ to articles published in a journal in years } X - 1 \text{ and } X - 2
\]

\[
\text{The number of articles published in that journal in years } X - 1 \text{ and } X - 2
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To determine it, you take the number of citations seen in a given year to articles published in the 2 previous years and divide that by the total number of articles that were published in those 2 previous years. So, for example, the most recent IF is the 2016 IF which is, citations in 2016 to articles published in 2015 and 2014 divided by the total number of articles published in the journal in 2015 and 2014. The denominator only includes research articles and review articles—publications such as editorials and book reviews are excluded (although any citations to those types of articles are still included in the numerator).

The IF is a citation metric, and it assumes that citations are a reasonable indicator for the quality of the work described. Citation is a very good measure in many ways—generally a citation means that this new work could not have been done without the cited work. A citation is a sign that one’s research has inspired further research. However, relying solely on citations can limit our concept of research impact.

Driving subsequent research is valuable, but it’s not the only reason we do research. The ultimate goal is to benefit society, to broaden our knowledge and improve our lives. Citation can only show us part of that picture, and only for particular kinds of research impact. Take for example papers describing a new clinical practice. These kinds of papers are often poorly cited, but usually widely read. One paper can change the way millions of patients are cared for, but you can’t see that from the citation record because practitioners are caring for patients, not writing subsequent papers.

Because it was designed to measure the performance of journals, the IF is deliberately a journal-level metric. The worst article in a journal has the same IF as the best article in that same journal. That makes it a problematic tool to look at the work described in one article or by one particular author.

The IF has other well-documented problems. First, citation is a slow process. The current IF we use looks at where the journal was 2 years ago, rather than where it is now. And by limiting it to those 2 years, you may be missing out on the true impact of some papers. Sometimes the importance of a paper won’t be realized until 5 or 10 years after it’s published. Any citation that falls outside of that 2-year window doesn’t count.

Review articles are almost always cited at higher rates than articles presenting new data. Many research articles start with an introduction, a summary about the state of the field, and rather than write out all the details, they instead cite a recent review article. That leads to many citations for a good review article. Because of this, review journals tend to dominate the top of each IF category, even though they are not directly presenting new and impactful research.

Another problem is that the IF for a journal can also be greatly swayed by a small number of highly cited articles. One article in the journal Acta Crystallographica Section A was cited more than 6000 times. This boosted the journal’s IF in 1 year from 2.051 to 49.926, higher than Science or Nature. The next most cited article in the journal was cited 28 times. As soon as that one article stopped counting, the IF dropped back down to around 2.

Different fields publish at different volumes, and have different citation behaviours, making it impossible to meaningfully compare a sociology journal’s IF with a neuroscience journal’s IF.

The IF is imperfect, but to be fair, every metric has its flaws. An understanding of what’s being measured and any inherent biases is necessary to use any metric effectively. The IF is indeed useful for some purposes, generally for getting a sense of journal performance and reputation, but it is not a good metric for measuring the impact of an individual article or an individual researcher. There is no single metric that effectively captures every aspect of research impact, and perhaps