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EDITORIAL

Impact Factors and the Law of Unintended Consequences

At the last annual meeting of the International Academy of Nursing Editors, held in July, Dr. Margaret Freda reported on progress made in getting the Institute for Scientific Information (ISI) to include more nursing journals in its rankings. At the moment, CINAHL lists 547 nursing journals, only 39 of which are ranked by the ISI, and these generally have low impact factors.

Does this mean that nursing research journals have relatively little impact, influence, or importance? Does it mean that journals not selected by the ISI are of such poor quality they do not even merit ranking? What does all of this say about the "impact" of nursing research on other researchers and on clinicians, educators, administrators, policy-makers, and decision-makers? Why are the editors of nursing journals clamouring to have impact factor assigned to their publications, given that they will be at a distinct disadvantage and will be relegated to the lowest rungs? And why is there reason for concern here?

One cannot address these questions without some understanding of the history of impact factor, what these scores really mean, and how the scores are affecting scholarship in nursing.

The Impact Factor and Its Impact

In the 1950s Eugene Garfield was looking for an objective way to measure the contributions of scholarly papers in the natural, medical, and biomedical sciences. In his search, he came across Bradford's Law. Samuel C. Bradford had observed, in 1934, that a few core publications in science were contributing a disproportionate share of the articles that had the greatest impact on the field (http://en.wikipedia.org/wiki/bradford's_law). Once these core journals have been identified, extending library searches to other publications in order to track down changes in our understanding of a phenomenon yields exponentially diminishing returns (Bradford's Law). Inspired by Bradford's Law and the need for a tool to assist librarians in the selection of journals, Garfield set out to identify the "core" biomedical and medical journals — those with the greatest

impact. He co-founded the ISI, now a Thomson company, to carry out this work.

The ISI calculates an impact factor for each journal that it has chosen to rank. The calculation is based on the number of times that articles appearing in the journal are cited by the other journals in the ISI's databases over a 2-year period, in relation to the indexed journal's total number of eligible articles. An impact factor of 1 implies that the journal's articles tend to be cited once (among our colleagues in the hard[er] sciences, it is considered less than ideal to publish in journals with an impact factor below 5). With the ISI formula, a journal's impact factor can be influenced by one or two articles being very extensively cited, even if the majority are never cited at all. The editors of *Nature* report that 89% of that prestigious journal's impact factor is attributable to 25% of its articles ("Not-so-deep impact," 2005). Impact factor can be very sensitive to the types of articles a journal publishes. Not surprisingly, articles that review the literature on a particular topic are among the heavily cited ones, because authors use them extensively to establish the foundations of their research projects. A high or low number of reviews in a journal can easily skew the journal's impact factor.

Even the very idea of counting citations can be critiqued. It is noteworthy that impact factor calculations do not screen out inaccurate or inappropriate citations, although it is well known that cited articles do not necessarily address or support the point that an author is making. Nor does impact factor distinguish between favourable and unfavourable citations (in an area of active research, it is possible for one's work to be repeatedly cited as flawed in one or more respects) (Manske, 2004).

It must also be borne in mind that citation patterns vary by discipline and specialties within disciplines. Journals in "fast moving" fields like genetics and cancer research, where the most newsworthy findings with broad appeal are reported in a handful of large-circulation publications, tend to have high impact factors. This is because, in many fields, articles — with the exception of those that become classics for one reason or another — are cited most heavily within the first 2 years of publication, after which the odds of their ever being referenced fall steadily. Indeed, the formulae for computing impact factors militate against even the most established and widely read nursing journals, which tend to have relatively small subscription bases and among which it can take years for an idea or theme to be picked up by other authors. So even if nursing journals were to pool their resources in order to develop their own impact factors specific to the discipline (thereby jumping the ISI's long queue — thousands of journals are waiting to be evaluated), the basic method of calculating impact factor would always result in low scores for most if not all of the journals specific to our field. But why is this important?

The Fallout

Publish or perish — the imperative for researchers, particularly those in academic settings, to disseminate their work in print as often as possible — has become a cliché. The stakes have been raised. All but the most naïve readers of academic CVs know that some journals are much less discriminating than others in what they choose to publish. So an increasing number of universities care about not only the number of publications a scholar has to his or her credit, but also the prestige or selectivity of the journals in which the scholar's work appears. It is difficult to obtain an "objective" (often mistakenly equated with "fair") measure of prestige as interpreted by reviewers who may not be familiar with the pecking order of journals within various fields (or within specialties and subspecialties). Not surprisingly, skilful marketing has resulted in the widespread adoption, both formal and informal, of the ISI's impact factors in the criteria for merit raises, as well as for tenure and promotion decisions. Impact factors are also used by research funding agencies to weigh the scholarly productivity of grant applicants.

However, the impact factor was never intended as a measure of the quality of an individual researcher's work. It is widely assumed that if a scholar publishes in high-impact journals, then his or her work must be of superior quality. Remember, the impact factor concerns the impact of the journal, *not* an individual article. It is also argued that high-impact journals publish only high-quality articles. Porta, Copete, Fernandez, Alguacil, and Murillo (2003) report that 85% of citations of journal articles make up only about 15% of the articles that actually appear. Even if one accepts frequency of citation as a valid indicator of a scholar's contribution, 85% of the articles in "high impact" journals are, to some degree, part of a spillover, or halo, effect.

Practically speaking, career survival in some universities means publishing in the highest-impact journals possible. Increasingly, authors are telling editors that, regardless of where the logical scholarly "home" of their work might be, they cannot afford to submit their work to journals that lack high-impact factor. Thus nursing journals are fighting an uphill battle to publish at the cutting edge of the field. The end result is that if we continue to accept and integrate the impact factor, we will be encouraging our finest researchers to shape their studies and their findings for publication outside our field, such as in medical journals. The impact factor ratings of the most widely read general medical journals, such as the *Journal of the American Medical Association* and the *New England Journal of Medicine,* are 30 and higher. Many smaller journals of high scientific quality are important and influential among relatively small audiences yet will never achieve high impact factors. These journals may

not survive in the long run unless someone speaks up, since libraries with tight periodical budgets may feel increasing pressure to drop them.

If we fail to think seriously about why we want to institutionalize the impact factor in our field, given the limited number of "slots" in high-impact journals, nursing scholarship may sink deeper and deeper into Darwinian selection. "Unfit" subject matter, "unfit" journals, and "unfit" scholars will fall away (not necessarily in that order). We may unwittingly censor ideas and approaches, because the priorities and emphases of most biomedical journals may be very different from those of nursing journals. In many settings, the "ideal" nurse academic is becoming one who achieves a favourable profile on a host of indices set by those outside of nursing. Whether we like it or not, this individual is quickly becoming one who does not publish in the nursing literature. If we continue to tell nurse scholars that publication in nursing is next to pointless (as it will most often be in a journal with a small impact factor or even no impact factor at all), many may withdraw from publishing and academic life altogether. This would impoverish our discipline immensely, and if it comes to pass we will have only ourselves — not the ISI or the impact factor — to blame.

Where to Next?

It is generally recognized that we do need criteria for assessing the importance of researchers' work. We must ask whether the impact factors of the journals in which nursing scholars publish are necessarily the best measure of the quality of scholarly output. Fortunately, the use of the impact factor, even in medicine, is being questioned. Many believe that the ISI and impact factors are exerting undue influence on the direction of the scientific enterprise (Monastersky, 2005). Many excellent articles have identified the distortions and misuses of impact factors (e.g., Cameron, 2005). Even Eugene Garfield has lamented the misuse of his system (Garfield, 1996). Yet misunderstandings about the meaning of impact factors persist even at the highest reaches of academic nursing and medicine.

Much responsibility lies with academic leaders who use impact factor data in their decisions and who are called upon to explain the nature of scholarship in our field to non-nurses. Impact factors for nursing journals must be interpreted within and outside the field, in proper context and in a way that does not denigrate the scholarship of the many nurses whose work has met with limited success in "crossing over" into high-impact biomedical journals.

We hasten to say that the impact factors of nursing journals make some sobering comments about the rarity of cumulative knowledge

building in nursing. But solutions to this deeper problem will not be found by adopting arbitrary yardsticks that do not reflect the realities of nursing research and scholarship.

Several alternatives or adjuncts to the impact factor have been suggested. One of these is the Faculty of 1000 (http://facultyof1000.com) model that has been developed in biology and medicine. It shifts the focus from the journal to the individual paper, with articles that have had the most impact on a field being judged by the foremost scholars in that field. These and other approaches, such as examining the impact that articles have had on practice by determining whether they have been included in practice guidelines, certainly have their strengths and limitations. Fair assessment of any scholar's work hinges on one's actually reading the work and seeking out information that might situate it with respect to the work of his or her peers and with respect to its effects on research, practice, and policy. A combination of approaches will be much fairer and will lead to better decisions by those assessing a scientist's body of work than a reliance on an index like the impact factor, which often fails to tell much of the "real story."

Surely impact on science encompasses more than just the venues in the periodical literature where articles land, and surely the contribution of nursing scholarship extends beyond a work's influence on other publications — to include direct and indirect influences on the quality of health care. Nursing has an opportunity to lead by developing and testing new ways of assessing impact and influence, as an alternative to blindly following disciplines that, for a variety of reasons, have unquestioningly adopted the impact factor to the exclusion of other measures and considerations. Let us hope that researchers and leaders in academic nursing take up this challenge — and quickly.

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