

EDITORIAL**Counting the publications that count**

Many chapters and reviews have outlined the evolution and influences on pediatric liver transplantation over the last 4-5 decades starting with the early cases of Dr. Starzl, now sadly departed. There tends to be a great deal of subjectivity in the specific recollections of the evolutionary influences within the field of pediatric liver transplantation. One's particular perspective is affected by where you trained; in which center, in which country, who your mentors were, whether you are a surgeon or pediatrician. One way to make such an assessment more objectively is to see who is publishing in the field and what previous publications have influenced the thinking of these authors by analyzing what and who they use as references. This, in essence, is what McDowell et al.¹ have done in the paper published in this edition of *Pediatric Transplantation*. Most of us are familiar with the concept of "citation index" or "impact factor" as it applies to the reputation of a journal or the assessment of productivity of an individual, but what we are less familiar with is the whole range of descriptive and statistical methods that collectively are known as *Bibliometrics*. Bibliometric analysis can identify the major influences in academic publishing within a given specialty and, to date, these techniques have been applied to a wide array of topics ranging from aromatherapy to cardiac surgery.^{2,3} What all of these have in common is that they demonstrate a massive increase in publications in all fields over recent years (including bibliometric analysis itself; see Figure 1) and a greater number of citations for more recent publications. Many also show that, somewhat counter to intuition, the most commonly cited papers are not the research articles describing clinical and basic science studies, but first descriptions of clinical phenotypes, clinical tools (such as prognostic scores), new surgical techniques, and collaborative experiences; this is no different in the current article.

The aim of the paper was "to identify the highly cited articles in pediatric liver transplantation, explore the characteristics of these seminal papers and the quality of the journal where they are found." So what do McDowell and colleagues show us? They examined publications related to pediatric liver transplantation listed in the Scopus[®] database from 1945 and 2014 and identified almost 3000 papers published after 1969. From this, the 50 most cited papers were identified. They listed and ranked the papers by publishing journal, country of origin, author and article type (ie, case reports or series, surgical technique, clinical tools, etc.) The quality of the journals publishing these 50 titles was assessed using a comprehensive set of citation-based metrics. The relationships between authors in the top cited articles are examined graphically using the VOSviewer techniques, a freely available computer program that focuses on bibliometric mapping images.⁴

Overall this paper reveals that pediatric liver transplantation has produced oft-cited articles that demonstrate innovations in clinical experience. An alternative conclusion may be that there exist only a

limited number of properly conducted trials in pediatric liver transplantation, except that analysis of publications in other areas of medicine with greater track records of research has similar findings. The papers were published in a range of journals covering pediatrics, transplantation, and high-profile general journals. The acceleration in the number of publications over time, the predominance of English speaking countries, and English language publications are all in line with similar analyses across many field of academia. The seven countries publishing the majority of top 50 papers (namely USA, France, UK, Japan, Belgium, Canada, and Italy) aligns with what I suspect is the gestalt for most who are familiar with pediatric transplantation. The surge of top cited papers in the late 1980s and early 1990s correlates to some extent with innovations such as reduced size and split liver allografts, living donor liver transplantation, the introduction of tacrolimus, and the change of organ allocation policy in the United States to the MELD/PELD system, which all emerged during these years. The graphical representations of co-authorship nicely demonstrated nodes of influence and productivity such as the groups from Chicago, Los Angeles, and Belgium. It also demonstrates to some extent the effect of collaborations and I would suggest that one grouping clearly represents the output from SPLIT (Studies in Pediatric Liver Transplantation).

Despite the sophisticated methodologies available for bibliometric analysis, there are substantial biases that cannot be easily overcome when interpreting the outputs. These include, but are not limited to:

- In-house and self-citation bias
- Language bias
- Nationality bias—for example, it has been demonstrated that authors are more likely to quote publications from their own countries⁵
- Era bias—more recent publications are easier to find online and easier to include in reference managers
- Age of author bias—older authors more likely to be cited
- Journal bias
- Omission bias—intentionally not quoting a competitors work

Analysis of citations actually identifies publications that have come to the notice of those who publish and maybe biased by those who publish most prolifically; citations by a famed author may influence others to use the same references. Although it has been argued that there are many reasons for citing a publication and not all of them are because the paper is thought to be useful, it is probably fair to assume the most frequently cited articles do have intrinsic value. The top 50 list may make a good basis of articles for our trainees to read. The clear effect of co-authorship also suggests that if a trainee or junior faculty wishes to develop a reputation for publishing influential papers they can do no better than identify a mentor with that exact track record.

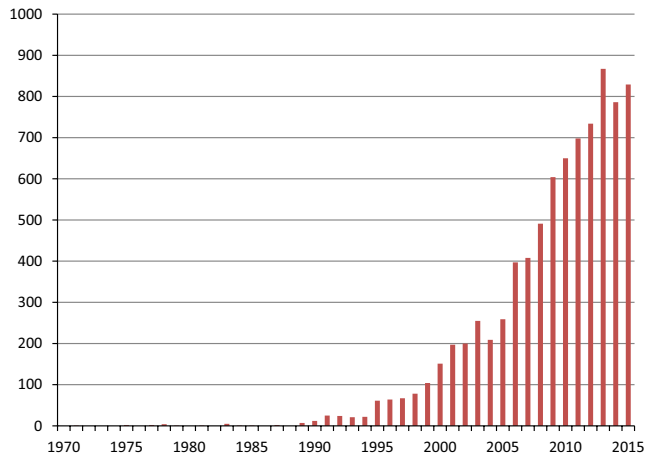


FIGURE 1 Number of publications listed on PubMed by year using the search term <Bibliometric analysis>

This paper shows conclusively the empiric nature of knowledge acquisition in the field of pediatric liver transplantation. Few well controlled trials have been carried out in the field yet enormous progress has been made over the relatively short period of the last few decades. While we as a community should continue to strive for good science and carefully controlled trials to guide future advances, we must not be embarrassed to continue to report clinical innovation and experience. This and other bibliometric analyses

show that these types of publications can be highly influential. Taken as a whole, the analysis by McDowell et al. does demonstrate the evolution of our field from the very edge of clinical innovation to what is now a mature technology that is making a huge difference every day to the lives of so many patients and families around the world.

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