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EDITORIAL

Open access publishing is a logical evolutionary extension of evidence-based medicine

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Approximately 20 years ago, evidence based medicine emerged as a novel approach to teaching medicine, and was coined by the originators as a paradigm change (EBMWG, 1992). The core idea at the time was to educate the next generation of physicians how to use best research evidence in taking care of patients. The teaching model gained rapidly momentum internationally and within all health care professions, principally because it is difficult to disagree with the axiom that translating good evidence into good clinical decisions is likely to do more good than harm for patients. However, even from its inception several very competent individuals questioned how it was possible to judge some research evidence as "best" and inversely as "inadequate" (Polychronis et al., 1996). Also underscored was the realities of widespread grey zones of clinical practice because of lack of good evidence (Naylor, 1995), and the benefits of rational clinical reasoning based on experience and understanding of pathophysiological mechanisms (Feinstein & Horwitz, 1997). Since then, disputes have raged amongst academicians, clinicians and other stakeholders. Worse, the debates do not seem to abate, likely because scientism seems to play a role, as opposed to the situation that "*Medicine is a science of uncertainty and an art of probability*", a quotation attributed to the Canadian physician William Osler more than a century ago but still very much relevant today. Incidentally, the same individual made numerous insightful statements, and many are directly relevant to today's debates. Another passage ascribed to Osler is the slightly more provocative statement: "*Common sense in matters medical is rare, and is usually in inverse ratio to the degree of education*" (https://en.wikiquote.org/wiki/William_Osler).

One of the biggest misunderstandings in these debates appears to be a belief that research resulting from one particular study methodology of research trumps the strength of evidence obtained from all other alternative study methodologies. It is unclear why so many debate contestants hold this view. One may speculate that there appears to a resemblance with the widespread misconstruction in judging risks. Stated in other words, relatively few can interpret abstractions such as probabilistic estimates correctly. Probability rationalization based on observations is the core of any scientific paper. To promulgate that only results obtained in randomized controlled trials (RCTs) can be trusted, in contrast to any other non-RCT research designs is a fallacy based on a failure to understand and apply fundamental mathematical reasoning. Other statistical constructs like level of study power, likelihood of systematic and random errors and sizes of confidence intervals are equally or perhaps even more important with regard to probabilistic thinking and logics of scientific reasoning.

In essence, an RCT is "a dumb" study design, because only one simple objective can be addressed, which is whether the intervention titled "experimental" is likely not better than the intervention titled "control". An RCT can provide nothing more and nothing less, and results can be subverted by choices of inappropriate "control intervention" or surrogate outcomes. Moreover, dependent on the randomization, allocation, blinding, possible collinearity amongst variables in combination with a range of biases, the inherent risks of type I – alfa and type II - beta errors are always latent. Within my own field of dental research, i.e., prosthodontics and implant dentistry, it has been recognized that a substantial number of published RCTs have a high risk of bias (Esposito et al., 2001; Jokstad et al., 2002), and the phenomenon appears not to have disappeared 15 years later (Papageorgiou et al., 2015). Not everything that glitters in the scientific publishing world is necessarily RCTs, and not all

RCTs glitter. When the journal Evidence-Based Dentistry was introduced in 1998, I had the privilege to write a short editorial in the inaugural issue (Jokstad, 1998). The synopsis next to my title was "*Evidence-based dentistry is much more than randomized, controlled trials*". I still uphold this argument, and I believe that it is important that everyone recognize that the difference between strong and weak evidence is not simply a question of data from RCT versus from non-RCT studies.

Another aspect to the new approach to teaching medicine meant that our patients are empowered far more today than before to influence the choice of the most "personalized" diagnostic and therapeutic interventions. This is a good thing. A premise, however, is that the individual patient and their advocates have the possibility to access the same clinical research data as the health care providers, as a basis for treatment decisions. Restricting this information in subscription journals is an artificial barrier, while open access journals that include enhanced html format articles with hyperlinked references enable everyone to explore medical research in context. Of course, obfuscated writing in general, as well as occasional special technical terms may be an impediment for laypersons, although most scientific journals, including Clinical Experimental Dental Research require that authors' adhere to the use of ICD disease codes, ISO nomenclature for all measurements and a correct statistical terminology reflecting accurately executed, properly interpreted and suitably presented data.

I believe that our patients and other stakeholders should be empowered to explore the scientific basis for treatment decisions made by health care professionals in society. A logical premise is that this research is accessible in scientific journals that follow a policy of open access, such as Clinical Experimental Dental Research. From this perspective, open access publishing is a logical evolutionary extension of evidence-based medicine.

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