Communicating useful information in the era of big data

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This month we span physiology to psychology in an effort to look closely at the subject of communicating strategies as deployed across ARTs. We live in a world of data overload. Facile to gather, the rapid migration to press in an expanding array of traditional journals, media devices, and avenues yet to arrive for disseminating processed data is the reality of the times. Is there a finite capacity somewhere in the depths of super computers for depositing all this new information? Probably not. And more importantly, how will essential new knowledge shaping care and management of fertility in patients be differentiated from bulk information flooding the fields of reproductive biology and medicine?

Well before the era of *omics*, the scientific literature resided in a place that you went to process published information. It was called a library. Long gone are the days when academic dinosaurs like myself took to the depths of a library with a stack of index cards in tow spending hours scanning journals of interest, selecting (and reading) articles, and summarizing contents including authors, titles, volume and page numbers. Afterall, when it was time to publish, it was expected that you would dutifully cite the literature upon which your own quest for new knowledge was based relying upon the data on those index cards collated into the reference list-yes typed! Doing science back then was a creative and gratifying exercise aimed at the betterment of society, and was well-served by the ivory towers of academia. The new knowledge obtained was believable and useful as it passed through the peer review system of reputable journals whose editors took pride in the validity and integrity of what they would publish.

Fast forward to a world where communicating essential evidence has been transformed into a three ring circus. Setting standards of care can and should rely upon our pyramidal evidence base and yes there are good reasons to believe that the ongoing

criticisms being levied on the evidence-based medicine paradigm are justified to a certain extent. And signs of a diminishing sense of responsibility are showing up everywhere in medicine, not just our own discipline. In fact, failing to disclose trial results, as mandated by the NIH and FDA in the 2017 rule, was found to be a pervasive and prominent measure of abuse in the 4700 trials registered at [ClinicalTrials.gov](https://clinicaltrials.gov) analyzed recently by Science (Piller, C. 2020 Transparency on trial. Science 367:240–243). A deeper look at the data demonstrated a clear lack of respect for the trial deadline dates, again making one wonder about the so-called transparency incentive such institutions were intended to achieve. Good intentions accompany registering trials but follow through seems to be neglected precluding the benefits of a well designed study aimed to provide guidance for patient care.

Trends in the direction of corrective behaviors from organizations like the NIH were evident when the whistleblower mentality took form in the 1980s and 1990s. Commensurate with increased NIH funding placed academic beneficiaries in the role of investigator whenever a suspected case of misconduct was brought to their attention. The forces challenging basic integrity in our national research enterprise were complex and efforts to identify and mitigate such trends were few and far between. In our field, one person took up the challenge-Ken Ryan [1, 2]. And while reproductive medicine stood in the shadows of so many disciplines from which the dark side of dealing with misconduct flourished, his efforts alone brought the specter of ethical conduct in ARTs to the drawing board. There are lessons to be learned from these early days on how to recognize and handle incidents of misconduct [3], but truth be told, our field continues to struggle with matters of scientific integrity at the interface of discovery and patient care.

One telling example is the matter of conflicts of interest (COIs). One need not go beyond the editorial offices of our major journals to appreciate just how prevalent COIs are and the challenges attendant with their detection and management in the everyday practice of scientific publishing. Flaws in our system for handling these and related matters (e.g. plagiarism) evoke consternation that continues to distort our image of

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what responsible conduct in biomedical research means [4]. This is especially apparent in human ARTs where “business is booming”.

(<https://www.economist.com/business/2019/08/08/the-fertility-business-is-booming>).

Closer to home, we draw our readership’s attention this month to the systematic review. Glujovsky and colleagues take a snapshot view of how for five journals in the field of reproductive medicine deal with an essential dimension of this guiding principle (*Quality of evidence matters: is it well reported and interpreted in infertility journals?;-https://doi.org/10.1007/s10815-019-01663*). The findings will not surprise most who remain concerned about our efforts to bring evidence-based medicine into the arena of human reproduction.

And while the systematic review remains an important tool to convey “truthiness” of data published in respected journals, the era of big data is bringing to light just how superficial our mounting genetic evidence may be when relating offspring health to risks associated with maternal health conditions [5]. And given the repeated suggestions that some forms of ARTs may contribute to autism spectrum disorders in offspring, the recent study by Breuss et al., draws attention to the future landscape of risk assessment focused on genetic

plasticity in the earliest stages of human development [6]. These kinds of studies portend a future where communicating useful information will transcend the biomedical research enterprise in form and function, leaving the message in the end to intelligence of an artificial variety-for better or worse.

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