Rapprochement: The Sensible Approach to Scientific and Medical Misinformation

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April 4, 2023

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Historical Precedents

Current discourse on COVID-19 has created a massive schism of opinions within the scientific and medical community. Such an occurrence is not new. In the 19th century, Semmelweis was abandoned by his medical colleagues for promoting handwashing, now considered a fundamental basis of infection control. In the 20th century, Drs. Marshall and Warren were denied publication of their findings concerning the bacteriological etiology of gastric ulcers, but later in 2005 were awarded the Nobel Prize in Physiology or Medicine. More recently, the historical frequency of performing tonsillectomies has been dramatically reduced due to a reassessment of the immunological role tonsils play in preventing infection and by the adoption of stricter criteria governing their removal. In addition, the importance of the appendix attached to the large colon, once considered expendable, is only now recognized as an important organ for the replenishment of the natural flora in the gut following diarrhea. These examples attest to the evolving nature of all theories relating to the biomedical sciences.

Health Care Inadequacies

A 1990 report by the US National Institute of Health concluded that only 21% of treatment was firmly based on research generated scientific evidence, which might account for the seemingly indecisive and fluctuating nature of medical care (1). Indeed, a 1991 British Medical Journal article suggested that "…only about 15% of medical interventions are supported by solid scientific findings" (1). On hearing this, a radio host reportedly commented that this "would put 80-90% of accepted medical procedures in the country under the heading of quackery" (1).

The exact level of evidence-based care is not known, however in 2022 an exhaustive large-scale study of medical interventions appearing in the *Journal of Clinical Epidemiology* concluded that 94% of such treatments were not supported by high quality evidence (2). A major reason for this is the way biomedical science concepts are formulated and communicated as identified in this quotation from a 1994 report by the Evidence-Based Care Resource Group "…*a large amount of medical information is not supported by valid research, including some articles published in prestigious medical journals and recommendations made by leading authorities"* (3).

Hierarchical Methodology

Health care authorities and experts have a lifelong influence on future generations of health care professionals and medical scientists. Commonly, those teachers are paternalistic and even autocratic figures who, with their credentials and egotistical attitudes, communicate personal opinions and experiences to students via lectures, laboratory exercises, clinical rounds, and examinations. This transfer of knowledge is often accomplished in a mystical aura of esotericism and idolization pervaded by covert and sometimes overt intimidation. It is, especially in clinical disciplines, a closed system which stifles debate and constructive criticism from students deemed

by their status to lack the intellectual capabilities of those in command. Stagnating due to an absence of fresh knowledge or creative input, this hierarchical system produces graduates and the next generation of potential experts who perpetuate the attitudes, behaviors, biases, and skills of their teachers. In turn, this closed rigid system creates a dogmatic - even arrogant - approach to the delivery of health care, which leads to the entrenchment of the status quo. In such an unyielding environment, it should be no surprise that the dissenting voices of Semmelweis, Marshall and Warren were not only ignored but ridiculed for their seemingly misinformed opinions.

The hierarchical way in which science is taught extends into how it is practiced. No longer does the lonely absent minded professor toil away among beakers and test tubes hoping for that "Eureka" moment. Since the mid 1950s, scientific research is conducted within bureaucratic fiefdoms whose prime purpose is to remain operational at all costs. This necessitates a perpetual demand for funding that is far from an altruistic exercise. Guaranteeing a cash flow requires ambition, persuasion, an essence of guile and the very practical realization that anything out of the ordinary is unlikely to receive financial support. When funding assistance comes from political organizations or business conglomerates, there are often strings attached. Compromising on what is most liable to be funded becomes the norm rather than the exception and is inevitably accompanied by conflicts of interest. It is highly likely that appeasing to the demands of funding agencies has curtailed many truly innovative research projects in favour of conformity with prevailing dogma and political priorities.

Biomedical scientists operating under such restraints tend to simply add to what knowledge currently exists. The system discourages the introduction of revolutionary theories or heterodox doctrines worthy of intellectual sparring. The bureaucratization of science has imparted an indelible quality to the concept of quackery, while ensuring that the shouter of "Eureka" will be vilified as a mad, misinformed professor.

Peer Review-Challenges to Objectivity

There is a perception that the process of "Peer Review" will filter out misinformation. The common understanding of peer review is that it improves or enhances the quality of a paper and assists a journal editor in accepting it for publication. However, Dr. R. Smith, former editor of the *British Medical Journal* considered it a "*flawed process, full of easily identified defects with little known evidence that it works*" (4). This view was shared by Sir T. Fox editor from 1944 to 1964 of the *Lancet,* which had achieved its status as a preeminent medical journal long before it introduced peer review in 1976 (4).

To emphasize these concerns, a 1997 *British Medical Journal* article concluded, "*The problem with peer review is that we have good evidence on its deficiencies and poor evidence on its benefits. We know that it is expensive, slow, prone to bias, open to abuse, possible anti-innovatory, and unable to detect fraud. We also know that the published papers that emerge*

from the process are grossly deficient" (5). This should not be a surprise since a 2007 study of 306 experienced reviewers confirmed that "*there are no easily identifiable types of training or experience that predict reviewer performance. Skill in scientific peer review may be as ill-defined and hard to impart as common sense"* (6). A 2007 Cochrane Data Base of Systemic Reviews review found little evidence to support the efficacy of editorial peer review (7).

Despite its assumed role as an arbiter of "good "science, there is no governing body that defines what is acceptable peer review or which demands that certain standards be followed. Consequently, journal editors have considerable latitude as to what they believe constitutes appropriate peer review and apply to that decision the same human foibles, prejudices, jealousies, and biases of their reviewers.

Historical records indicate that in 1731 the Royal College of Edinburgh might have been the first authoritative body to recognize the potential value of peer review, but it did so with the disclaimer that peer review did not guarantee accuracy, truthfulness or even that accepted papers were better than non-peer reviewed ones (8). Almost 300 hundred years later, those prophetic thoughts were confirmed by Ioannidis in his 2005 seminal paper, "Why most published research findings are false" (9). Ioannidis' pronouncement was further substantiated by Doleman, who in 2019 answered the question, "Why most published meta-analysis findings are false (10).

The challenge facing the peer review process is to prove, in a transparent and objective manner, that it always rejects irrelevant, misleading, trivial, and weak papers, improves the accuracy, clarity and usefulness of accepted papers, and that it encourages advancements in patient care through innovative ideas free of prevailing biases. Until these outcomes occur, the much-vaunted peer review process does not separate the chaff from the wheat. Rather, it seeds the medical and scientific literature with misinformation.

Scientific Democracy

Carl Sagan said, "*Science requires an almost complete openness to all ideas. On the other hand, it requires a most rigorous and uncompromising skepticism*." Therefore, making sense of the misinformation that is scattered throughout the biomedical sciences, necessitates establishing what might be relatively reliable facts and realizing that previously held convictions might be no longer tenable.

This means accepting that the opinions of others might have some validity and that when confronted with new data and information maintaining the righteousness of personal opinions verges on arrogance. It means not rejecting outright any conclusion that is contrary to a firmly held belief. It means being self critical rather than automatically discrediting the opposition. It means recognising the biases inherent in characterizing any statement, conclusion, or advice as

misinformation. Finally, it means having the humility to accept that no person nor authority has the knowledge and intelligence to be 100% infallible on every issue.

Justice Archie Campbell, author of Canada's SARS Commission Final Report, said "*Yesterday's scientific dogma is today's discarded fable"* (11). The pervasive nature of misinformation is perpetuating that belief. Overcoming divisiveness will require opposing protagonists to dispense with their self-aggrandizing postures and through constructive discussions, work together to clarify misunderstandings and ambiguities resulting in an agreement on what are reasonably reliable facts that will, inevitably, be subjected to the transient nature of all scientific knowledge. Such a rapprochement will mitigate the contagion that is misinformation and enhance patient care - the only goal of the biomedical sciences.

An independently sponsored and adjudicated national conference on misinformation could be the catalyst for such a detente.

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