Scientific fraud in physiotherapy: prevention is better than cure

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A recent case of alleged scientific fraud has shaken the foundations of pain medicine (Weinstein and Armstrong 2009). Dr Scott Reuben, prominent Massachusetts anaesthetist, is under investigation for fabricating data that claimed to show benefits from analgesics such as Vioxx and Celebrex. Consequently, over 21 of his publications have been retracted by medical journals (Schafer 2009). The impact is far-reaching because anaesthetists around the world have based medical decisions about perioperative pain management on Dr Reuben’s research.

Scientific fraud is fabrication, falsification, or plagiarism in the conduct of research. The US National Science Foundation provides the following definitions of each: ‘fabrication’ is making up results and recording or reporting them; ‘falsification’ is manipulating research materials, equipment, or processes or changing or omitting data or results such that the research is not accurately represented in the research record; ‘plagiarism’ is the appropriation of another person’s ideas, processes, results, or words without giving appropriate credit’ (Fischer (ND) p. 2).

There is a spectrum of seriousness of scientific fraud. The most serious fraud involves fabrication of entire data sets. Serious fraud is probably rare. Less serious fraud, such as the fraud that occurs when researchers misrepresent data (eg, by failing to disclose or emphasise appropriately data that are inconsistent with reported findings), may be more widespread, though this is difficult to verify.

The consequences of scientific fraud are grave. When fraud is detected the career of the individual who perpetrated the fraud may be ruined and the reputation of research associates, institutions, funding bodies, journals, and regulatory agencies may be tarnished. Such intense opprobrium reflects the seriousness with which fraud is regarded by the scientific community. Fraud is almost universally considered to be morally and ethically wrong; and in health research, fraudulent research findings can lead to suboptimal health care. Furthermore, fraud undermines confidence in the research process. Lastly, fraudulent researchers obtain unfair advantage in the competitive arena of science.

We are unaware of any verifiable case of scientific fraud by a physiotherapy researcher that is as serious as the Reuben case. Nonetheless, the Reuben case should alert us to the problem. Research managers need to implement strategies to minimise the opportunity for scientific fraud. Prevention is better than cure. A range of mechanisms addressing institutional governance, research training, data management, research dissemination, and audit, can reduce the opportunity for scientific fraud.

Institutional governance: All research institutions should have a research governance framework that is consistent with international conventions, national laws, regulations, guidelines, and codes of practice governing the conduct of research.

We believe that institutions should discourage (though not prohibit) research by a single investigator. Collaboration is to be encouraged for several reasons, not the least being that it increases scrutiny of the research process and reduces opportunities for fraud.

Research training: Induction and training of research students typically includes formal instruction on topics such as discipline-specific research methods and statistical analysis. Training about good research practice and research integrity is equally important. All research degree programs, including Honours, Masters by Research and PhD programs, should involve formal education in codes of research practice.

In Australia such education is mandatory. The Australian Code for the Responsible Conduct of Research (2007) specifies that ‘All research trainees must receive training on research ethics, this Code and the research policies of the institution’ (p 15). Continuing education for all research staff should reinforce responsible and ethical conduct of research.

In addition to formal training programs, there is a need for informal training. The role of research supervisors is critical because they provide powerful role models and they are well placed to monitor research students’ behaviours. Research supervisors need to display ethical behaviour and employ careful data management procedures. They also have a responsibility to enforce good data management practices by students.

Data management: Fraud may be prevented if managers of research groups ensure adherence to national and institutional rules about responsible data management practices. The Australian Code for the Responsible Conduct of Research (2007) has explicit rules about management, storage, retention and ownership of data and primary materials. If these rules are followed there can be greater scrutiny of data. Each research group should establish rigorous practices that provide a clear audit trail for data management and storage.

Research dissemination: Transparency and accountability can be promoted in the research dissemination process. Researchers can display integrity in research conduct by registration and publication of trial protocols. Some scientific journals, including Australian Journal of Physiotherapy, encourage registration by publishing only trials with registered protocols (De Angelis et al 2004).

Another process that could discourage fabrication or falsification of data is for researchers to make their research data publicly available. This makes it possible for others to
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scrutinise data and it makes researchers more accountable for what they publish. *Australian Journal of Physiotherapy* has been a leader in this regard because it explicitly encourages the practice of publishing data (Herbert 2008).

**Audit:** Regular audits, perhaps of randomly selected projects, can ensure the probity of research processes and data. Audits could be conducted at the institutional or research group level. For obvious reasons they should be conducted by a person who is independent from the research.

In the past, audit has revealed scientific fraud that would otherwise have gone undetected. In the Reuben case, the first alarms were raised after a routine audit of research summaries revealed that Reuben had failed to obtain approval of the hospital’s institutional review board for two of his more recent studies.

Researchers who know that they could be asked to provide original research records may be less inclined to fabricate data, and researchers who know their published data could be compared with original research records may be less inclined to fraudulent practice.

Physiotherapy researchers have a duty to conduct research that is characterised by honesty, integrity and rigour. Senior researchers have a responsibility to oversee systems of research governance that ensure those standards are met. We owe it to our profession and our patients.

**References**


