**Title**: Bad statistics in medical research

**Abstract**: Carefully conducted medical research can transform lives by providing robust evidence for what works and what doesn’t. Unfortunately careful research is rarely rewarded, instead the volume or “prestige” of the research is what matters for researchers’ careers. This drives a search for interesting findings that are highly publishable but not robust. Publishable results are often enabled by bad statistics, with many researchers using the wrong methods or using the right methods badly. There is an absurd focus on “significant” p-values even though most researchers cannot correctly define a p-value. The situation is getting worse, as a massive increase in paper numbers is making it hard for journals to filter the good from the bad.

Statisticians should be on the frontline of improving statistical practice, but there are not enough qualified statisticians available to meet the growing demand. Automated checks of journal papers could help reduce this gap and mean that more papers receive some statistical scrutiny and more researchers get good statistical advice. Automated checking will never replace human peer review, but it can deal with huge numbers and is becoming more sophisticated in what problems it can detect.

There is an urgent need to change the conversation about statistics in medical research and bust myths around ingrained bad practice. Statisticians do not have the numbers or power to do this individually, but if we can codify our knowledge in automated checks – and embed these checks in journals – we could take back some control of our own field and create better evidence and hence better health.

**Bio**: Professor Adrian Barnett is a statistician with a degree in statistics and PhD in mathematics. He has over 21 years’ experience in analysing medical data, during which time he has worked on trials, longitudinal data, case-control studies and cohort studies. He has co-authored two statistical text books with Professor Annette Dobson, most notably a popular book on generalised linear models. He was president of the Statistical Society of Australia from 2018 to 2020. His current focus is on meta-research, which uses research to investigate research with the goal of improving research practice.