Abstract:

The Evidence-based Medicine movement seeks to recover the scientific basis of medical practice by advocating the consideration of evidence from well designed, conducted and analyzed empirical research together with clinical experience and patient values. However this pre-supposes that we have a valid way of quantifying and expressing the evidential content of our research data. Unfortunately, in the vast majority of analyses this is not the case.

The methodological confusion stems from the subtle failure to recognize that empirical research data can be analyzed to address 3 related but fundamentally different objectives – (1) quantifying the evidence of the data in support of competing hypotheses (2) quantifying subjective belief in competing hypotheses given the data (3) choosing between alternative courses of action (decision-making). Each of these objectives requires its own analysis paradigm. We argue that the most foundational of these objectives is evidence appraisal and that even if ones ultimate objective is decision making, it is necessary to at least validly evaluate the evidential content of the data using an appropriate statistical paradigm.

The dominant frequentist paradigm of statistical hypothesis testing, p-values and confidence intervals was originally developed to address decision-making objectives but has been erroneously shoe-horned into the evidence assessment role. Our presentation will illustrate the differences among the 3 data analysis objectives in the clinically familiar setting of a diagnostic consultation. We will present and justify a comprehensive definition of the concept of evidence and show by counterexamples why the frequentist paradigm is fatally flawed. An appropriate paradigm for quantifying and expressing the evidential content of research data will be introduced.

Note: This is the first of a series of presentations on quantifying and expressing the evidential content of research data.

Biography:

Edwin Chan is Head of Epidemiology at the Singapore Clinical Research Institute and an Associate Professor at the Centre of Quantitative Medicine, Office of Clinical Sciences, Duke-NUS Graduate Medical School. He has served as the Director of the Singapore Branch of the Australasian Cochrane Centre since its inception. He is a member of the Evidence-based Medicine committees of Singapore General Hospital & the National University Health System and has research interests in evidence appraisal, synthesis and decision-making and in evidence-based medicine training and education.

Dr Assam is an Assistant Professor with the Centre of Quantitative Medicine, Office of Clinical Sciences, Duke-NUS Graduate Medical School Singapore and a Biostatistician in the Singapore Branch of the Australasian Cochrane Centre. His research has focused on methods for using biomarkers as surrogates for event-time endpoints and analysis of multi-level data. His current research now includes developing computational strategies to implement likelihood based approaches for quantifying evidence in primary studies and evidence synthesis in systematic reviews.