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# Journal of Orthodontic Editorial – September 2009

## The nature of evidence

Evidence based practice challenges us to use facts to substantiate our view about the best way to treat an individual. But what is evidence? The Oxford English dictionary defines evidence as 'Ground for belief; testimony or facts tending to prove or disprove any conclusion.'[1] But how easy is it to prove that a particular treatment is the most effective?

Randomised controlled trials are often the method of choice when determining the effectiveness of orthodontic interventions. If you are asking the question 'Does bonding material B lead to fewer bracket debonds than bonding material A?'; then an RCT is the proper approach, to minimise potential problems of bias and help the clinician decide which material to use; however one trial rarely gives the definitive answer. Results are usually expressed in probabilities and confidence intervals and will inform you about what might happen in an average patient, but not in a specific individual. Researchers hope that their sample is representative of all patients. If bonding material B is found to be more effective, then someone is going to have to repeat the trial when bonding material C comes along. Also bond failure is a simple outcome to measure. What about other outcomes that we are less certain about measuring accurately, such as cephalometric outcomes that are notoriously unreliable and often of dubious validity?

Then there is the problem that we, as individual clinicians, are dealing with an individual biological being rather than a mass-produced, engineered machine. Both the biological and the individual response to treatment varies and this can often have the greatest effect on the success or otherwise of treatment. Sometimes practitioners will interpret the same evidence in different ways and sometimes they will recognise best practice in a particular area, but chose not to apply it for very good reasons. The main problem is that in many of the areas we are interested in, for example self esteem, there are no clear biological endpoints or markers. A different sort of evidence is required to investigate and interpret these data.

Some believe that data are only useful when expressed as numbers that can be compared and analysed and other forms of evidence are too nebulous and subjective. There has been a deep suspicion of qualitative approaches to gathering evidence involving individual interviews, focus groups and observations. These methods have been used for many years by social scientists, who are interested in how people interact at the individual or societal level. There is now more of an understanding of how these methods can be useful in interpreting the behaviour of our patients; however the methods used to collect qualitative data need to be just as rigorous as quantitative data collection methods.

An important difference between qualitative and quantitative approaches is that, whereas in quantitative methods efforts are made to neutralise the researcher as much as possible through randomisation and blinding, in qualitative research the idea that the influence of the research and researcher can be entirely removed from the process is questioned. Qualitative researchers are encouraged to reflect and consider their role in the research process and take it into account in the analysis data collection.

Another important difference is that qualitative researchers use theories from social science to help design their research question, interpret their data and determine what might be going on beneath the surface to help explain a particular behaviour or reaction. They recognise that there is more than one way to explain a particular phenomenon and different theories are used as 'lenses' through which to look at complex issues, helping the researcher to concentrate on a specific aspect of the data and providing an framework upon which to base their analysis.[2]

The legal concept of evidence implies that there is room for doubt over evidence, hence the need to produce and argue over the facts. I believe that there needs to be broader understanding of the meaning of the word 'evidence' in medicine and dentistry. Rarely do researchers in medicine and dentistry discuss their work from a philosophical or theoretical viewpoint.

Dental training has traditionally been very biomedical. From an early stage I expect most of us were taught what is normal in the physical sense and then we were taught the pathology of disease and how to deal with it. There was little emphasis on the effects of social and individual factors. Much of clinical practice is similar. We aim to find solutions to physical problems and treat the human as a complex machine; however we ignore the individual and their circumstances at our peril.

[1] Oxford English Dictionary. 2nd edn. Oxford: Oxford University Press. 1989
[2] Reeves S, Albert M, Kuper A, Hodges BD. Why use theories in qualitative research? Br Med J 2008; **337**:a949 doi:10.1136/bmj.a949

**Philip Benson**
**Editor-in-Chief**