The misuse of statistical evidence in UK tort law: basic mistakes made by the court when assessing epidemiological evidence to determine questions of factual causation in complicated disease litigation

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Outline of main issues (1)

- English courts believe that epidemiologists/statisticians treat evidence of a two-fold increase in risk as conclusive proof of causation. (This belief forms the basis of a new and nonsensical test for causation called the 'doubling of the risk' test (DoR))
- This belief stems in part from a judicial misinterpretation of the concept of RR>2
- There is also serious confusion over the relationship between the value of a piece of statistical evidence and the 'balance of probabilities' (BoP) standard of proof. **Belief in 51% as the magic number for proving causation using statistical evidence**
- Basic mistake to present the BoP standard of proof in numerical terms – ie as a test requiring a minimum 51% proof.

Outline of main issues (2)

- Instead the BoP should be always be described as a requirement that the court is at least marginally more convinced by the claimant's evidence than by the defendant's. Emphasises that no direct correlation with any statistical evidence submitted.
- A very serious problem is a tendency to treat any evidence expressed in numerical terms as being 'statistical' or 'epidemiological'. No enquiry into source or scientific reliability
- Further problem is the routine use of non-expert expert witnesses - assumption that clinicians are experts on statistics and epidemiology
- Potential solutions – abolish 'DoR' test, basic statistics training for lawyers, increased use of statisticians and epidemiologists as expert witnesses

Novartis v Cookson [2007] EWCA Civ 1261

- Two potential causes of C's bladder cancer – negligent occupational exposure to carcinogenic dyes and C's own smoking habit
- D's expert was an epidemiologist who specialised in the causes of bladder cancer. He opined that the levels of occupational exposure were so low that the smoking had to be regarded as most likely cause of C's cancer
- C's expert was a consultant urologist who opined that the occupational exposure was the main contributing cause. He estimated that it contributed 70-75% of the harm, with smoking contributing 20-25%

Novartis v Cookson (2)

- Smith LJ "If occupational exposure more than doubles the risk due to smoking, it must, *as a matter of logic*, be probable that the disease was caused by the former" (emphasis added)
- "The proposition that a clinician is not capable of fully understanding the published epidemiological literature on the causation of a condition within his own specialty seems unsustainable and would, I think, surprise many clinicians and epidemiologists"
- D held liable for entirety of the harm

Sienkiewicz v Grief [2011] UKSC 10

- Lord Phillips describes the DoR test as 'an epidemiological principle' and directly connects with the fallacious RR>2 rule. Expresses severe reservations about value of epidemiological evidence – treats as a pseudo-science
- '*..[a]s a matter of logic*, if the defendant is responsible for a tortious exposure that has more than doubled the risk of the claimant's disease, it follows on the balance of probability that he has caused the disease' (emphasis added)
- Two potential sources of C's mesothelioma – occupational exposure to asbestos and environmental exposure to asbestos
- No actual dust readings for the factory. Trial judge relied on estimates from witnesses as to likely extent and intensity of exposure – evidence not epidemiological
- Risk associated with factory said to be 4.39 cases per million, while risk associated with environmental was 24 cases per million
- Increase in risk of only18% so no liability – need occupational risk to have been over 24 cases per million. But even then, would not satisfy the BoP

Different applications of the notion of 'probability'

- Unfortunate that standard of proof requirement contains the term 'probability' (BoP) – lawyers tend to draw direct correlation between statistical probability and the BoP.

- To help lawyers distinguish between the meaning of these two uses of the term 'probability', Gold draws a helpful distinction between 'fact probabilities' and 'belief probabilities'.

- Emphasise that there is no direct correlation between a statistical result and the BoP. I could have a very low degree of belief in a statistical result of 90% - eg if it is shown to have resulted from a poorly designed study, or a high p-value, or expert with poor reputation etc

- Avoid expressing BoP numerically. Even if a statistical result of 51% is shown to be scientifically reliable, it is unlikely on its own to persuade anybody that it is more likely than not that X caused Y. Too borderline.

Using the wrong kind of expert – Gregg v Scott

[2005] UKHL 2

- Defendant doctor's breach of duty led to 9 month delay in claimant being diagnosed with cancer and starting appropriate treatment
- Expert was a clinician, a consultant haematologist.
- He opined that if it had not been for the delay, the claimant would have had a 42% chance of survival.
- The effect of the delay was to reduce that chance to 25%
- These figures were said to have come from a cohort study carried out by the haematologist himself. Not questioned by the court.
- Claim for lost of curative outcome failed on basis that he would have died anyway.
- Mr Gregg was actually alive at the time of the HL hearing, 9 years after misdiagnosis.

Very brief overview of problems in US law

- Unlike the UK, US law implements a strict admissibility test for scientific evidence – the Daubert test
- Practice varies between states, but many require epidemiological evidence to show an RR of at least 2 before it is even admissible
- Arguably too much reliance on epidemiology. Other kinds of scientific evidence excluded. If epidemiology is weak or non-existent, claim risks being thrown out at the pre-trial stage.

Conclusion

- Emphasise to all lawyers that RR>2 has no intrinsic value in epidemiology
- Abolish DoR test in UK law
- Stop expressing BoP in numerical terms
- Training for lawyers and epidemiologists
- Increased use of statisticians and epidemiologists as expert witnesses.