Statistical evidence of causation in English tort law

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(i) What is statistical evidence?

(ii) Causation

a. Wrong-constituting causation: the causal link between wrongful conduct and injury, not the causal link between injury and consequential losses (assessment of damages).

   i. \( C \) is a cause of \( E \) if \( E \) would not have occurred had \( C \) not occurred: ‘the but-for test’ (or if \( C \) was necessary for the existence of a contribution to the mechanism by which \( E \) occurred: one meaning of the phrase ‘material contribution to damage’; see S Steel & D Ibbetson, ‘More grief on uncertain causation in tort’ [2011] Cambridge Law Journal 451, 458 and J Stapleton, ‘Unnecessary causes’ (2013) 129 LQR 39, 50-53)

b. General causation: can \( C \) cause \( E \) in some circumstances?

c. Specific causation: did \( C \) cause \( E \) in the case at hand?

   i. \( \text{Cf referring to this distinction, eg, Loveday v Renton [1990] 1 Med LR 117; Elvicta Wood Engineering Ltd v Huxley [2000] EWCA Civ 139 (Buxton LJ distinguishing the establishing of a ‘general pattern of causality’ and causation in the particular case); McTear v Imperial Tobacco 2005 ScotsCS CSOH 69, at [6.1].} \)

(iii) Proof of causation: the balance of probability standard.

\textit{Nulty v Milton Keynes Borough Council [2013] EWCA Civ 15, at [35]:}

The civil “balance of probability” test means no less and no more than that the court must be satisfied on rational and objective grounds that the case for believing that the suggested means of causation occurred is stronger than the case for not so believing (per Toulson LJ)

(iv) Is statistical evidence necessary to establish causation on the balance of probability?

a. General causation

   i. \textit{Reay v British Nuclear Fuels Plc [1994] 5 Med LR 1}

   ii. \textit{Ministry of Defence v Wood [2011] EWCA Civ 792, [61]}:

      ‘it is implicit from the paper that Sir Austin recognised that it is not always necessary to have scientific proof by
epidemiological study before one can reach a sensible conclusion that a particular agent has caused a certain effect. Other forms of evidence are of probative value’.

But cf A Bradford Hill, ‘The environment and disease’, 295: ‘our observations reveal an association between two variables, perfectly clear-cut and beyond what we would care to attribute to the play of chance’.

*Roe v Minister of Health* [1954] 2 QB 66, 70 (McNair J).

b. Specific causation

(v) Is statistical evidence *sufficient* to establish causation on the balance of probability?

a. General causation

b. Specific causation


ii. *Novartis Ltd v Cookson* [2007] EWCA Civ 1261, [74]:

‘In terms of risk, 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.’ (per Smith LJ)

iii. *Jones v Secretary of State for Energy and Climate Change* [2012] EWHC 2936 (lung cancer, *inter alia*)

iv. *Beech v Timney* [2013] EWHC 2345, [82] (stroke): ‘The scientific literature demonstrates that, in any given case, the chances of making any difference to the risk of a stroke after a treatment regime in place for no more than a few months are negligible’.

v. *McGlone v Greater Glasgow Health Board* [2011] CSOH 63 (adenocarcinoma of the cervix)


vii. *Cf JD v Mather* [2012] EWHC 3063, [35]: accept his evidence that 30% of melanoma patients with a tumour 3mm thick go on to suffer regional lymph node involvement (a figure confirmed by research papers of Rousseau and Lee adduced by the Claimant's team), whereas 45% of those with a 5mm thickness do so. And we do know that by October 2006 the Claimant had developed palpable regional lymph node involvement. But this is not, as I see it, enough in itself to prove that his likelihood of doing so in March 2006 was two-thirds, or somewhere between 30% and two-thirds. There is a difficulty about applying such
statistics to show an individual cancer patient's prognosis for the purposes of a trial of causation: see Gregg v Scott, at [153]; Sinkiewicz v Greif UK Ltd at [163]. But Cf. ibid, [47].

When will the ‘more than doubling of the risk’ reasoning work so as to satisfy the balance of probability on causation?

(1) **Statistical validity issue**

(2) **Legal applicability issues**

**Statistical validity issue:** is generating a statistical probability of causation from the evidence statistically valid in the sense that it is consistent with what is known or not known about the mechanism by which the injury can be caused?


‘The comparison of risk estimates is valid where we know that these estimates represent mutually exclusive ways the injury may have been caused and we seek to estimate the likelihood it was one way which had operated in the particular case rather than one of the other possible ways’

For judicial awareness of the need for sensitivity to knowledge about the mechanism, see:


Cf Swift J in Jones, at [8.57]:

Having regard to the evidence about the carcinogenic process given to me, it does not seem to me that, in Shortell, the asbestos and cigarette smoke can properly be said to have acted cumulatively to cause the claimant's cancer. The multiplicative effect described in Shortell referred, not to the biological mechanism which took place in order to cause the cancer, but to the greatly increased effect on risk produced by exposure to a combination of the two carcinogens. It seems to me that the court in Shortell was really being told, not that asbestos and cigarette smoke had combined cumulatively to cause the claimant's lung cancer, but that asbestos and cigarette smoke had combined cumulatively to increase the risk of lung cancer. Jones: [8.57]

The problem of the unknown mechanism in mesothelioma cases:
Stapleton, *op cit*, above:

‘…it is feasible that the mechanism by which asbestos caused mesothelioma in Mrs Costello involved fibres from both the defendant’s breach and from other sources. This means that it is not known that the two risk estimates accepted as evidence in relation to Mrs Costello represent mutually exclusive ways her injury might have occurred: and so the comparison of risk estimates, which is intrinsic to the defendant’s doubling of the risk approach, is statistically invalid here’.

*Legal applicability issues*

(i) Fit with the case at hand  
(ii) Weight of the statistical probability  
   a. Blue Buses and Red/Yellow Buses  
   b. *Cf* ‘Likelihood and prevalence are different concepts’: *Garner v Salford City Council* [2013] EWHC 1573 [26].  
(iii) General reliability issues

*Arguments offered against the sufficiency of statistical evidence in Sienkiewicz*

(1) Lady Hale: the difference between ‘risk’, a forward-looking concept, and ‘probability’, a backward-looking concept.

(2) Lord Rodger: the meaning of the balance of probability.

- a. The balance of probability rule requires the judge to be convinced, ‘on the balance of probability’, that *C was a cause of E.*  
- b. Therefore, it does not suffice that the judge is convinced on the balance of probability, that *C probably was a cause of E.*  
- c. Statistical evidence only permits the judge to make a b-type conclusion.  
- d. Therefore, statistical evidence cannot alone satisfy the balance of probability rule.

*Cf* *Briginshaw v Briginshaw* [1938] HCA 34, (1938) 60 CLR 336. ‘The truth is that, when the law requires the proof of any fact, the tribunal must feel an actual persuasion of its occurrence or existence before it can be found. It cannot be found as a result of a mere mechanical comparison of probabilities independently of any belief in its reality.’ (Sir Owen Dixon)

(3) Lord Mance: the moral argument: the law shouldn’t treat individuals (or ‘even companies’ as statistics.)