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Review Article

Applying Group Data to an Individual as a Scientific Expert in a Court Room Setting: An Unacknowledged Problem in Forensic Mental Health

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ABSTRACT

While the application of group data to an individual case is central to both clinical practice and its legal implications, it is a topic that has been largely neglected by professionals. Two recent contributions from Faigman et al. and Dawid et al. focus on the legal applications of this issue and are discussed in this article. While both papers make many worthwhile points, neither is above criticism. The paper concludes that integrating scientific principles with the legal framework is not as straight forward as many scientists might wish to believe.

Keywords: Forensic mental health; Legal implications; Scientific testimony

INTRODUCTION

These two quotations identify a major problem for a court in assessing expert scientific testimony. There are three reasons why this area now merits further discussion. First is the belief that clinical practice in general and its legal application specifically, ought to be evidence-based [1]. Second, some recent conceptual criticisms and particularly those of Faigman et al. and Dawid et al., address the challenge of applying group data to an individual that we believe are worthy of wider dissemination. Third, there has been a recent controversy in the UK which highlighted the difference between the scientific and legal criteria for expert witnesses.

Interested readers will be aware of a parallel literature on the controversy surrounding the application of actuarial violence risk assessment data to an individual case [2]. This was initiated by a paper from Hart et al. and subsequently by Cooke and Michie who calculated the confidence and prediction intervals, respectively, for actuarial estimates to determine their precision for individual-level risk estimates. They concluded that the risk estimates were virtually meaningless as they spanned nearly the entire range from 0 to 1. Their analysis provoked critical rejoinders by Mossman and Selike, Harris et al., Hanson and Howard and perhaps, most cogently by Scurich and John. Hart and Cooke updated their approach in light of some of these criticisms [3]. The heart of this controversy focused on the 'frequentist' interpretation of probability which depends on repeatable random events and hence cannot be applied to a single event (such as could mental disorder in this individual lead to a further episode of violence yes or no). This was the interpretation favoured by Hart et al. and has been criticised by those who support a Bayesian approach. We will revisit this controversy later in the paper when discussing the alternative Bayesian interpretation of probability in greater detail [4].

While both Faigman et al. and Dawid et al. make several important points, neither is above criticism. In this article, we will set out the points made by both of their papers detailing their criticisms levelled both at current courtroom procedure and how expert evidence is presented. While agreeing in the main with their approach, we will argue that some of their conclusions are misplaced as they are based on a misunderstanding of how the relevant evidence is collected, contextualised and presented by expert witnesses in court and propose an alternative interpretation of current practice.

Although few would argue about the desirability of basing clinical decisions and their legal implications on best available scientific evidence, there are problems with its implementation in practice. First, the relevant research evidence may be unavailable or be of such poor quality that the wrong conclusions are drawn, for example, from underpowered studies with small effect sizes which are prone to bias. Secondly and more importantly for our argument here, there is the challenge

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of applying even good research 'evidence' that inevitably comes from population or group data to an individual case [5].

LITERATURE REVIEW

Evidence-based medicine and the challenge of its application to individuals

Sackett et al. defined evidence-based medicine as the conscientious, explicit and judicious use of current best evidence in making decisions about the care of individual patients (our italics). While they emphasise the importance of integrating this external evidence to an individual case using 'individual clinical expertise'; there is little written about how this might actually be done in practice.

This is surprising as much if not all of every-day clinical practice faces the challenge of applying such evidence to an individual case. This is what clinicians do when, for example, they prescribe a medication, choose to operate on a patient or decide on a psychological intervention [6]. Clearly, these decisions ought to follow from the combination of best evidence on the therapy together with the features of the individual case.

And while recent movement towards personalised medicine and joint decision making in medical and psychological practice ought to involve integrating the patient's perspective into decision making about individual cases nonetheless, when a clinical recommendation has to be made when applied to this individual, we argue that, this is an integration of the evidence is largely intuitive, based on the training and experience of the clinician involved, rather than calculated in a way that can be made explicit [7].

Framework versus diagnostic evidence

Faigman et al. propose a distinction between framework evidence and diagnostic evidence in laying down admissibility standards for expert testimony. The former refers to the description of general scientific propositions (group data based) and the latter to the application of these to an individual case (extrapolating to the individual case). Taking an example in forensic mental health, 'framework evidence' would refer to the prevalence of violence in people diagnosed with schizophrenia whereas 'diagnostic evidence' would refer to the likelihood that schizophrenia caused/contributed to an individual's violent behaviour [8].

According to Faigman et al, this distinction between framework and diagnostic evidence has implications for how an expert witness's evidence ought to be treated by the court. Indeed, the bulk of their paper (pp. 440-480) seeks to lay down best practice guidelines on how these two types of evidence ought to be evaluated against criteria of (a) relevance, (b) qualifications (of the experts), (c) scientific validity, (d) added value and (e) unfair prejudice. While space does not permit us to discuss these in any detail, we will reference two criteria (*i.e.,* qualifications and scientific validity) which are especially relevant to this article.

The Sally Clark case an example of the misreading of scientific evidence

An example of how an expert may mislead the court is provided by the Sally Clark case in the UK. Briefly, after the sudden death one year apart of two of her infant sons, Ms Clark was convicted of their murder and sentenced to life in prison in 1996. Subsequently, it was shown that a medical expert had misinterpreted the statistical evidence which was crucial in leading to her conviction. She was subsequently exonerated on appeal [9].

Due to professional concern raised by this case, the royal statistical society together with the royal college of paediatrics and child health investigated in a theoretical case study the likelihood of abuse in a child attending an accident and emergency department. The scenario consisted of an infant presenting with an acute life threatening event together with a nose bleed. It was also revealed that another sibling had died of Sudden Infant Death (SID). The question was whether this presentation and history was sufficient evidence that the child had been abused.

The court's response to the admissibility of expert evidence

Faigman et al., suggest two strategies whereby the court can respond to this challenge of applying group evidence to the individual. First, it can restrict the evidence presented by experts to research findings for the group alone (*i.e.,* to framework evidence only). Then it would be for the judge or jury to apply this evidence to the case at hand having been informed by the expert on its general scientific status. The second strategy is to accept expert evidence for both the group and the specific case at hand (*i.e.,* the expert presents both framework and diagnostic evidence or one expert provides framework evidence and another provides diagnostic evidence). This is what many jurisdictions rely on. In the Dawid et al. article, a third strategy is described whereby the expert reasons directly from his/her 'clinical experience' so that diagnostic evidence is used alone.

Implications for forensic mental health

Unfortunately, one has to acknowledge that the research base for much of forensic mental health is weak so that there is likely to be a greater level of uncertainty as compared to other areas of clinical practice. As the Best et al. case study illustrates the levels of uncertainty surrounding decision-making in child protection proceedings is considerable. Although the articles cited above are important in highlighting the difficulties of applying group data to an individual case, this is still the task of the expert in most court proceedings. Nonetheless, it is striking that how this ought to be done in operational terms remains opaque [10].

What the court requires

As Faigman et al., point out; there are the standards that the court employs in accepting and evaluating expert evidence. These admissibility criteria rely on the 'knowledge skills and experience' of the expert. These, however, are not the only

concern of the court for it must also assess the weight that is attached to the expert testimony. This refers to the reasoned argument proffered by an expert witness having regard to all of the facts at his/her disposal; in other words, how plausible is the explanation that is being offered. These authors cite a quotation from lord prosser which expresses this well: 'As the judicial or other opinions, what carries weight is the reasoning, not the conclusion.' Indeed, it can occur that an expert passes the test of admissibility but the court subsequently decides that the expert is not competent to express an opinion on a particular issue and even to remove their expert status mid-trial. Here, what appears to be at issue is the plausibility of the expert witness and his/her capacity to draw on the relevant scientific literature to produce a convincing explanation to a particular event.

Tacit knowledge

If one accepts this argument, there is a need therefore to examine and describe the process of what a scientific expert brings to the table. In this respect Michael Polyani a philosopher of science makes a useful contribution when he separates knowledge into that which is either 'propositional' or 'tacit'. The former refers to encoded formulaic knowledge that is exchanged between professionals that is detached from the set of skills required for working in a clinical setting. Tacit knowledge, in contrast comprises skills, ideas and experiences that people have in their minds and are therefore not aware of or how it can be valuable to others. Crucially, the acquisition and effective transfer of this tacit knowledge generally requires extensive personal contact, regular interaction and trust a situation that is mimicked by the long apprenticeship of clinical training.

For example, an expert opines that treating a woman who killed her child acting upon persecutory delusions, with aripiprazole is sufficient to make her asymptomatic (based upon a past history of successful response to this medication) and hence provide sufficient confidence that future risks can be safely managed if she is maintained on an injectable version of this drug. The opposing expert disagrees, claiming that aripiprazole is a 'gentle' antipsychotic whereas given the severity of the Effects of Cause (EoC), this person should be medicated with injectable haloperidol, a more 'potent' drug known for high D2-receptor blockade. On exploration it emerges that this expert believes that since haloperidol causes more extra-pyramidal side-effects compared to aripiprazole, a feature he believes leads to greater 'chemical restraint' from within, it can provide greater impulse-control. While it is true that haloperidol causes greater D2-receptor blockage and more extrapyramidal side effects, there is no difference in the efficacy of the two agents. This is an instance of an experience-based, intuitive 'diagnostic' evidence detracting from framework evidence [11].

Enhancing scientific rigor within opinions

While the appeal to 'tacit knowledge' as underpinning a plausible explanation provides a partial rebuttal to critics who claim that current practice lacks scientific rigour, we believe that the incorporation of science principles can further strengthen expert evidence. By way of illustration, we present a case which utilises epidemiological principles to anchor expert evidence to a more secure foundation. We consider the causation issue: Here, the task of the expert is to separate the mere a) co-existence of a disorder in a defendant to, b) substantial contributory links between the disorder and alleged offence from, c) a direct causal link between the mental disorder and the offence, i.e., whether the offence would not have occurred 'but for' the presence of the disorder.

To illustrate, consider that for a man diagnosed to suffer from exhibitionistic disorder and who exposes his genitals to the distress of the female victim, a framework expert in exhibitionistic disorder for example may state that exposing one's genitals to others is a key feature of this disorder. The 'theoretical basis', in this case would be the classificatory systems, e.g. DSM or ICD, which are internationally accepted. The framework expert may then state that by applying the specific diagnostic criteria laid out in these systems, one could make a valid diagnosis that is reliable. Up until this point all of the standards outlined above have been met.

DISCUSSION

Proposals for improvement

Inferring causal connections: In law 'mens rea' represents prior guilty mind or 'intent' which precedes or is concurrent with 'actus reus' or the physical act of the crime (killing, injuring, stealing, raping, etc.). In this section we suggest ways to determine whether or not and to what extent the 'mens rea' (intention) of the defendant, emanating from a diagnosed mental disorder, has a causal relationship with the alleged offence, the 'actus reus'. In doing so, we have adapted a set of principles that were devised to establish thresholds, beyond which association between two variables becomes causative in epidemiological research.

Temporality: The presence of a mental disorder and thereby its influence on mens rea, must precede the act of omission or commission for which the defendant is charged. Development of a disorder after commission of a crime will not reduce criminal responsibility even if the offender is treated for his mental disorder in a secure hospital.

Dose-response relationship: The stronger the association between mens rea and actus reus, more likely it is that there is a cause-and-effect relationship between the two. Here, there are a spectrum of possibilities. (a) There may be no association, *i.e.*, mens rea is absent as is the case in sleepwalking or epilepsy, etc. where the defendant is considered to have been acting like an 'automaton' devoid of his own free will, (b) alternatively, there may be full association between mens rea and actus reus, *i.e.*, the defendant premeditatedly, knowingly and willfully, commits a crime in a clear state of mental reasoning, (c) In other cases, the law recognizes different types of mens rea based upon the strength of the association. Consider the impulsivity of a person with mania who engages in dangerous acts that he would not have done were he mentally well: A mens rea of recklessness. The schizophrenic mother commanded by god's voice not to feed her infant because she is evil thereby risking the child's life; a mens rea of gross negligence. Finally, the paranoid man, who

speeds in trying to escape imaginary persecutors and is involved in a road traffic accident: A mens rea of blameless inadvertence; these are all examples of varying levels of mens rea associated with mental disorders but not necessarily 'caused' by them.

Specificity of association: The degree of specificity of mens rea that is contributed (partially or entirely) by a mental disorder that leads to an actus reus is critical in determining the extent of causal link and thereby the level of culpability. There may be a direct or specific link between an abnormal mental state and offence, e.g. a psychotic man who kills someone whilst believing delusionally that he is killing a snake, for example (considered legally insane) or one who has knowledge that he is injuring someone so severely as to cause his death, yet is unable to control his impulse to do so on account of symptoms of his mental disorder thereby reducing the blameworthiness of his actions (considered to have diminished responsibility). In addition, having a mental disorder may affect the capacity to form mens rea in a myriad manner which may be relevant to several other defences, e.g. provocation, amnesia, duress, intoxication, etc. It is also quite common to find instances where this relationship does not hold (e.g. someone who is very severely affected by schizophrenia and is not at all violent).

Plausibility: This refers to the underlying reason why a person with a mental disorder may commit an offence. In essence, plausibility refers to underlying motivation. It is plausible for instance for a paedophile who experiences deviant sexual arousal to prepubescent children to cruise around a school (motivation to identify potential victims) that ultimately brings him into contact with a potential victim (intent), who he eventually abuses sexually (actus reus). It is less plausible for a person with severe depression to be found loitering around a school and who exposes himself to children. The lack of plausibility between a prevailing mental state and the eventual offending act should highlight a greater influence of mental disorder than less. Exploration of this factor to our mind allows an elaboration of the intent (mens rea) [12].

Using Bayesian approach as an alternative to the frequencist position

In the second paragraph of this paper, we made reference to the debate among those who adopt the frequencist position regarding the likelihood of the risk that an individual poses when using group data. The Bayesian model provides a viable alternative to the 'frequencist' approach upon which much of this earlier debate was premised.

The difference between the two approaches has been aptly characterised by Elwood as follows: 'Frequentist probability is defined by the relative frequency of an event, how frequently an event occurs over a series of repeated trials. However, a single trial has no relative frequency. Therefore, Frequentist probability cannot be meaningfully applied to a single case. Bayesian probability is not defined by relative frequency but by our knowledge about the outcome. It can be applied to single events like sexual recidivism.

Thomas Bayes was an 18th century English clergyman who was interested in conditional probability (*i.e.,* the likelihood of an event given the occurrence of another event) and developed a theorem to calculate its likelihood. (For a readily understandable description of a Bayesian approach see, Elwood). The basic premise is that one starts with a prior belief regarding an event and then uses additional evidence to adjust the likelihood of that event in the light of this new evidence. This adjusted likelihood (i.e., the posterior belief) then becomes a new (prior) belief awaiting additional evidence to adjust its likelihood and so on.

Duggan and Jones provide an example of this process by addressing how much a positive mammogram increases one's belief that a 45-year-old woman has breast cancer. A Bayesian calculation showed that the presence of a positive mammogram (*i.e.,* new evidence) increased one's belief on the likelihood of breast cancer from a base-rate of breast cancer of 1% (the prior belief) to 10% (the posterior belief). Elwood provides a similar example showing that belief in the likelihood of sexual reoffending in a sex offender with a high static-99R score increased the 10-year recidivism base-rate of 29% to 41.9% (p. 1266). Such an approach has also been used in the prognosis of coronary heart disease and breast cancer.

Reasonable medical certainty

The concept of 'reasonable medical certainty' has been recognized in the US supreme court for some time now. The word 'reasonable' indicates that there is a range of acceptable solutions to the forensic psychiatric assessment. In contradistinction, the word 'certainty' connotes absoluteness. So reasonable certainty' would defy a precise meaning. Notwithstanding the oxymoronic nature of the phrase, individual courts have defined reasonable medical certainty as a threshold starting from just over 50% probability to an upper limit approaching 100%, mirroring the legal standards of proof of preponderance of the evidence (beyond 50%) and beyond a reasonable doubt (nearly 100% certainty). In this connection, it is interesting that Elwood proposes that an offender in Sexually Violent Predator (SVP) evaluation does not meet the criteria for continued commitment unless his risk (more likely than not or >50%) exceeds the threshold by a credible margin of error. If the credible margin of error were not to exceed 50%, then the individual would not meet the criteria for continued commitment although his individual score was beyond 50%. This approach satisfies Daubert v Merrell Dow criterion on specifying a margin of error which was previously mentioned.

CONCLUSION

In this paper, we have described the critique of current expert evidence in mental health by Faigman et al. and Dawid et al. While both papers make several important points, we offer a rejoinder that we hope extends the debate and provides an alternative interpretation. First, the legal definition of an expert that is relevant to the court is broader than the strict scientific definition (described in these articles) of an 'expert' that has relevance to the courts. Second, we argue that the elements of 'tacit knowledge' acquired by the expert in his/her training, provides the court with an opinion that is more than an 'educated guess' and in addition, suggest ways in which this can

be further strengthened by adopting the epidemiological criteria of Hill in establishing causation and a Bayesian rather than a frequentist approach in data interpretation. These strategies, we suggest, offer possible solutions to group to individual (G2i) conundrum.

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