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Introduction

'*Every surgeon carries about him a little cemetery, in which from time to time he goes to pray, a cemetery of bitterness and regret, of which he seeks the reason for certain of his failures.*' René Leriche 1951[1]

Over the past two decades enquiries into medical mistakes – their contexts, causes, consequences and costs – have widened in scope and deepened in their conceptual grasp of the nature and variety of healthcare errors.[2–6] Medical errors were previously seen as residual phenomena, unfortunate events on the margins of healthcare. Today they are understood to be integral to the medical endeavour.

Here, we identify the cultural and intellectual antecedents of scientific and safety interest in aberrantly provided healthcare. Investigators began formally to enquire into human error just over a century ago. Freud's *Psychopathology of Everyday Life* discussed slips of the tongue and pen, aberrant actions, misreadings, forgettings and muddlements which together Freud called 'parapraxes'. He believed the cognitive basis of such phenomena lay in intrapsychic conflict; when repression fails, otherwise secret desires, ambitions, fantasies and fears erupt into waking life as perturbations of thought and action – slips, transpositions and substitutions. Initially published in *Monatsschrift für Psychiatrie und Neurologie* in 1901, this work was influential in gaining a naturalistic framing for the study of human error.[7]

At the time that Freud's work was beginning to appear in translation, a Hungarian psychiatrist, Jenö Kollarits, was developing an empirical focus on errors, by observing his own and a smaller number of his wife and colleagues' dyspraxias of speech, reading and writing. From this work he constructed a four-fold phenomenological classification comprising substitution (66% of his series [n=1100]), omission (21%), insertion (12%) and repetition (1%). Less concerned with psychological mechanisms than Freud, Kollarits believed the cognitive basis of error lay in 'action [that] is split away from intention by insufficient attention'.[8,9]

Modern interest in medical fallibility can be traced to these works. Prior to them, only exceptional doctors had discussed their own errors. Sydenham, for example, published a case report in 1697 in which he wrote of 'my mistake' in treating a woman with dropsy, which he attributed to the 'juvenile confidence of an inexperienced'. Occasionally Osler mentions errors and mistakes,[10] but before the second half of the 20th century confession of this sort in print is rare. Medical errors gain institutionalized presence in journals only after the 1984 publication in the *New England Journal of Medicine* of a dramatic mistake that existentially harms a woman, and when *The Lancet* (1999) calls for doctors to share their errors in print.[11,12]

Novelists and playwrights had explored errors, violations and their consequences a good deal earlier. In *Madame Bovary* (1857), for example, Gustave Flaubert created a story that hinges on the character and practice of Charles Bovary, a French officier de santé (health officer) working in rural Normandy. A well-meaning, if not particularly bright personal medical attendant, Bovary initially understands well the limits of his knowledge and the boundaries of his healthcare role. But he lets himself be persuaded by Emma, his wife, and by the town's pharmacist, Homais, into operating on a patient's congenital clubfoot even though he has no formal training in the surgical procedure.

Neither persuader is motivated by concern for the patient's wellbeing; Emma is bored with the domesticity of her life with a provincial, country doctor and longs for the social excitement (and advancement) that will ensue from her husband's surgical success. Homais, on the other hand, believes himself to be an enlightened man of science; inspired by reports of surgical progress he has read about in newspapers, he spurs Bovary on to perform the surgery, which initially proceeds uneventfully. But after five days of unremitting pain, it is clear that the contraption used to set the patient Hippolyte's foot postoperatively causes severe bruising. Gangrene sets in necessitating calling in a fully-trained surgeon who has no alternative but to amputate the leg. Bovary recognizes the damage he has caused Hippolyte and tries to make amends by buying him a wooden leg – the clippity-clop of his patient's step forever reminding him of his blunder. The novel is an acute observation of rural medicine in 19th-century France, a psychological study of a marriage and of a naïve, gullible yet hardworking doctor, who lacks insight into the state of his marriage and the motivations of his close associates. It is from this concatenation – *wilful* (not malicious) overstepping of the boundaries of an otherwise good doctor's training and competence – that this serious healthcare violation arises.[13]

But it is not until 100 years after the novel was published that sociological and ethnographic studies begin to characterize how medicine as a profession handles mistakes.[14–17] Until then, medical etiquette generally frowned on any public criticism of colleagues' healthcare errors and violations; these were generally handled by informal, *ad hoc*, collegial processes dominated by the values and procedures of patronage common to clans rather than by the standards of civil scrutiny (Osler kept the Professor of Surgery's addiction to morphine at the Johns Hopkins Medical School secret until 50 years after his own death).[10] Findings from ethnographic studies uncannily reinforced George Bernard Shaw's concerns set forth in the *Preface* to his play, *The Doctor's Dilemma* (1906):

'Anyone who has ever known doctors well enough to hear medical shop talk, without reserve, knows that they are full of stories about each other's blunders and errors, and that the theory of their omniscience and omnipotence no more holds good
among themselves than it did with Molière and Napoleon. But for this very reason no doctor dare accuse another of malpractice … the effect of this state of things is to make the medical profession a conspiracy to hide its own shortcomings.'[18]

After *The Doctor's Dilemma*, other writers explored healthcare mistakes and the closed culture of medical practice. In AJ Cronin's novel, *The Citadel* (1937), for example, a surgical error stands out: during an abdominal operation, Charles Ivory incises rather than ligates a vascular lesion and, as a consequence, the patient bleeds to death on the operating table. There is no question of informing anyone, not least the patient's distraught widow – Ivory tells her that 'no power on earth could have saved him' – and no investigation is instituted to establish whether the blunder was the result of a misidentification or of a cavalier attitude on the part of the surgeon.[19]

Today, discussion of medical errors and violations could not be more different. Healthcare errors and violations are at the nexus of empirical, ethical, legal and policy considerations worldwide, and agencies and reporting mechanisms have been established to collect data on mishaps and safety incidents in order to extract and promulgate lessons from them.[20]

In some spheres of activity, errors understood as unintentional divergences from desirable goals or standards have long been viewed as sentinel phenomena. 'Errors show us the way to truth' wrote the 16th-century German astronomer, Johannes Kepler, when discussing observational errors and defects in instrumentation.[21] 'By far the most instructive part of a [military] campaign is to know why we fail' wrote George Scovell, a 19th-century code-breaker in the Duke of Wellington's army during the Peninsular War.[22] Mistakes can be instructive; and they require not only to be corrected but *corrected for*.[23,24]

Unlike errors, violations are intentional actions; but like medical errors, medical violations do not always portend harm or a disregard of safety. The psychologist, James Reason, finds in violations 'deliberate – but not necessarily reprehensible – deviations from practices deemed necessary (by designers, managers and regulatory agencies) to maintain the safe operation of a potentially hazardous system'.[25]

In most walks of life error remains bound up with wandering off track, and those who err are

generally viewed negatively, whether in psychological, attitudinal, character, knowledge-based or in skills' terms, because (it is assumed) they could have done otherwise. Within this schema, negative traits diminish the moral worthiness of the erring person and simultaneously help to explain how a mistake actually came about: for example, by flawed reasoning, inattentiveness, absent-mindedness, poor planning, poor memory, ignorance, arrogance, lack of insight, impatience, over-ambitiousness, hurriedness, lack of perspective, over-confidence, inability to listen, tiredness, laziness or clumsiness.

Because the modern view of error conceptualizes it as essentially (and deeply) unintentional it is thought to be unavoidable by acts of will or by use of foresight. On this account, judgementalism towards those who err cannot ever be appropriate. Yet there remains a tension, as Judith André has noted, between lack of intention and true avoidability: 'Mistakes are inevitable. On the other hand they are to be avoided; nothing counts as a mistake unless in some sense we could have done otherwise.'[26] 'Avoidability in some sense' continues to ground moral disapprobation of mistakes, even though modern students of error generally find in questions of avoidability an end or goal that directs attention *away* from the character (or characteristics) of those who have erred and *towards* factors or flaws in the design of healthcare systems that predispose to errors and violations.

After the deaths of four patients from mercuric oxicyanide in Stockholm's Maria Hospital in 1936 (which was administered instead of local anaesthetic) medication-related harm was recognized in Sweden, which enacted legislation to create a self-reporting system of serious injuries related to medical treatment;[27] and after the Second World War, a clutch of studies revealed the extent and sheer variety of the harms caused by hospital care.[28–32] These prompted Leape to visualize the magnitude of the harm caused by comparing hospital mortality from errors to the death toll caused by three jumbo jets crashing every two days in the USA. This startling image drew attention not only to the massive scale of the loss of life from hospital care, but also to differences in the intensity and purpose of investigations which follow deaths in the two sectors. By comparison with plane crash investigations, those into healthcare harms seemed much less visible, rigorous and systematic.

In the last quarter of the 20th century, psychologists interested in the cognitive origins of human error joined with human factor engineers interested in the design of technologies and human-machine interfaces, to discuss the origins and effects of errors in complex settings. Meetings sponsored by the Science Committee of the North Atlantic Treaty Organization and the Rockefeller Foundation brought together psychologists, mathematicians, philosophers and engineers to stake out cross-disciplinary approaches to human error, stimulated in part by industrial catastrophes that had taken place in the 1970s and 1980s, such as the meltdown at Three Mile Island nuclear power plant near Harrisburg, USA, release of poisoned gas at Bhopal, India, uncontrolled release of radiation from the Chernobyl nuclear power station in the Soviet Union and the conflagrations of the North Sea Piper Alpha oil rig and King's Cross underground station in London. Among factors identified as causally significant were operator errors, low tolerance of margins of error, close coupling of undesirable effects, insufficient buffering of failures in plant organization which meant, in effect, that some accidents had been 'waiting to happen':

> 'If interactive complexity and tight coupling – system characteristics – inevitably will produce an accident, I believe we are justified in calling it a normal accident *or* system accident. *This is an expression of an integral part of the system, not a statement of frequency'*

wrote one influential analyst.[33] The healthcare counterpart to this is 'latent error', a mistake likely to occur as a result of poorly designed healthcare systems.

Conclusions

Years before sociologists and psychologists began formally to study medical errors and violations, novelists and playwrights explored healthcare mistakes and violations in terms of character flaws and a closed medical culture. Discussion of error today frequently takes the form of case reports that generate many questions: can a doctor apologise without increasing medicolegal liability? Does apology vitiate medical indemnity insurance? What effects do

errors have on a clinician's self-esteem and practice?[34,35] Extended semi-fictionalized accounts of clinical cases in popular expositions allow in-depth exploration of these issues with a wide audience.[36–39]

Today, we view error not as something that is 'fallen into momentarily' but as something 'omnipresent' in medicine.[40] The image of medical care today conspicuously encompasses fallibility: Hollywood films feature healthcare roles that no longer depict the stereotypes of dedicated, compassionate doctors and nurses. A new zone of medical work has come into view, featuring the many dangers inherent in provision of healthcare; including doctors who feel conflicted about careers that seem at odds with their personal lives, flawed professionals who make mistakes, commit violations and face litigation.[41] But however uncomfortable this zone may be to inhabit and work in, systematic multidisciplinary study of its characteristics and parameters promises significant gains for patient safety.[42]

Papers in the next two issues will elaborate on these themes. Next month, Richard Baker and Brian Hurwitz consider, through a case study of the serial murderer Dr Harold Shipman, the uncomfortable subject of deliberate and extreme violations of professional (and legal) norms, arguing that there is much to learn from such aberrations being brought into the fold of patient safety enquiry (without precluding criminal proceedings). In the following issue, Alan Merry will consider the intriguing and thorny questions which surround how the law deals and should deal with medical errors.

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