

Medicine and the McNamara fallacy

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The 'McNamara fallacy' (also known as quantitative fallacy) is named after the US Secretary of Defense during the Vietnam War. The fallacy consists of over-reliance on metrics, and may be summarised as: 'if it cannot be measured, it is not important'. This paper describes the McNamara fallacy as it applies to medicine and healthcare, taking as examples hospital mortality data, NHS targets and quality assurance.

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Introduction

Robert McNamara (1916–2007) was US Secretary of Defense from 1961–1968, during the presidencies of John F. Kennedy and Lyndon Johnson.¹ His career was, by any standard, stellar: after graduating in economics at Berkeley, he took an MBA at the Harvard Business School and became its youngest assistant professor at the age of 24. During the Second World War, McNamara served in the US Army's Department of Statistical Control. He applied rigorous statistical methodology to the planning and execution of aerial bombing missions, achieving a dramatic improvement in efficiency. After the War, the Ford Motor Corporation recruited several members of Statistical Control, including McNamara and these clever young men were nicknamed 'the Whiz Kids'. The once-great company was in disarray and losing money. McNamara applied his skills of rational statistical analysis to the problems of the ailing giant, and he and his fellow Whiz Kids achieved dramatic improvements, returning Ford to profit. He had a highly-developed sense of the greater good, and was a pioneer of passenger safety in car manufacture. In 1960, aged 44, he was appointed President of the Ford Corporation. After less than two months in this post, he was offered a cabinet position by President-Elect John F. Kennedy. McNamara rejected the initial offer of Treasury Secretary, but accepted the post of Secretary of Defense.

McNamara applied the same rigorous systemic analysis to the Pentagon that had worked so well at Ford. As the conflict in Vietnam escalated, he believed that as long as Viet Cong casualties exceeded the numbers of US dead, the war would eventually be won: 'Things you can count, you ought to count; loss of life is one.' The data, however, were flawed: the South Vietnamese army reported what they thought the Pentagon

wanted to hear – they were 'gaming' the figures – and the US did not question the numbers. He later conceded that excessive emphasis on a single crude metric over-simplified the complexities of the conflict:

Uncertain how to evaluate results in a war without battle lines, the military tried to gauge its progress with quantitative measurements. We failed then – as we have since – to recognize the limitations of modern, high-technology military equipment, forces, and doctrines in confronting highly unconventional, highly motivated people's movements.²

By late 1967, the US was no nearer to concluding the war; McNamara and President Johnson did not agree on strategy, and public opposition to the war had grown. McNamara now believed that US troop numbers should be frozen, and that aerial bombing of North Vietnam should stop. President Johnson and the Joint Chiefs of Staff did not agree: McNamara resigned in November 1967. He became President of the World Bank in April 1968, a position he held until 1981.

McNamara's name became inextricably linked with American failure in Vietnam: here was a problem that did not submit itself to numerical analysis. In 1972, the sociologist Daniel Yankelovich coined the phrase 'The McNamara Fallacy':³

The first step is to measure whatever can easily be measured. This is OK as far as it goes. The second step is to disregard that which can't be easily measured or to give it an arbitrary quantitative value. This is artificial and misleading. The third step is to presume that what

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can't be measured easily really isn't important. This is blindness. The fourth step is to say that what can't be easily measured really doesn't exist. This is suicide.

The Anglo-Irish author Charles Handy popularised the phrase in *The Empty Raincoat*,⁴ and is often erroneously credited as the originator of the concept.

The McNamara fallacy in medicine

Medicine is, and always has been, messy, imprecise and uncertain. This messiness, lack of precision and uncertainty is on an even greater scale than the conflict in Vietnam. Doctors deal with problems which may be simple, complicated and complex. Commenting on the use of the 'e-portfolio' to assess trainee GPs as an example of the McNamara fallacy, Dr Michael Basler observed:⁵

A simple problem is to bake a cake, a complicated problem is fly a human to the moon and back, a complex problem is to toilet train a child. A skilful doctor needs to deal with a lot of complicated problems but also deal with a lot of much more complex issues, some of which are always changing. This applies to both technical and non-technical, clinical and non-clinical skills. It beggars belief that these assessment tools, full of word salads of 'unspeak', can actually measure the gamut of clinical skills, discretionary judgement and interpersonal skills to deal with complex problems.

The McNamara fallacy in medicine is characterised by the following features: (i) the delusion that all of this complexity can yield itself to numerical analysis and control; (ii) over-reliance on crude metrics, such as hospital mortality rates; (iii) the setting of arbitrary targets, many or most of which do not improve patient care, and some of which cause harm; (iv) the pressure of audit and quality assurance programmes on doctors to carry out treatments which are not in the patient's best interest; (v) the neglect of unquantifiable attributes, such as communication, competence, continuity and compassion.

I have chosen some examples of this fallacy in medicine: this is a personal list; I could have picked many others. This includes the target culture in the NHS. Each example illustrates different aspects of the fallacy.

Hospital mortality rates

The scandal of poor care at Stafford Hospital culminated in the publication of the second Francis Report in 2013; this was the fifth official inquiry into care at the hospital. The main focus of concern for the media, politicians and the general public was the mortality rate at the hospital. I have previously described the limitations of the mortality statistics from Stafford.⁶ Mortality rates were calculated using the Hospital Standardised Mortality Ratio (HSMR), a statistical tool developed by the Dr Foster Intelligence Unit at the School of Public Health at Imperial College London. The HSMR was then widely used in the NHS to compare mortality rates

between hospitals. This ratio is calculated by working out the risk of death associated with particular diagnoses; this risk, or ratio, is then adjusted, depending on the patient's age, sex, social deprivation score and type of admission (emergency or elective). Using this ratio, it was calculated that mortality at Stafford Hospital was considerably higher than the national average. *The Guardian* stated: 'An estimated 400-1,200 patients died as a result of poor care over the 50 months between January 2005 and March 2009.'⁷

Many commentators have demonstrated the crudity of the HSMR:⁸ it is subject to many biases and distortions, including the accuracy of coding, the quality of local GP care, and access to hospice care. After the publication of the second Francis Report, it emerged that the hospital had no full-time coding officer for several years leading up to the scandal. A commercial competitor of Dr Foster Intelligence, Caspe Healthcare Knowledge Systems, advised another hospital – Medway – which also had a high HSMR. They advised the hospital that it had been 'under-using' the specific code for palliative care: by increasing the proportion of patients it coded as receiving palliative care, Medway lowered its HSMR dramatically.⁸

The first Francis Report gave a summary of an independent assessment of the HSMR statistical method by two epidemiologists from the University of Birmingham, Professor Richard Lilford and Dr M.A. Mohammed: 'Our most crucial finding is that the methodology used to derive the Dr Foster SMR is riddled with the constant risk-adjustment fallacy and so is not fit for purpose.'⁹ Francis stated that no firm conclusions could be drawn from the hospital mortality figures. He acknowledged that unkindness, rather than a high death rate, was the main concern of those who gave evidence: 'It was striking how many accounts I received related to basic elements of care and the quality of the patient experience, as opposed to concerns about clinical errors leading to death or injury.' Unfortunately, there was little or no media coverage of these doubts about the mortality statistics: the public, the media and the politicians assumed that any deaths above the national average must be the consequence of poor care, and thus avoidable.

The mortality figures at Stafford Hospital were, in retrospect, crude, inaccurate and misleading. It is likely that death rates at the hospital were similar to many other acute general hospitals in the NHS. Indeed, Dr Foster's 2009 *Good Hospital Guide* rated Stafford as among the five most improved hospitals in the previous three years, and in the top ten for quality of care.¹⁰ The problem at Stafford was not 'avoidable' deaths, but a culture of unkindness, a systemic absence of compassion. This failure was not quantifiable.

In May 2010, an issue of the *British Medical Journal* devoted three papers to hospital mortality ratios: Nigel Hawkes demonstrated how inaccuracies in coding distorted the ratios;¹⁰ Richard Lilford and Peter Pronovost wrote a review entitled *Using hospital mortality rates to judge hospital performance: a bad idea that just won't go away*,¹¹ and

an editorial by Nick Black, Professor of Health Services Research, concluded: 'Hospital standardized mortality ratios should be abandoned'.¹² He pointed out that, even if coding and diagnostic data were completely accurate, it is:

perverse to use a hospital's mortality statistics to judge its quality of care...the incongruity of using mortality to assess a hospital is exacerbated by geographical variation in the proportion of deaths that occur in hospital (40–65%), which reflects not only the availability of alternative forms of end of life care, such as hospices and community palliative services, but also cultural, religious, and socioeconomic characteristics of the local population. It is no surprise that the higher the proportion of all deaths in a population that take place in hospital, the higher the HSMR will be.

Mortality statistics no more reflect quality of care in our hospitals than the body counts in Vietnam guided the US military of their progress in that war.

The target culture in the NHS

Targets are perhaps the best example of the McNamara fallacy at work in healthcare. Ian Blunt, Health Services Analyst at the Nuffield Trust, wrote:

One of the fundamental challenges to targets is that they measure what can be counted rather than what matters. This is particularly true when a target (one tiny slice of activity) is used to infer quality (which is the result of a complex array of care processes and interactions).¹³

Although John Major's Conservative Government started the process in the early 1990s with the Patient's Charter, most of the current targets in the NHS were imposed by Tony Blair's New Labour government in the 2000s. These targets related to such matters as waiting times, cleanliness, and average length of hospital stay. Blunt noted that, when first introduced, NHS targets were generally achieved because of increased funding and pressure from the centre. Targets, however, came with a downside: 'But methods such as increasing the risk of managers being sacked and public 'naming and shaming' led to dysfunctional behaviour such as 'gaming' data, short-termism, bullying and obsessive checking and assurance activities.' He concluded:

In summary, targets can be effective if used sparingly and for a few carefully chosen areas. Adding increasing numbers diminishes their effectiveness and confuses organizations about what the priorities really are. There are also problems with the way in which people take a broader and more nuanced view when considering quality. A target is a useful tool for improving services when combined with additional support, but targets should never be the sole arbiter of quality in the NHS.¹³

The target culture was partly to blame for Stafford. The politicians who expressed their shock and outrage over

Stafford in parliament were often the very same politicians who had imposed the target culture on the NHS.

NHS doctors are familiar with instances of patients having cancer surgery cancelled so the target for elective surgery for patients with less serious conditions can be met. Most will also be familiar with the cynical, and sometimes bizarre, ruses ('gaming') employed by managers to meet the four hour emergency department target. The Academy of Medical Royal Colleges and Faculties in Scotland spoke for many in the NHS in their 2015 document *Building a more sustainable NHS in Scotland: Health Professions lead the call for action*:¹⁴

The current approach to setting and reporting on national targets and measures, while having initially delivered some real improvements, is now creating an unsustainable culture that pervades the NHS. It is often skewing clinical priorities, wasting resources and focusing energy on too many of the wrong things. As a matter of urgency, there needs to be a more mature approach to how the NHS uses targets, standards and other performance measures to ensure better and sustainable outcomes across the health service.

Targets, which were intended to guide and promote good care, have become an end in themselves, often leading to a grotesque inversion of their original purpose. Even politicians – traditionally the great supporters of NHS targets – are beginning to have their doubts. I quote from the health section of the 2016 Scottish Conservative Manifesto (*A world-class health care system for your loved ones*):¹⁵

Some targets have been successful in driving up performance and boosting accountability, but it's now clear that some are responsible for skewing clinical priorities and heaping pressure on medical staff. We want our doctors making the best medical decision for a successful outcome, rather than feeling they have to service the input targets.

However, less than a year later, in February 2017, the Scottish Conservatives attacked the Scottish Nationalist Party Government for its failure to meet such targets.¹⁶

In 2015, the Dr Foster Intelligence Unit published a report called *Uses and Abuses of Performance Data in Healthcare*.¹⁷ When a body such as Dr Foster, whose entire raison d'être is healthcare metrics, produces a document admitting the limitations of metrics-based clinical targets, one should take notice. They listed the unintended adverse consequences of targets as: (i) tunnel vision: focusing on aspects of clinical performance that are measured and neglecting unmeasured areas; (ii) adverse selection/inequity: avoiding the most seriously ill patients; (iii) bullying; (iv) erosion: diminution of intrinsic professional motivation; (v) ceiling effect: removing incentives for further improvement; (vi) gaming, and (vii) distraction: challenging, obfuscating or denying data which suggests under-performance.

Dr Foster identified five steps to 'reduce data abuse': (i) make data quality as important as hitting targets; (ii) measure the context not just the indicator; (iii) avoid thresholds and consider the potential to incentivise gaming in the design of metrics; (iv) be more open, and (v) apply measures fairly. These five steps might be summarised as: 'make the data better', and simply perpetuate the McNamara fallacy. In the same year as this report, Dr Foster was acquired by Telstra, an Australian telecommunications company. Telstra Health is 'a leading provider of e-health solutions'.

NHS digital recently replaced the Dr Foster HSMR with the Summary Hospital-level Mortality Indicator (SHMI).¹⁸ Like the HSMR, this 'is the ratio between the actual number of patients who die following hospitalisation at the trust and the number that would be expected to die on the basis of average England figures'. Although NHS digital lists five main differences between the HSMR and the SHMI (such as the fact that the SHMI includes deaths occurring outside hospital within 30 days of discharge), the statistical methodology is broadly similar, as is the logical fallacy.

Quality assurance

Even the very phrase 'quality assurance' (QA) is misleading, implying, as it does, an assurance, or guarantee, of a good outcome from medical treatments. Within my own speciality of gastroenterology, QA led to significant improvements in endoscopy practice in the UK over the last 15 years. QA programmes set targets for caecal intubation at colonoscopy, biliary cannulation for endoscopic retrograde cholangiopancreatography, and so on. The Joint Advisory Group, which oversees and accredits endoscopy practice in the UK, sets performance targets for both individual endoscopists and endoscopy units.¹⁹ One of these targets is an adenoma detection rate of 15% at colonoscopy, thought to be a surrogate marker for thoroughness of the examination, and a caecal intubation rate of > 90%.

The American Society for Gastrointestinal Endoscopy has set a target of 25% for adenoma detection,²⁰ but this target is based on screening colonoscopy of asymptomatic individuals, the main purpose of which is adenoma detection. Most colonoscopies in the UK (outside of the national screening programme for colon cancer) are performed for symptomatic reasons, rather than as a screening exercise. Polyp detection is the primary function of a screening colonoscopy, but most polyps detected in symptomatic individuals are incidental, and their detection and removal is essentially a form of opportunistic screening.

These targets unwittingly placed pressure on endoscopists to behave in ways that did not always benefit the patient: examples of such behaviour include removal of small polyps in elderly patients, and over-prolonged attempts at caecal intubation when the clinically relevant information has been obtained by examination of the left colon.

A 2016 case report entitled *Learning from adverse outcomes: guidelines on colonoscopic polypectomy in patients aged 85 years and older*²¹ illustrates the McNamara fallacy as it applies to endoscopy QA. This paper reported the case of 'a patient between 80 and 90 years of age' who underwent routine surveillance colonoscopy, having had colonic polyps removed three years previously, when colonoscopy was carried out to investigate anaemia. The endoscopist, we are told, 'was a locum'. At colonoscopy, seven polyps were detected, six of which were removed:

Two small (2 mm and 9 mm) sessile polyps, confirmed as tubular adenomas with low-grade dysplasia, were removed from the caecum by endoscopic mucosal resection (EMR). Three small transverse colonic polyps (1 mm, 2 mm and 7 mm) and one splenic flexure polyp (13 mm) were removed by EMR...The patient was readmitted 5 days postprocedure with severe abdominal pain and tenderness in the right iliac fossa...A CT scan revealed a retroperitoneal caecal perforation with a collection. An emergency right hemicolectomy was performed and the patient was transferred to an intensive care facility. The patient developed multi-organ failure and despite optimal organ support died. The colectomy specimen revealed a defect in the wall of the caecum as the site of the perforation. There was no evidence of malignancy.

The case was discussed at the hospital's Clinical Governance Review. The Governance Committee acknowledged that 'the decision to repeat a colonoscopy at 3 years complied with published guidance', but 'considered the decision to remove so many polyps in someone so old with comorbidity, questionable.' The Committee acknowledged that QA targets were at least partly to blame for this patient's death:

The performance data of endoscopists in the UK are closely scrutinised and there is an expectation that colonoscopists should have a high polyp/adenoma detection rate...[this] encourages removal of all polyps, in this case, when it was not in the patient's best interests. It is very likely that that in elderly patients there is minimal risk of subsequent development of colon cancer when small polyps are left behind. By contrast, the consequences for the older patient when there is a complication are often more serious.

The Governance Committee decided to formulate a new local guideline, advising that polypectomy of low risk (< 10 mm) polyps was not necessary in patients aged 85 years and older. This guideline, although sensible, contains the unspoken assumption that polypectomy is appropriate in an 84 year old patient with comorbidity. The key theme of this case report is the conflict between guidelines and clinical judgement, yet the response of the Governance committee was to produce another guideline.

Endoscopy has come to be regarded as an end in itself, with much attention devoted to metrics such as adenoma detection rates. Endoscopists, too, tend to be seen as

technicians, rather than physicians; the growth of non-physician endoscopy is symptomatic of this trend. For the majority of our patients, however, an endoscopy is simply an investigation carried out to determine what ails them. It may not answer this question, and may be one of several investigations. The experienced endoscopist places the procedure in the broader context of the patient's progress and best interests. The endoscopy list also functions as an unofficial outpatient clinic: the endoscopist needs to be both technician and wise physician. In 1985, Sir Christopher Booth asked 'what has technology done to gastroenterology?',²² and raised the concern that the gastroenterologist will become 'a technician who carried out a series of complex but personally satisfying tasks.'

Other phenomena related to the McNamara fallacy

Goodhart's law (named after the British economist) states that once a variable is adopted as a policy target, it rapidly loses its ability to capture the phenomenon or characteristic that is supposedly being measured.²³ Adoption of a new indicator 'leads to changes in behaviour with gaming to maximise the score; perverse incentives, and unintended consequences.' Mario Biagioli, professor of law and of science and technology at the University of California, Davis, cited this law in an analysis of how individual researchers and institutions 'game' bibliometric metrics, such as impact factors, citation indices and rankings.²⁴ Goodhart's law, however, is a behavioural phenomenon, rather than a logical fallacy.

One of the very few references to the McNamara fallacy in the medical literature is in a 2012 paper by Christopher Booth (not to be confused with the late Sir Christopher Booth, quoted above) and Elizabeth Eisenhauer of the National Cancer Institute of Canada Clinical Trials Group at Queen's University, Kingston, Ontario, entitled *Progression-Free Survival: Meaningful or Simple Measureable?*²⁵ The authors describe the increase in the number of randomised controlled trials of new drugs for metastatic solid tumours using progression-free survival (PFS) as the primary endpoint:

Some trials showing improvement in PFS, without a corresponding increase in overall survival (OS), have led to approval of new drugs and/or changes in standard of care. This suggests a growing belief in the oncology community that delaying progression in metastatic disease is a worthy goal, even if OS is not improved. But is a new treatment that improves PFS really an advance for patients? Or is it only lowering the bar to declare active some of our much-heralded new molecular targeted therapies? We believe that as a community, this trend requires discussion and debate.

They concluded that PFS was neither clinically significant for doctors, nor existentially significant for patients:

We should not let clinical cancer research fall victim to what has been termed the McNamara fallacy...Let us not

assign meaning to something that is merely measurable, while failing to measure, or failing to make decisions based on, those things that are truly important.

There are many other examples in clinical trials of relatively meaningless secondary endpoints being used to justify the adoption of new therapies: the most striking (in my view) being the third international stroke trial of thrombolysis of acute ischaemic stroke.²⁶

But is the use (or abuse) of these metrics really an example of the McNamara fallacy? The word 'fallacy' implies a mistaken belief or incorrect logic. McNamara truly believed that the metrics of enemy dead and tons of bombs dropped would guide him to victory. The use of a meaningless metric like progression-free survival is far more likely to be a deliberate ploy on the part of pharmaceutical companies (who sponsor the overwhelming majority of such studies) to gain approval for these drugs, rather than a cognitive or logical error.

Conclusion

It is perhaps unfair to Robert McNamara that his name has been linked with this fallacy. His long post-White House career proved him a man of subtle intelligence, who repeatedly revisited his Vietnam experience to see what could be learned from it. At the age of 85, he told an interviewer: 'I'm at an age where I can look back and derive some conclusions about my actions. My rule has been: Try to learn. Try to understand what happened. Develop the lessons and pass them on.'¹ He devoted his later years to doing just that. He met with the Viet Cong leader Vo Nguyen Giap, and learned that the US had failed to understand their North Vietnamese adversaries: 'We saw Vietnam as an element of the Cold War, not what they saw it as, a civil war.'¹ McNamara admitted that this failure 'reflected our profound ignorance of the history, culture and politics of the people in the area and the personalities and habits of their leaders.'¹ He was the subject of an Academy Award-winning documentary *The Fog of War*, in which he analysed his own, and his country's, failure in Vietnam.

In later life McNamara concluded that the conflict in Vietnam could not be understood by metrics alone, in the way that car production could be. The very concept of the 'McNamara fallacy', which describes simplistic, metric-driven analysis, is itself a simplistic judgement on McNamara: his 1995 memoir *In Retrospect: the Tragedy and Lessons of Vietnam*² describes a far more complex series of events. Although he did believe in the importance of metrics, McNamara was no mere number cruncher. When he died in 2009, the *Economist* observed: 'He was haunted by the thought that amid all the objective-setting and evaluating, the careful counting and the cost-benefit analysis, stood ordinary human beings. They behaved unpredictably.'²⁷ In *The Fog of War*, he concluded that America had lost in Vietnam because they failed to understand or empathise with the enemy. Metrics have their place, but the failure was ultimately emotional and cultural.

McNamara's career is also a great example of the cult of managerialism which came to dominate, in the second half of the 20th century, not just business, but also many other spheres of human activity, including healthcare, education and government. McNamara was a great exemplar of the new manager: 'a trained specialist in the science of business management who is also a generalist moving easily from one technical area to another.'¹ In a 1980 article,²⁸ Robert H. Hayes and William J. Abernathy blamed managerialism (at least in part) for America's economic decline:

What has developed, in the business community as in academia, is a preoccupation with a false and shallow concept of the professional manager, a 'pseudoprofessional' really – an individual having no special expertise in any particular industry or technology who nevertheless can step into an unfamiliar company and run it successfully through strict application of financial controls, portfolio concepts, and a market-driven strategy.

The obsession with metrics is partly due to managerialism. The delusion that generic business methods can be easily applied to the complexities of healthcare has been perpetuated by famous managerialists such as Sir Gerry Robinson. Less than two weeks after the publication of the second Francis report into Stafford Hospital in 2013, he wrote an opinion piece entitled: 'Yes, we can fix the NHS':²⁹

Imagine a McDonald's in Leicester, say, where things are going wrong. Perhaps the wrong number of chicken nuggets are being handed out, or the washrooms aren't supplied with soap. These problems would show up immediately via a weekly reporting system which compared its performance against every other McDonald's in the country, and you'd have a senior manager down in days to sort out the problems.

Robinson's analogy is telling: to the metrics-driven managerialist, running the health service is essentially no

different to ensuring a uniformity of customer experience at McDonald's many outlets.

It would be foolish to argue that metrics have no place in medicine, but over-emphasis on such metrics has distracted contemporary medicine from its core mission. Society's main concern about medicine is lack of compassion. This concern, as the Stafford scandal showed, is justified; many doctors and nurses see this as the greatest challenge for contemporary healthcare. The components of compassion – kindness, courage, competence – are unquantifiable. The 'invisible glue' and good will which held together publicly-funded health systems such as the NHS, is fast disappearing. In the wake of the Francis Report into the Stafford scandal, there was much pious obeisance made to 'putting patients first', but what practical steps might do this? In hospital medicine, I would suggest three: (i) the rebuilding of clinical teams, (ii) the prioritisation of continuity of care, and (iii) the restoration (with both financial and professional incentives) of the prestige of senior ward (charge) nurses.

Those who are anti-science often seize on the McNamara fallacy as evidence that science is just another flawed 'narrative'. Science is ultimately above that; it is the best way we have of finding out about the world we live in. Science, however, is a human activity, and humans are prone to systematic cognitive bias,³⁰ not to mention common or garden venality and greed. The philosopher John Gray has argued that although scientific knowledge steadily increases, human irrationality remains stubbornly unchanged.³¹ Numbers should be our tool, not our tyrant. ①

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