

Spotting the black swan: why emergency medicine is ahead of the curve

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ABSTRACT

"Black Swans", originally described as an economic theory, are unexpected events whose potential to occur only becomes apparent after they have happened. The concept is very relevant to the practice of Emergency Medicine and this article explores how black swans impact on emergency care and how staff unconsciously aim to mitigate against them.

In his provocative book *Nassim Taleb* (a statistician and market trader) describes 'The Black Swan' event.¹ The name is taken from the impact the discovery of black swans in Western Australia had on the prior notion that all swans were white. A Black Swan event, as described by Taleb, would not be considered a possibility at the time but has a huge impact when it occurs and only in retrospect is it realised to be a potentially predictable event. Taleb developed the theory through his experience of economics and an observation many so called *experts* were blind to the potential of instability in financial markets (eg, banks being too big to fail):

What I saw was that in one of the most prestigious business schools in the world, in the most potent country in the history of the world, the executives of the most powerful corporations were coming to describe what they did for a living, and it was possible that they too did not know what was going on.

He argues you can not predict Black Swans, as if you could they would not be black swans. However, you can mitigate their impact if you are prepared for their occurrence. While the term is not widely used in medicine, the concept is recognised by those who work in emergency care.² Take the dilemma faced by consultants in charge of overcrowded EDs. Managers or other clinical specialties may point to decreasing inflow and improving bed availability as a way of maintaining positivity in the absence of any obvious solutions. The consultant wonders what if there is an unexpected arrest, a major incident or staff sickness on the night shift that will push you from an already precipitous event into a disastrous one. The experienced emergency medicine consultant is not just planning for the present; they are planning for the potential future(s).

Determining whether an event is a Black Swan is dependant on perspective. Subtleties in vital signs and clinical appearance may be obvious to an experienced clinician but not a doctor at the beginning of their training. An 'unexpected' collapse, for all intents a Black Swan to the junior doctor, may actually be a known complication of a condition recognised by a senior with a greater knowledge

base. The awareness of Black Swans is an important educational process in its own right. A consultant may have previously experienced sending home (appropriately in their opinion) a feverish child who then decompensated with features of sepsis. For future cases, they will try to mitigate against this happening again and may reflect there were subtle features of illness they had missed. In medicine therefore, although you can not predict which individual patient may have a Black Swan event, the knowledge of them may stop them from occurring in a particular cohort of patients.

Not being aware of the potential for Black Swans is an endemic problem throughout history. Taleb describes a triplet of opacity: the world is more complicated than people realise, there is always retrospective distortion (ie, history is far less organised than books make it appear) and we categorise factual information more than we should. These issues are confounded by human nature celebrating 'events' rather than 'non-events' and focusing on results rather than process. This is particularly true in patient safety and our approach to reducing error. Reviewing serious untoward events consumes vast amount of energy and resource. From an individual patient perspective, it is imperative we understand why something has happened and how we can prevent it happening again. But not only is the process of root cause analysis subject to large variation,³ it ignores the huge number of events that are happening all the time that do not result in harm or were actually very positive practice that we could learn from.⁴

Understanding and using knowledge is a core tenet of Taleb's approach to mitigating the risks of Black Swan events. The Dunning-Kruger curve (figure 1) displays a bias in which you demonstrate overconfidence in the early stages of knowledge acquisition.⁵ The more experienced you become, the more you realise what you do not know and therefore confidence falls, rather than increases, until you become an expert. Those on the left-hand side of the curve are much more likely to be blind to Black Swans than those on the right. In all fields of medicine, but especially emergency and intensive care, the junior doctor does not need close supervision because of what they do not know, but because of what they do not know they do not know.

Taleb does not reference the Dunning-Kruger curve but rather highlights '*arrogance in the face of competence*' or (more scientifically) errors in probability estimation that experts make. While it may be argued a true expert is someone who has enough insight to never become overconfident, regardless of where you are on the Dunning-Kruger

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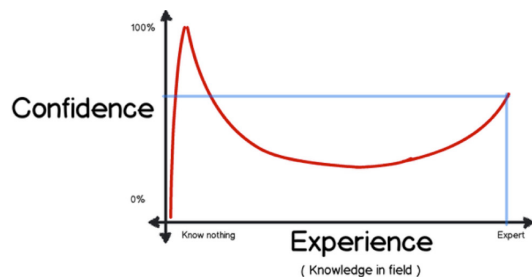


Figure 1 A representation of the Dunning-Kruger curve (via Dr Salim Rezaie).

curve, cognitive biases can beset you. Based on his own personal experiences, Taleb challenges the orthodoxy of confirming ‘No evidence of disease’ rather than ‘Evidence of no disease’. This is a subtle distinction but one that causes a great deal of tension between emergency clinicians and admitting specialties: the Black Swan event being hidden to those who are happy to accept the absence of evidence, ‘*why are you phoning me about this patient who doesn’t have raised inflammatory markers?*’, rather than the evidence of absence, ‘*I would like you to observe this patient’s persistent abdominal pain.*’

A growing challenge in emergency care is the amount of information that can be obtained in an increasingly short period of time. Taleb argues that knowledge itself is an impediment: ‘*...additional knowledge of the minutiae of daily business can be useless, even actually toxic.*’ Certainly, cognitive overload affects individual decision

making and overall situational awareness. However, there is a further issue in emergency care in relation to the impact the consequence of a decision can have versus the probability of it occurring. The utility of Bayesian modelling to inform treatments is extremely laudable in journal articles and textbooks, but in respect of conditions such as sepsis and myocardial infarction, it leaves the treating clinician with visceral emotional dilemmas. While as a profession we do not end shifts congratulating ourselves on not having seen a Black Swan, our practice may unknowingly work hard at avoiding them.

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