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Failure as Teacher

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Drs Singh, Graeb, Fung, and Teal (1) have published a case report in this edition of the *American Journal of Neuroradiology*. Read it. It is a gripping story. In brief, a woman suffered a myocardial infarction. One week later she had a stroke. The middle cerebral artery embolus was successfully lysed with intraarterial urokinase. Then her heart ruptured and she died.

Why publish such a case report in the *AJNR*? Confession cleanses the psyche; that is well known, but the *AJNR* is not in the business of providing for the psychotherapeutic needs of our neuroradiologic brethren. Medical journals, especially those that are clinically oriented, have a mission to foster the exchange of ideas and information of use in understanding disease and treating patients. What are the values and utilities of case reports in achieving that mission? Are they just padding for academic CVs, as some cynically believe, or do they have a true function in helping to serve patients in need?

There are, in fact, several categories of case reports that truly are significant. Case reports deal with rare events, events sufficiently unusual that a series of similar cases cannot be accumulated. Rare events are not perforce insignificant; a single event can point to a concept that has important implications for more common situations. A case report can document a rare event that illuminates a new facet of a more common condition (eg, Hecht et al [2]). Some case reports alert members of the medical community to emerging new conditions that they might soon encounter. AIDS, Lyme disease, and the MELAS syndrome are just a few of the conditions that have been initially reported and described in recent years. We can expect to encounter many new maladies in the years to come, and many of the introductions will be via case reports. Some case reports alert colleagues to potential complications, which they can then avoid. Personally, I am glad Dr Singh and colleagues have already sensitized me to the risk of cardiac rupture complicating cerebral intraarterial thrombolytic therapy, rather than waiting

to develop a larger series of similar cases before publication. Aware of this possible complication, I can now work to avoid it as I select patients for thrombolysis.

Much as we detest them, complications are intrinsic to the practice of medicine. Important as they are, we tend to lump complications generically into a single, contemptible group of untoward events that lead to undesired outcomes. If we classify complications more precisely into groups or types, we can gain insights into their etiologies, and from there we can work to change the patterns that lead toward problems.

In *Forgive and Remember: Managing Medical Failure* (3), a study of decision making in a surgical service of a teaching hospital, sociologist Charles L. Bosk divides medical errors into several types. Technical errors are those in which an operator's skills fall short of those required by a task. All physicians make technical errors. As physicians gain experience, their frequency of technical errors will decrease, but technical errors can occur at any time, even to prudent physicians.

Judgment errors are the result of selecting an incorrect treatment strategy. Curiously, the incidence of judgment errors can actually increase with experience, since more critical decisions tend to be made by more senior practitioners, and when those big decisions go wrong, they go wrong in a big way. Emotional as medical decision making tends to be (4), we evaluate the quality of decisions based on their results, rather than on the underlying scientific logic and reasoning.

Bosk characterizes normative errors as those that result from a failure to discharge a role obligation. Normative error would include failure to disclose important events fully to colleagues, or even lying. Whereas all physicians make technical errors and judgment errors, most physicians go through an entire career without ever making a single normative error. Because they so severely undermine the conventions that underpin the social system we depend

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on to deliver medical care, normative errors are regarded as grave offenses.

Technical error, judgment error, and normative error are situations when a physician errs and an undesired outcome ensues. What about situations when medical personnel do everything correctly and there is a failure anyway (ie, no-fault failure)? I would like to propose two types of no-fault failure. The first type (which I call "Trojan horse" failure) is characterized by an unanticipated and unforeseeable threat embedded within a medical process. Transfusion with HIV-infected blood products and immunization with SV40-contaminated polio vaccine are examples of Trojan horse failure. Trojan horse failure is generally identified at the population level, and a decisive solution is generally developed to abolish the problem.

The second type of no-fault failure is what I call "blowback" failure. Blowback is an expression used in the CIA to describe situations in which actions taken in distant parts of the world later have negative consequences (blowback) in the United States. In blowback failure, the law of unintended consequences fully plays itself out, often brutally. Examples of blowback failure are wide ranging. Lethal injury to children and small adults by normally functioning automobile air bags is an example of blowback failure. Another example is the introduction of house cats as pets in the Hawaiian Islands, resulting in devastation of native bird species. In blowback failure there is no operator error; systems and devices function as they were designed to, but an unpredicted, logically extreme event ensues. Cardiac rupture complicating cerebral intraarterial thrombolytic therapy is an example of blowback failure. No errors were made, but an extreme and unintended consequence caused a severe failure.

Humans normally anticipate problems to some extent. We also learn from our mistakes. The anticipation of situations is intrinsic to the game of chess, and chess masters excel at anticipation. While an untrained chess player might plan three or four moves ahead, a chess master might play nine to 12 moves deep. The human process of anticipation, however, is not exhaustive. We anticipate probable situations, not every possible situation. The ability to analyze the consequences of every possible move in part accounted for the recent chess-match victory of a computer, Deep Blue, over Gary Kasparov, a chess grand master. Whether it is a chess game or an

intracerebral thrombolysis, we cannot imagine every possible contingency of every possible action. We get blindsided by improbable events, and those events can result in blowback failure.

The traditional forum for dealing with unexpected medical failure is the morbidity and mortality conference, in which we discuss cases that have gone awry, analyze the failures, and discuss what we would do differently in the future to avoid the problem. Interventional neuroradiologists generally work alone or in small groups, usually distant from their nearest colleagues. It is extremely difficult for us to meet regularly for meaningful morbidity and mortality conferences. The publication of case reports detailing untoward events represents a globalized morbidity and mortality conference. By sharing our problem cases, in the form of case reports, we can be primed to avoid improbable situations that can lead to blowback failure. As the aphorism goes, "chance favors the prepared mind."

In our daily practices we tend to focus on our own actions, our systems in our own hospitals, and our patients, as if we were independent and isolated from other similar systems. We could instead think of ourselves as parts of an extended community of related and ultimately interdependent individuals, as in a coral reef. The factors that lead to procedural failure for one of us can lead to failure for any or all of us. I would rather not have a complication tomorrow that a colleague had yesterday. Only through communication can we forge the connections that improve us as practitioners and benefit our patients. Rather than quietly licking their wounds after a case that surely upset them, Singh and colleagues courageously communicated with our entire community, epitomizing good citizenship. By sharing our mishaps, as Singh and colleagues have so generously done, we improve the practice for everyone.

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