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## Outcomes and attitudes: lessons learned from pilots

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As a pilot, surgeon, 6 Sigma champion and colleague of one of the authors of the article being discussed here,<sup>1</sup> I have to declare my conflicts of interest early in this editorial. However, the paper in question deserves careful appraisal, because it opens the door to more studies and a more appropriate way of determining how we can improve our operational efficiencies and outcomes in the operating room.

As a pilot of a single-engined plane, one is responsible for all of the cockpit controls; there is a direct relation between the outcome of the flight and the performance of the pilot. In a multi-engined machine, the complexity of the flight increases, and for this reason it was determined that 2 pilots were necessary for commercial flight to ensure that safe operations were more likely with a

sharing of the workload. However, the captain had the ultimate authority, and there was a strict hierarchical approach to decision-making that prevented the rest of the crew from influencing the captain's decisions, sometimes with disastrous results. As a consequence, it was recognized that the cockpit was a resource area where the whole crew all had a responsibility for the safe outcome of a flight and that there had to be a change in individual behaviour so that potential adverse outcomes were recognized early and avoided, even if that meant that the captain's authority was challenged as a result. The use of the Flight Management Attitudes Questionnaire (FMAQ) allowed operating airline companies to identify and train recruits and airline staff in the appropriate behaviour necessary to prevent aviation accidents

due to error or poor decision-making by the flight crew.

This approach was identified and modified for use in medical arenas where one person, the surgeon, is trained to perform complex surgical procedures with a necessary supporting team of allied health care workers, who are also a vital part of the team. The Winnipeg public enquiry<sup>2</sup> identified many dysfunctional aspects of the pediatric cardiac health care team, one of which related to the functioning of the team as a whole in delivering the expected high-quality care needed for such tertiary level activities.

One can see that there are similarities between the surgeon and the captain of an airplane: a hernia repair could be seen as equivalent to piloting a single-engined plane in visual flight rules conditions, a coronary bypass procedure could be seen as

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Accepted for publication Dec. 16, 2005

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piloting a multi-engined plane in instrument conditions, and a pediatric cardiac repair of a tetralogy of Fallot could be seen as piloting a multi-engined plane in icing conditions with one engine out. The more complex the procedure, the more resources are needed, such that a higher demand is placed on expert communication among the operating team.

However, along with an improved cockpit environment and the training to go with it, in aviation there are a lot more regulations and rules regarding how a pilot will behave in different aviation conditions: the pilot is governed by a formidable regulatory authority and by company guidelines that determine what should be done in all of the many situations that are encountered in flights across the world. The pilot's authority is constrained to making judgments based upon a significant rule book.

This is not the case in surgery, and often the surgeon is the one to whom the operating team looks for both guidance and decision-making when the situation is threatening the desired outcome. Much of the Winnipeg enquiry<sup>2</sup> focused on the competencies of the surgeon and how those competencies were judged before the surgeon was exposed to potentially life-threatening situations in the operating room.

The paper by Mark Fleming and colleagues<sup>1</sup> in this issue of the *Canadian Journal of Surgery* (page 22) explores the attitudes of the team present in an operating room for cardiac procedures using the modified FMAQ developed by Sexton and colleagues,<sup>3</sup> the Operating Room Management Attitudes Questionnaire. They found, in a small pilot study, that there are wide variations

in attitudes to decision-making and the identification of errors in medicine. The importance of this study is that there is now a potential means of assessing personnel who work together in the operating room and instituting education and training to improve those outcomes that are supported by the team. Successful teams are often headed by individuals who are able to communicate their ideas, get buy-in from all or most members of the team, and then work with the team to achieve outcomes and standards that are higher than would otherwise be expected. All too often when a team comprises individuals who answer to different masters, there is little chance of changing inherent attitudes without a clear identification of responsibility and authority. The methodology presented in the paper by Fleming and colleagues<sup>1</sup> can be seen as a tool to allow one to survey a team and change a team so that improvements can be made in operational outcomes.

Again, tools like this can be abused; it is not enough for one group to seize upon this tool and then demand equality in the intraoperative decision-making process. The lines of authority have to be clear, and the responsibility to intervene when outcomes are threatened by any one member of the team also has to be clear. The ideal situation would be where standards of operation are defined, supported and enacted for those parts of the operation that are routine, similar to the use of checklists in the cockpit for common and uncommon occurrences, from engine start-up to engine fires. This would include the clear identification of the patient, the operation and

side, blood products, set-up and operation of the heart-lung machine, etc. It would allow all participants to define what is expected from the institution as well as from the operative personnel.

Outcomes that are successful have to be defined, data have to be collected and analyzed, and in the end we are only as successful as our last operation, just the same as a pilot. The cardiac surgeons have gone further than most in publishing the outcomes that concern the patient, namely, survival and complications, and as such they are committed to improving outcomes by making sure that there are few mistakes and by bringing better techniques to the operating room for a systematic evaluation. The rest of the surgical disciplines will have to follow, and this paper identifies ways in which our inner sanctum, the operating room or theatre, can be made to perform at the highest standard. We would do well to follow this group's further investigations in this area.

**Competing interests:** None declared.

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