Letter from North America

WHY SURGEONS SHOULD FLY

Recent reports in the USA have noted that in the past 3 years, there was one major crash for every three million flights commonly flown by Americans. In addition to improved technology and better training, this statistic was explained by the economic climate since airlines retain experienced pilots in a slow economy. Experienced pilots are less likely to commit mistakes, and their near-perfect record can be attributed to periodic mandatory training and adherence to pre- and in-flight checklists. Pre-flight and in-flight checklists originated in part from an incident of a preventable error involving Boeing's B-17 bomber. In 1935, a highly skilled Army Air Corps pilot forgot to release the locking mechanism of the elevator and rudder controls during the test flight of the Boeing long range bomber. This resulted in the plane crashing seconds after take-off, killing several crew members. Boeing's new plane required the pilot to simultaneously manage many details; the problem was not the pilot's lack of skill but that there was 'too much airplane for one man to fly'.[1] The plane was too complex, and in response the Army drew up a segmented checklist to be implemented by pilots before take-off and landing.[2] It resolved the problem of non-technical errors resulting from the failure to recall a single step among a list of dozens, virtually eliminating the need to commit long lists to memory. The Army went on to fly the plane 1.8 million miles without an accident.

Just as the aviation world came up with a viable solution in response to the 1935 tragedy, the medical/surgical field has started implementing checklists as an effective solution for reducing preventable procedural errors. Several medical errors caught the attention of the media in the USA, resulting in greater scrutiny and more checklists for interventional and operative procedures. On completion of a heart–lung transplantation surgery performed on a 5-year-old girl at Duke University Hospital, the surgeons realized that the organ donor's blood type was ABO, which was incompatible with that of the patient. Another set of organs was emergently procured 11 days later and these were transplanted. Despite the surgical team's efforts, the patient was declared brain dead and subsequently taken off respiratory support.[3] Confirming donor–recipient ABO compatibility is one of several preoperative measures that need to be taken before commencing a transplant operation. It may seem that this step is too obvious to be missed, but the fact that it was so easily overlooked showed that there was a major flaw in the system.

When there are numerous steps to be remembered, it is easy to forget simple, albeit crucial, steps. In the case of the heart–lung transplant operation mentioned above, each person assumed that someone else had already confirmed the compatibility of the blood type. As many as 98 000 people die in hospitals each year due to preventable medical errors.[4] Furthermore, unintentional harm is caused in up to 16% of hospital in-patients.[5] Another study found that 27.6% of adverse events experienced by patients were due to negligence,[6] and yet another found that 11.7% of its cohort experienced adverse events.[7] Another study found that half of the cases were deemed preventable[7] and were mostly due to non-technical, procedural errors.[1,8–10] Some studies have examined the use of checklists in hospitals in the USA and found them to be effective.[8–10] Having a checklist can enumerate all necessary pre- and post-procedure tasks, apart from the tasks involved in the procedure itself, analogous to pilot checklists used for a similar purpose. In effect, surgeons are not forced to commit all steps to memory and can focus their attention on the procedure itself. Recent studies aimed at reducing the risks associated with surgery have demonstrated the efficacy of improved organization and have shown drastically reduced rates of nosocomial infection, among other postoperative complications.[5]

A checklist should be used to confirm that a series of steps has been taken before and after a particular procedure. Only when it includes the appropriate steps and is used in the correct context can a checklist be effective in reducing unintentional harm to patients. In the case of surgery or invasive procedures, this consists exclusively of a series of pre- and postoperative/procedure steps that should be routinely followed. Intensivist Peter Pronovost, who made and implemented the first largely successful checklist for intensive care units (ICUs), developed a 5-step checklist for placing central venous catheters in patients at the Johns Hopkins ICU, where he had noticed an alarmingly high rate of catheter-related infections. To ensure the implementation of the checklist, Pronovost had the hospital administration authorize nurses to stop the procedure if the list was not followed. After 1 year of using the checklist, the hospital's catheter-related infection rate fell from 11% to 0%, saving the hospital approximately US$ 2 million.[1,8] Impressed with these statistics, the Michigan Keystone ICU study implemented three similar checklists with Pronovost's help in a large undertaking involving over 100 ICUs in the state of Michigan. The rate of catheter-related bloodstream infections per 1000-catheter days was measured every 3 months. The state-wide infection rate decreased by 66%, saving an estimated 1500 lives in the first 18 months.[8,11]

The applicability of the checklist to low-income areas and developing countries inspired the WHO, under the direction of Dr Atul Gawande, to create a Surgical Safety Checklist that could be used in developing countries to reduce the consumption of resources. Like pilots' checklists, the segmented WHO checklist consists of key items that need to be completed before inducing anaesthesia, prior to skin incision and before the patient leaves the operating room. The checklist can be generalized for use in all surgical procedures. These checklists, which have already been implemented in all procedures in the USA, require that: (i) 'all team members have introduced themselves by name and role'; (ii) the surgeon, nurse and anesthesiologist all verbally confirm the patient, procedure and surgical site; (iii) the surgical team has reviewed anticipated critical events; (iv) the nursing team has ensured sterility and the presence of all required equipment; (v) antibiotic prophylaxis has been given before skin incision; and (vi) essential imaging is readily displayed. Before patients leave the operating room, several items must be completed, including: (i) recording the procedure; (ii) that instrument, sponge and needle counts are correct; (iii) that surgical specimens are labelled (if applicable); (iv) that equipment problems, if any, are addressed; and (v) that the surgeon, anaesthesiologist and nursing team together review postoperative management.[12] This checklist, a key component of WHO's Safe Surgery Saves Lives initiative, has reduced complications and resource consumption related to items addressed within the checklist.[10]

In a large-scale study involving eight hospitals from around the

world (including a hospital in New Delhi) representing a wide range of economic circumstances, the overall rate of death decreased to nearly zero and the overall rate of postoperative complications decreased by 36% after the implementation of the WHO checklist.[10] Eleven hospitals in the Netherlands participated in a similar study to examine the effectiveness of a 'comprehensive, multidisciplinary surgical safety checklist, including items such as medication, marking the operative side, and use of postoperative instructions'.[9] This checklist was very similar to the WHO checklist. Compared with the five control hospitals, where there was no change in the number of complications and in-hospital mortality, in the six hospitals where the checklist was used, the total number of complications decreased by over 10% and in-hospital mortality decreased to nearly zero.[9]

Medical/surgical checklists may prove to be especially helpful in developing countries, where resources are limited and procedures are often far from standardized. Interestingly, in the previously mentioned WHO study that implemented the checklist in eight international hospitals, hospitals located in developing countries demonstrated the most significant reduction in complications.[10] WHO has since introduced the Surgical Safety Checklist in several developing countries, where it has been effective.[10] In efforts to further reduce mortality, WHO recently created a checklist for safer childbirth that is currently being piloted in a large healthcare clinic in Karnataka, India.[12] The utility of these checklists is that they are nearly universally applicable; as WHO has shown, one checklist can be used in different operating rooms and for a wide variety of procedures.[12]

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Letter from Chennai

A HAZARDOUS OCCUPATION

Medicine is a hazardous occupation anywhere in India, but in Tamil Nadu it can even be fatal. A doctor in a southern town, who happened to be an anaesthetist at an Employees' State Insurance (ESI) Hospital, had a private clinic (Tamil Nadu's Government Medical Service permits private practice) where she did obstetric work. She was providing antenatal care to a pregnant woman. One day this woman complained of abdominal pain, and the doctor found the foetus dead *in utero*, and suggested a caesarean section to save the life of the mother. Apparently, the mother developed complications during surgery, and the doctor immediately referred her to a private hospital that had better facilities. The patient was declared dead on arrival at that hospital. Her husband was understandably aggrieved and picked up a quarrel with the doctor. It is said that the doctor complained to the local police station and asked for protection, but apparently no action was taken. Sadly, the husband did not stop there. After completing the funeral rites on 31 December 2011, he walked into the clinic and killed the doctor with a sickle. He then surrendered himself to the police, admitting that he killed the doctor. He claimed that she was responsible for the death of his wife and child because of a wrong diagnosis.

Readers might remember that after numerous incidents of violence against doctors in the past, and after a strike by members of the Indian Medical Association (IMA) of Tamil Nadu, the government passed the Tamil Nadu Medicare Service Persons and Medicare Service Institutions (Prevention of Violence and Damage or Loss to Property) Act, 2008. This law has clearly not served its purpose as a preventive measure. Some doctors have been assaulted and their hospitals and clinics have been damaged, but no one had committed a deliberate murder till this incident.

The Tamil Nadu Government Doctors' Association (TNGDA) went on strike; 16 000 doctors are said to have taken part, including 1500 from medical colleges. The next day, they were joined by several members of the state unit of the IMA. A number of demands were presented to the Collectors of various districts: immediate punishment of the perpetrator of the crime, an order that all hospitals should be protected by the police station in the vicinity, and disciplinary action against the police officer who did not take any steps to protect the doctor though a complaint had