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Checklists, Briefings, and Operating Room Safety

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Key Points
- Preoperative checklists have been shown to be highly effective in improving compliance with safety steps and reducing perioperative morbidity and mortality.
- Their effectiveness seems to be enhanced when they are used as a framework for a team briefing that is used to improve communication and promote team behaviors, including empowering junior staff to question more senior authority figures and feeling free to communicate their concerns.
- It seems such a cultural change is essential to ensure full implementation and sustainability of a preprocedural pause/checklist and to effect significant improvements in patient safety.
- There also seems to be an increasing role for these cognitive aids in assisting physicians in handling evidence-based pathways and emergency situations.

INTRODUCTION

Mistakes happen. The inevitability of human error has been the subject of an entire discipline of science, documenting the mechanisms by which fallible humans are doomed to error, from simply losing car keys to miscalculating a dose of critical medications. Limited memory span (the number of objects an average human can hold in working memory is 7 ± 2, frequently referred to as "Miller's Law") and variable attention span (susceptible to multiple distractions and fatigue) make mistakes unavoidable in daily life and the workplace. Theorists have devised multiple approaches and tools to reduce the frequency of errors, particularly to avoid having multiple errors accumulate to produce a significant adverse outcome [1]. The major shift in recent approaches to error prevention is to move away from "blaming" individuals (who are usually trying

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very hard) to identifying the "systems" barriers to avoiding error. Multiple cognitive aids and thought-structuring tools have been developed [2]. This article focuses on the most elementary, the development of a checklist. A checklist roughly defined is a list of "to do" items, from as simple as a grocery list to as complex as the steps needed for a moon landing. Recent large-scale catastrophes, such as the airplane disaster on Tenerife and the Chernobyl nuclear power plant accident, have emphasized the need for adoption of more and more stringent tools to reduce human error.

HISTORY OF THE CHECKLIST

The first significant industrial checklist was developed in the aviation industry. In 1934, Boeing Aircraft Company was submitting a proposed heavy bomber to the Army Air Corps in the hopes of obtaining a large order. Although the plane had performed extremely well in initial trials, on the day of the final phase of evaluations, an army pilot took off in a test model and crashed the plane shortly after becoming airborne. Subsequent review showed that the test pilot was unfamiliar with the controls and had failed to release the elevator lock before take off. Boeing was subsequently given a very limited order for 13 planes. The pilots assigned to this new squadron recognized that this new model was a complex aircraft that may be "too much for one man to fly." The pilots developed a new tool to make sure that everything was done for the flight and that nothing was overlooked; it was a checklist. They actually developed four checklists (take off, flight, landing, and after landing). Their squadron subsequently flew 1,800,000 miles without an accident and the army eventually ordered 12,731 of the B-17 bombers [3]. Since that time, military and commercial aviation has relied extensively on a series of checklists for their normal operative procedures and for all emergency procedures. The ultimate vindication and a public embrace of this type of "cognitive aide" may have occurred when the crew of the US Airways flight out of LaGuardia in January 2009 was able to perform an emergency landing in the Hudson River and save all 155 persons aboard despite the loss of both engines. Coincidentally, within 2 weeks of that highly publicized, heroic event, *The New England Journal of Medicine* published a monumental report about the success of the use of a presurgical checklist to reduce mortality and morbidity in surgical procedures in eight study hospitals around the world [4].

TYPES OF CHECKLISTS

There are many forms of checklists, although all are designed to provide a standardization of a task and to remove the reliance on (fallible) human memory. Simple mnemonics are best known to medical students. Others are lists of tasks to be done in order, a "read-do" format. More complex forms include "read-do-verify," such as pilots do before take-off. When a group is involved, the format can expand to "verify and confirm," as would be most appropriate in the operating room (OR) [5]. Checklists can also be available for emergency situations, not just routine events, such as the ones used in the Hudson river plane landing. Although other industries have developed formal systems for constructing,