A novel approach to improving the safety of patients undergoing lumbar laminectomy surgery

E M Salkind

Abstract
Introduction
The anaesthetics field has recently embraced the use of checklists to obviate the need for long-term memory. The aviation industry has shown that checklists increase safety outcomes and reduce the need for active memory to achieve tasks properly. The use of checklists in anaesthesia in the prone laminectomy patient will reduce bad outcomes specifically POVL, peripheral nerve injuries and cervical injuries. Checklists are derived from IPT (Informational Processing Theory). Anaesthetists training with checklists will learn the proper processes with less actual experience and should have safer outcomes. The aim of this paper is to demonstrate that the use of checklists in anaesthesia will increase safety without reliance on short term memory, improve customer satisfaction, and reduce mortality and morbidity.

Conclusion
I have concluded that there is a national trend in medicine toward the use of checklists just as in other industries. Checklists have proven effective in reducing mortality and morbidity in surgeries by various authors. Checklists in anaesthesia training reduce dependence on active memory and increase safety of outcomes and make decisions more evidence based and consistent. Checklists may enhance post-op screening for possible complications.

Introduction
Mortality and morbidity related to anaesthesia has decreased dramatically in the past two decades. This trend has been influenced by consumer awareness, a rise in insurance rates and malpractice judgments. The identification of causative factors coupled with new technology, improved education, training, supervision and vigilance are the keys to eliminating errors and injuries without the reliance on short term memory.

Lessons learned from industry
The aviation industry has shown that checklists increase safety outcomes and reduce the need for active memory to achieve tasks properly. The use of checklists in anaesthesia in the prone laminectomy patient should reduce bad outcomes specifically POVL, peripheral nerve injuries and cervical injuries. Checklists are derived from IPT. Anaesthetists training with checklists will learn the proper processes with less actual experience. CRNA’s should also have safer outcomes. In anaesthesia practice the response to consumer demand, state regulatory pressures, hospital boards and the insurance industry has fostered changes in safety practice.

Aviation team checklists and Industrial catastrophic events
Aviation team checklists allow crosschecking amongst crew; dictate duties to facilitate coordination and enhance team concept. Members are kept in the loop. The checklist serves as a quality control measure by management and regulators and provides and maintains a standard configuration of the aircraft to defeat degradation of crew’s mental and physical condition.

The usual reaction to a catastrophic event is, “This can’t be happening.” There is no specific planning for such an incident. In the nuclear industry the fix is cumbersome. There are large, unfamiliar and sometimes hard to access manuals and tools. Is there a flowchart or checklist of specifics? How does one handle a stuck valve or overheated core? Checklists in aviation are subdivided into specific tasks such as preflight and taxiing before landing. Are you going through the motions or are you really paying attention?

Problem statement
Anaesthesiology has met the demands to lower mortality and morbidity. Pressure has come from government regulation, licensing agencies and medical centre governing boards. Various authors site new technology training methods through ACRM to reduce accidents. New technology involves checklists in the aviation industry and anaesthesiology.

Purpose of the paper
The purpose of the paper is to assess the use of a checklist to improve outcomes in prone laminectomy patients and the impact of a checklist on injuries resulting from faulty positioning. We also want to assess how Checklists and ACRM simulate years of experience and training and allow non-dependence on long term memory and the relevance of a checklist tool derived from IPT.

Problem from the surgeon’s perspective
From the Surgeon’s perspective problems include, bleeding, infection, “bad anaesthesia” and surgical misadventure or anaesthesia accidents; “The unexpected.”

Theoretical background
Bacharach’s method of constructs and variables is used to validate our hypotheses derived from IPT. Short term memory encodes chunks on work space, gistification, patterning, mental...
models, protocols, and checklists which are not dependent on long term memory. Hypotheses are generated from Bacharach’s models. Theory is derived from IPT. Algorithms (checklists) are useful in improving safety outcomes and tasks not dependent on memory. Bacharach’s system was used to prove the validity of the application of IPT through the use of checklists to perform a task. (Figure 1)

Informational Processing Theory

IPT is identified as supporting a framework for the Checklist Tool and incorporates general skills and knowledge. Vocalizing and eye movements are important to short term memory. Changes in short term memory storage and retrieval from long term memory are affected by informational gathering strategies and perceptions in problem solving. “Chunks” refers to the storage of poorly structured data in short term memory. Rote memory of “Chunks” is necessary to implant in long-term memory. The problem space is an area of short term memory similar to the desktop space of a computer and different from the task environment. A node is a piece of data; a possible state of attainable knowledge. Nodes are identified as attainable or unattainable due to individual node characteristics. Information may be

The instance of pattern is analogous to “a memory of a theorem” held in long term memory and used for comparison. Similar patterns are recognized and projected as possible strategies for games of strategy.

Hypothesis

In surgery, improved anaesthetic outcomes are measured by fewer morbidities and mortalities. The anaesthetist will use a checklist to facilitate task performance with fewer bad outcomes. Practitioners in a control group will not have a checklist to facilitate the performance of the given tasks in the prone laminectomy patient. This will be measured against a control group.

Method

A questionnaire will be distributed to practitioners. Since there was no actual SRNA control group, similar results will be derived from the Institute of Medicine (IOM) statistics of injuries in a retrospective analysis. This will be compared to questionnaire responses of the practitioners. The results were discussed in the 2013 Oct. AANA journal and used to improve the checklist.

Discussion

Limitations

Limitations in a study similar to the Welch (2009) study of peripheral nerve injuries in prone anaesthesia patients are represented by confounders. Checklists should be supplemented by a pre-op questionnaire. McDonald’s tracking of post-op morbidities were found to be supplemented by a post-op questionnaire. Selection bias and underreporting is a key limitation. Under reporting may be due to fear of legal action and censure by professional committees. Difference in individual ability and variations in achieving goals, where not all goals are of equal value, may affect the study’s validity.

Effective Checklists

Checklists should address a populations needs, be appropriate to the demands of the situation and environment, simple enough to understand yet detailed enough to accomplish its goal, not cumbersome, written in an easily digestible form and developed from practitioner’s frame of reference. Checklists need to evolve with results dictating efficiency, good human engineering and testing in a target environment. They need to display adaptability, usability, flexibility, consistency, efficiency, reduced redundancy and accessibility and identify specific usability problems.

Drawbacks of Checklists

Use of checklists without understanding the principles, poses a threat to the population and does not replace vigilance, especially in positioning.

Injuries in Prone Lumbar Laminectomy Surgery

Injuries include post-operative Vision Loss (POVL), brachial plexus injuries, cervical spinal injuries and crush injuries to genitals.

Prevention of Injuries during surgery for prone lumbar laminectomy

Identify mal-positioning –possibly due to Wilson frame selection – identify

Figure 1: Components of a theory.

Licensee OAPL (UK) 2014. Creative Commons Attribution License (CC-BY)

The 10 P’s of The Lumbar Laminectomy Checklist Tool

The Salkind Laminectomy Checklist Tool—The 10 P’s

Conclusion

References

The author would like to thank Dr. R. Levitt of the VA Medical Center in Miami and the University of Miami for reviewing this paper in 2011 and Pat Salkind for proofreading and tech support.

There is a national trend in medicine to checklists in anaesthesia and morbidity in surgeries by various other industries. Checklists have been used to improve patient safety and reduce adverse events. This paper was originally presented as a project for the DNAP program at Virginia Commonwealth University in Richmond at the MCV Campus in 2011.

This work expresses only the opinions of the author not those of the Department of Veteran’s Affairs or its agents or affiliates. No compensation has been received for the writing, research or publishing of this paper.

All authors contributed to conception and design, manuscript preparation, read and approved the final manuscript. All authors abide by the Association for Medical Ethics (AME) ethical rules of disclosure.

Competing interests: None declared.

References


Licensee OAPL (UK) 2014. Creative Commons Attribution License (CC-BY)


