



# A pilot study for introduction of cognitive aids during in-situ simulation of anesthesia crises



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## OBJECTIVE

The purpose of this study was to familiarize the anesthesiology residents with the use of cognitive aids during simulated operating room (OR) crises. We hypothesized that cognitive aids use would improve adherence to critical management steps .

## BACKGROUND

Standard protocols, checklists and various forms of cognitive aids are routinely used in patient care during non-crisis situations. Safety-conscious industries such as aviation have expanded the use of cognitive aids for emergency situations. This experience is starting to be translated to medicine and it is receiving increased interest by the anesthesia community. Cognitive aids have significant safety implications because of possibility to decrease variability in human performance, particularly in crisis situations. Familiarization with cognitive aids is essential for their efficient utilization. Simulation training offers an excellent way for anesthesia professionals to become familiarized with cognitive aids and to practice during stress. Also, due to relative infrequency of critical events, the use of simulation facilitates a structured observation of these unpredictable events.

## METHOD

This study was subjected to Yale University Human Investigation Committee (HIC) approval. CA1 (PGY2) and CA2 (PGY3) anesthesiology residents were recruited as participants in this study. The participants were surveyed regarding their previous exposure to cognitive aids. The monthly simulation sessions were conducted in-situ, in the operating room setting familiar to the participants in coordination with SYN:APSE, Yale New Haven Health Center. The simulation scenarios covered clinical topics relevant to the residents level of training. Each simulation session was 15 minutes long and each team was composed by 4 residents. The teams were randomly assigned to manage the scenario with a set of crisis checklists or from memory alone. The checklists were provided in booklet form (Emergency Manual . Stanford Anesthesia Cognitive Aid Group 2014 presented in Fig.1). The booklet was easily accessible, adjacent to the anesthesia machine. The outcomes recorded included failure to adhere to critical steps of crisis management, delayed adherence to critical steps, inappropriate dosing of medication, inappropriate parameters for cardioversion or for transcutaneous pacing. At the end of each session, the participants were surveyed regarding their perception and clinical relevance of the checklists. The 5-point Likert scale was used to assess the realism and the quality of the simulation scenarios.

Table 1.

Examples of management changes secondary to cognitive aid use during simulated crises

Example	With checklist	Without checklist
Unstable bradycardia	Prompt transcutaneous pacing	Transcutaneous pacing was delayed and the settings inadequate
Amniotic fluid embolism	Cardiopulmonary bypass considered	CPB not considered when resuscitation measures were unsuccessful
Anaphylaxis	All critical steps completed. Adequate dosing of medication	Missing various critical steps (e.g. fluid administration), delayed administration for drug of choice (epinephrine), inadequate dosing
Malignant hyperthermia (pediatric patient)	Adequate dosing of medication	Missing critical steps (e.g. discontinuation of volatile anesthetics). Inadequate dosing
Pheocromocytoma , Unstable tachycardia	Adequate dosing of medication Adequate cardioversion parameters	Inadequate dosing of medication. Inadequate cardioversion parameters
All scenarios	Prompt call for help	Delayed call for help

## RESULTS

A total of 40 anesthesiology residents participated in this study . The preliminary survey indicated that most residents are familiar with cognitive aids use during non-crisis situations. However, none of participants has used cognitive aids during management of critical events. 28 simulation sessions have been conducted between January to April 2015 using 7 simulation scenarios (3 scenarios for CA1 residents and 4 scenarios for CA2 residents). 50% of these sessions (14 sessions) were performed by memory alone and 50% of them were performed using cognitive aids. Checklist use resulted in improvement in the management of simulated anesthesia crises by trainees, as illustrated in the examples provided in Table 1. Calling for help, adequate dosing of various medications and completion of the critical steps were impacted by the use of checklists. Feedback comments indicated that the checklists were easy to use and that the residents would use these checklists if presented with these operative emergencies in real life. All participants rated the overall quality of the sessions as above average or excellent.

## CONCLUSIONS

Cognitive aid use was associated with improvement in management of simulated anesthesia crises by trainees. Limitations of this study include the simulated nature of the crises as events undoubtedly occur in more varied circumstances than we could simulate. Future work is needed to address the implementation of cognitive aids in the real OR environment.

## REFERENCES

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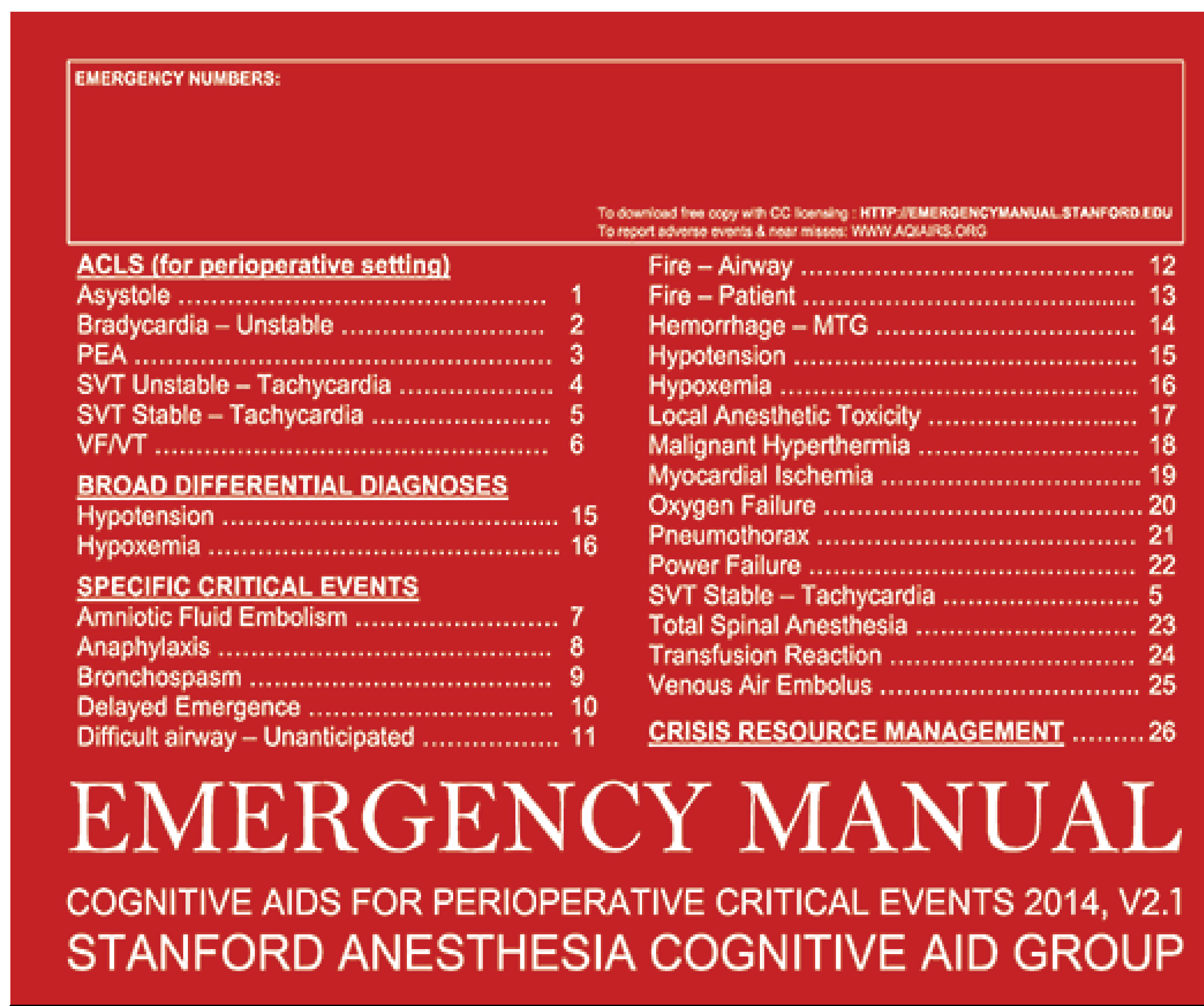


Figure 1. Emergency Manual. Stanford Anesthesia Cognitive Aid Group 2014