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## **Anesthesiologists' Nontechnical and Cognitive Skills Evaluation Tool**

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**Background:** Increasingly, anesthesiology has been embracing the importance of nontechnical skills as an important component of error prevention and management strategy (1). Various paradigms exist with considerable overlap, none likely superior to the next (3). The Anesthetists' Nontechnical Skills focusing on teamwork, task management, decision-making, and situation awareness (2). Crisis Resource Management includes dynamic decision-making, interpersonal behavior, and team management (3). The concept of cognitive errors, or faulty thought processes which lead to errors despite available knowledge to make the correct decision, address the behavioral psychology of decision making (4). We designed and evaluated an assessment tool to represent a synthesis of these concepts.

**Methods:** Categories and behaviors of nontechnical and cognitive skill were taken from the literature for content validity and synthesized into a 5 point Likert-style evaluation tool containing an overall performance score and 24 discrete behavioral questions. Anesthesiology residents (PGY 2-4) were observed during management of simulated emergencies (n=38); performance was rated by two previously trained and calibrated experts. Performance ratings were given after debriefing to allow for thought process exploration, since not all of the skills are directly observable.

**Results:** Instrument reliability was demonstrated by Cronbach's alpha of 0.812.

**Discussion:** The nontechnical and cognitive skills (NCTS) tool reflects principles of various proprietary nontechnical skills curricula, and adds the concepts of cognitive errors to the assessment of decision making. It is crucial to debrief prior to completing the tool, since information about participant thought process is revealed during debriefing. A key feature of cognitive errors is that they are distinct from knowledge gaps, and thus the evaluator must know whether a knowledge gap is present in order to classify an observed behavior as a cognitive error. This assessment tool can be used to reliably evaluate anesthesiology residents' performance of these important skills that are ubiquitous across clinical encounters, regardless of the nature of the emergency.

1. Glavin RJ. *Excellence in anesthesiology: the role of nontechnical skills*. Anesthesiology. 2009 Feb;110(2):201-3.
2. Fletcher, G., Flin, R., McGeorge, P., Glavin, R., Maran, N., & Patey, R. (2004). *Rating non-technical skills: Developing a behavioural marker system for use in anaesthesia*. Cognition, Technology & Work, 6, 165-171
3. Gaba DM. *Crisis resource management and teamwork training in anaesthesia*. Br J Anaesth. 2010 Jul;105(1):3-6.
4. Croskerry P. *The importance of cognitive errors in diagnosis and strategies to minimize them*. Acad Med. 2003 Aug;78(8):775-80. Review.

### Non-Technical and Cognitive Skills Evaluation Tool

Faculty Instructions: Place a checkmark in the box that represents your assessment of resident performance during this simulation exercise:

Behavior	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1. Elicited all needed information for pre-op or handoff					
2. Followed established protocols (ex: ASA Difficult Airway, ACLS, etc)					
3. Initiated critical treatments in a timely manner					
4. Appeared to consider life-threatening causes of problem					
5. Prioritized most critical tasks first					
6. Allocated attention to all presenting issues, not just the biggest problem					
7. Communicated status changes to the OR team clearly					
8. Treatments were indicated based on established emergency procedures (not desperation, "try anything")					
9. Revised plans if therapies were unsuccessful					
10. Utilized team members (RN, surgeon) to perform needed tasks					
11. Gave helpers explicit assignments as to what was needed					
12. Called for needed resources (people or supplies) in a timely manner					
13. Ensured the clear establishment of a leader, even if it wasn't "hot seat" resident					

<b>14. Anticipated future patient states well (was right about predicted responses to decisions)</b>					
<b>15. Clearly informed others of the seriousness of the situation</b>					
<b>16. Acknowledged concerns voiced by other team members</b>					
<b>17. The simulated environment was confusing enough to significantly affect resident actions</b>					
<b>18. Asked for input from team members during decision making</b>					
<b>19. Became focused on one issue at the expense of fully understanding the situation</b>					
<b>20. Considered a thorough differential diagnosis</b>					
<b>21. Chose a diagnosis because it was easily retrieved from memory ("I've been burned" in the past)</b>					
<b>22. Was significantly swayed by a feature early in the clinical presentation</b>					
<b>23. Addressed specific team members instead of just making statements aloud</b>					
<b>24. Made adjustments when new information was presented; did not try to "make" data fit a diagnosis</b>					

\* The following questions may correspond to cognitive errors, though debriefing (exploring residents thinking process) is required to determine if the cognitive error occurred, or if knowledge deficit or other factor resulted in poor performance

- 3. Omission Bias
- 6, 19. Anchoring
- 8. Commission Bias
- 9. Sunk Cost
- 12. Overconfidence
- 20. Premature Closure
- 21. Availability Bias
- 22. Framing Bias
- 24. Confirmation Bias

\*\* Other items correspond to categories of NonTechnical Skills from the following sources, which have considerable overlap:

**TeamSTEPPS (<http://teamstepps.ahrq.gov/>)**

- Leadership
- Communication
- Situation Monitoring
- Mutual Support

**Safety at the Sharp End: A Guide to Non-Technical Skills.** Flin et al Ashgate Publishing. 2008

- Situation Awareness (gathering/interpreting info, anticipating future states)
- Decision-making (defining problem, considering options, selecting/implementing options, outcome review)
- Communication (sending info clearly, include context and intent, receiving info by listening, addressing barriers to communication)
- Team Working (supporting others, solving conflicts, exchanging info, coordinating activities)
- Leadership (using authority, maintaining standards, planning and prioritizing, managing workloads and resources)
- Managing Stress (identifying and coping)
- Coping with Fatigue (identifying and management strategies)

**Anesthetists' Non-Technical Skills System (<http://www.abdn.ac.uk/iprc/ants/>)**

- Task Management
- Team Working
- Situation Awareness
- Decision Making