

# The Evaluation Cube: A Novel Approach to Assessing Pediatric Anesthesia Fellows

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## Background

- Goal of a pediatric anesthesia fellowship is to train individuals who can independently manage all perioperative aspects of a patient regardless of age or severity of illness.
- Current evaluation systems rely on numerical scores to show progression.
- Adult training focuses on independence and case complexity
- Pediatric training adds a third component: age.
- Independence, case complexity, and age can be combined to form a cube that visually expresses competency as the volume of the cube.
- We propose that using this visual format improves communication of fellow evaluation results.

## Methods

- Attending anesthesiologists evaluate fellows on preoperative planning, intraoperative management, postoperative planning, and technical skills, using a structured questionnaire (**Table**).
- Evaluators rate a fellow's level of independence, and the youngest age and highest ASA status of the patient for whom the fellow can care independently.
- Higher ratings indicate greater independence, younger age, and higher ASA status
- The cube volume formed by these three dimensions expresses overall competency.

**Table.** Examples of questions used to assess each resident and build the cube:

**PRE-OP CLINICAL** How well does the fellow create a perioperative plan?

- Superficial:** Identifies clinical issues but relies on the attending's help and guidance to create a basic perioperative plan.
- General Sense:** Can optimize a non-complex patient and formulate a complete perioperative plan with active help.
- Adequate:** With passive help can optimize and a complete perioperative plan for complex procedures, i.e., identifies the TOF but needs help in assessing the risks inherent to the lesion.
- Almost Perfect:** With supervision can optimize a complex patient and create a complete perioperative plan for most, if not all procedures.
- Expert:** Can independently formulate a perioperative plan for complex patients undergoing any procedure.

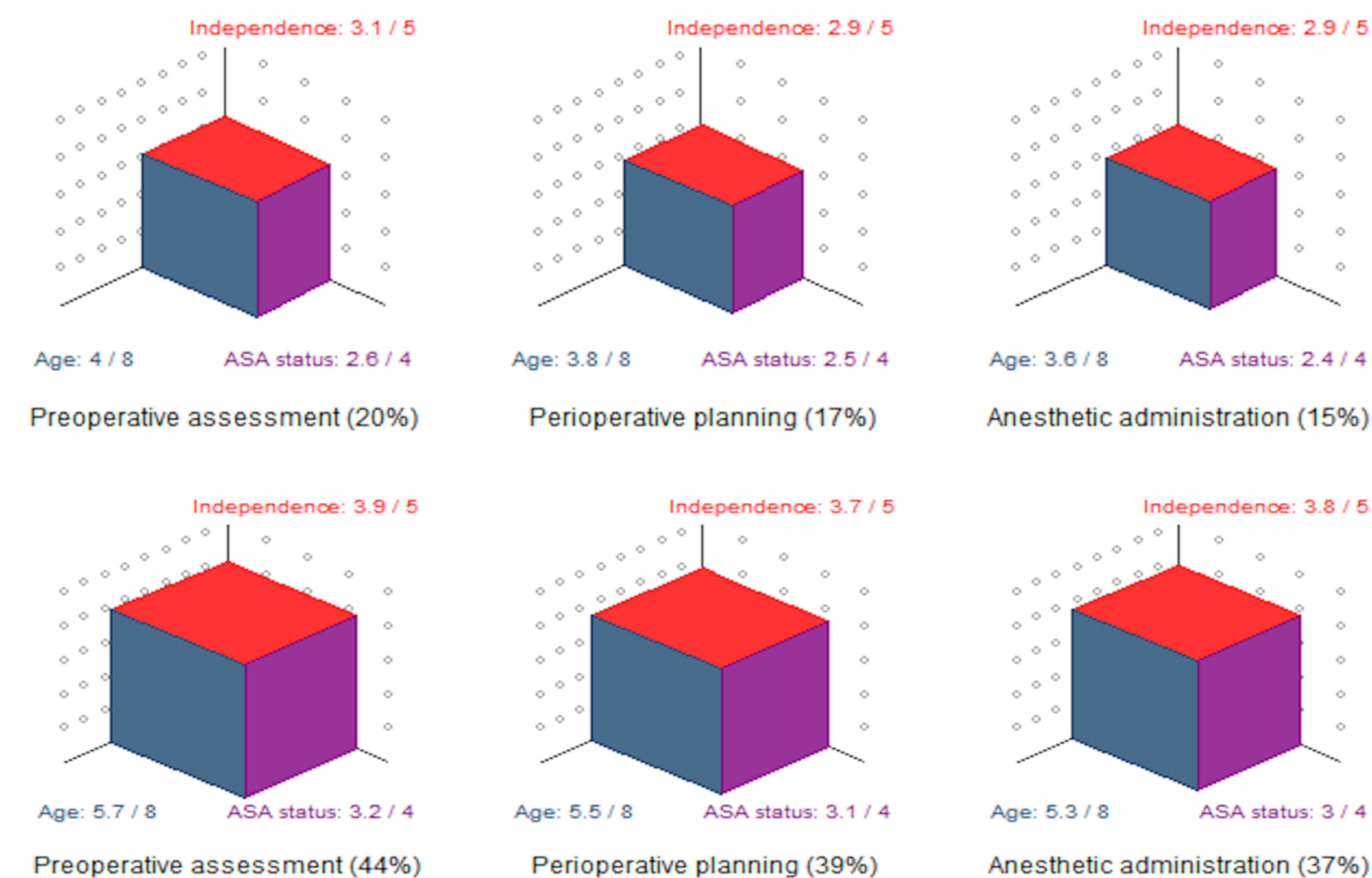
**INTRA-OP CLINICAL** What age group can the fellow independently deliver an anesthetic for an exploratory laparotomy? Assume that older patients are easier and younger are more difficult.

- Adult (>18 years)
- 12-17 yo
- 3-11 yo
- 1-2 years
- 6 month to 1 year
- 5 weeks to 6 months
- term to <5 weeks
- preterm to less than 45 week PCA

**POST-OP CLINICAL** What ASA status can the fellow independently plan and manage the post-operative period of their patients for an exploratory laparotomy?

- ASA 1
- ASA 2
- ASA 3
- ASA 4

**Figure.** Sample three-dimensional representation of a pediatric anesthesia fellow's competency as a percent of maximum attainable competency. Initial evaluation on top and subsequent evaluation on bottom.



## Results

- Since 2015, we have used cube volume, as a percent of attainable maximum (**Figure**), to summarize a fellow's competency at 3-4 time points during the year.
- Change in cube volume was used to illustrate a fellow's progress.
- The shape of the cube facilitated discussion about fellows' different educational needs.
  - For example, one fellow may be able to function independently over a large range of complexity, but only in older patients; whereas another fellow with a similar cube volume may function less independently, but over a broader age range.

## Discussion

- Using numerical questionnaire responses, we have constructed a three-dimensional representation of fellow competency that facilitates fellow evaluation and discussion of their educational plan.
- Increasing cube volume over time succinctly summarizes the clinical maturation of the fellow.
- The cube format shows fellows aspects of their clinical skills that may need more attention, and encourages a well-rounded comprehension of their current skill sets.
- This novel evaluation tool has been well received in our department, and has provided fellows with a graphical representation of their progress throughout their fellowship training.

## References