Can You Intubate? A Continuous Statistical Analysis of Clinical Competence

Pott LM, Budde AO, Vaida S, Reddy V.
Airway Research Group, Department of Anesthesiology, Hershey Medical Center, Hershey, Pennsylvania

Learner Audience: All anesthesiology residents, throughout their training. Study has IRB approval.

Background: Anesthesiology residents must become competent at intubation using a variety of different techniques, and the training institution should document that competence. Statistical process control, particularly the CUSUM technique, determines whether the resident's performance is superior to a predetermined rate, and displays the performance curve graphically. This technique has been applied to assess technical proficiency in medical practice previously (see appendix 1).

Needs Assessment: The ABA and the ACGME requires documentation of clinical competence. Our Department, like many others, had no record of resident performance at intubation. Merely counting cases provides no information about whether the attending or the resident performed the task, or whether success was achieved. Oversight of airway training was lacking.

Hypothesis: The intervention goal was to continuously monitor resident performance, thereby identifying suboptimal practice enabling corrective action. Group data can be used to determine the average number of cases required for establishing competence at a skill, providing a scientific basis for training requirements.

Curriculum Design: Residents use a check-list (fig 1) to record performance for every case. The data is entered into a spreadsheet for each resident and graphs determined (fig 2 and 3). Practice Based Learning is promoted strongly by reviewing the data with the resident. Statistical techniques can be used to determine the probability that the next attempt will be successful. The described technique can be used to assess training program performance.

Outcome: The analysis allows early feedback for under-performing residents, and forms an objective basis for the rapid promotion of high-achievers. The CUSUM provides accurate data on learning curves. This analysis provides medico-legal protection for the individual and the training institution by documenting skill level and adequacy of training. The technique is likely to be suitable for assessing all motor skills (regional anesthesia, invasive monitoring) and can easily be introduced at other institutions. Provided the same performance criteria are used, multi-center data collection is easy.

Appendix 1.
References:

Figure 1.
Airway Audit Form.

Resident:……Patient:

Date:……

Attending:……..

Face Mask LMA Supreme ILMA Macintosh Miller

Awake FO Asleep FO GlideScope McGrath Bullard Shikani

Other *(specify)*

……..

Less than 3 maneuvers for instrument positioning. Yes No

An maneuver is defined as a backwards/ forwards movement, or left/right movement, of greater than approximately 1 inch.

Less than 3 attempts at intubation. Yes No

An attempt is defined as a backwards/ forwards movement, or left/right movement, of greater than approximately 1 inch.

Intubation time less than 60 seconds. Yes No

Time measured from blade insertion until tube inserted.

Termination by supervisor. Yes No

Please provide reasons in comment section below.
Termination is defined as physical intervention, or advice necessary to prevent complication.

Comments:

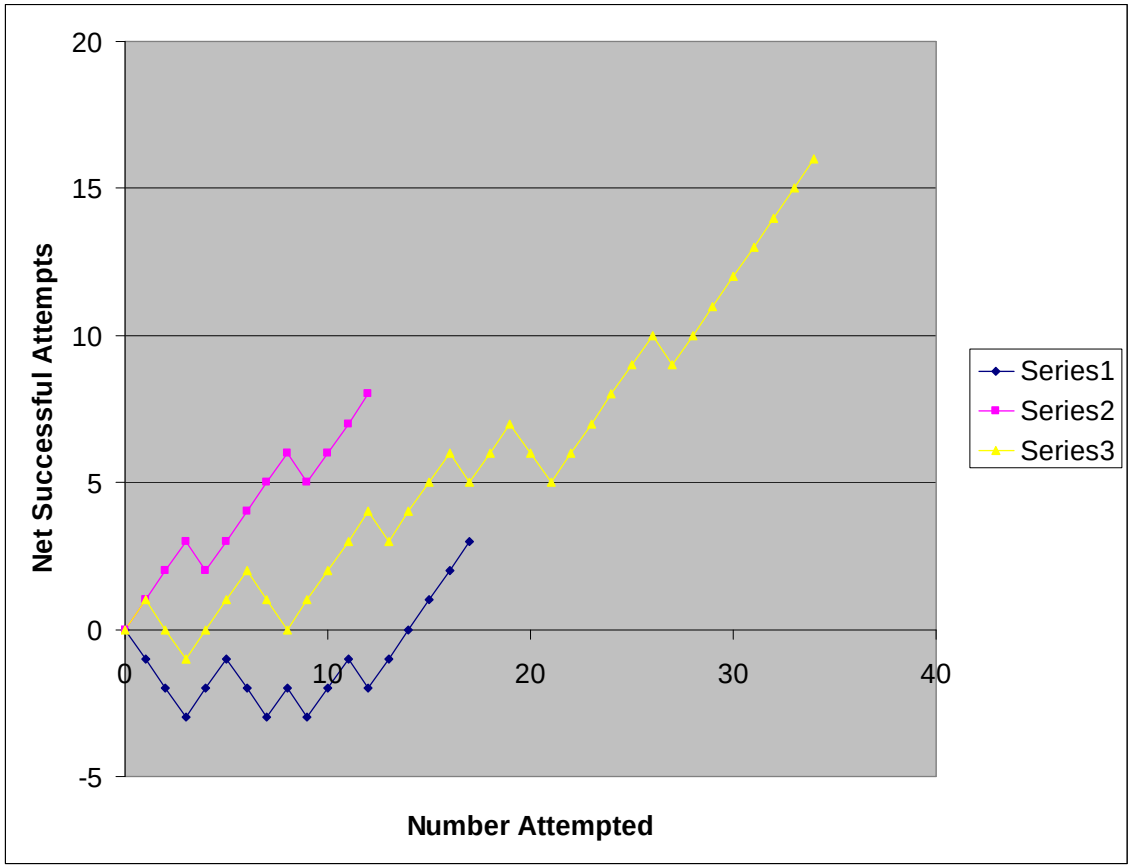

Figure 2. Graphical representation of success / failure at intubation. (Successes are plotted

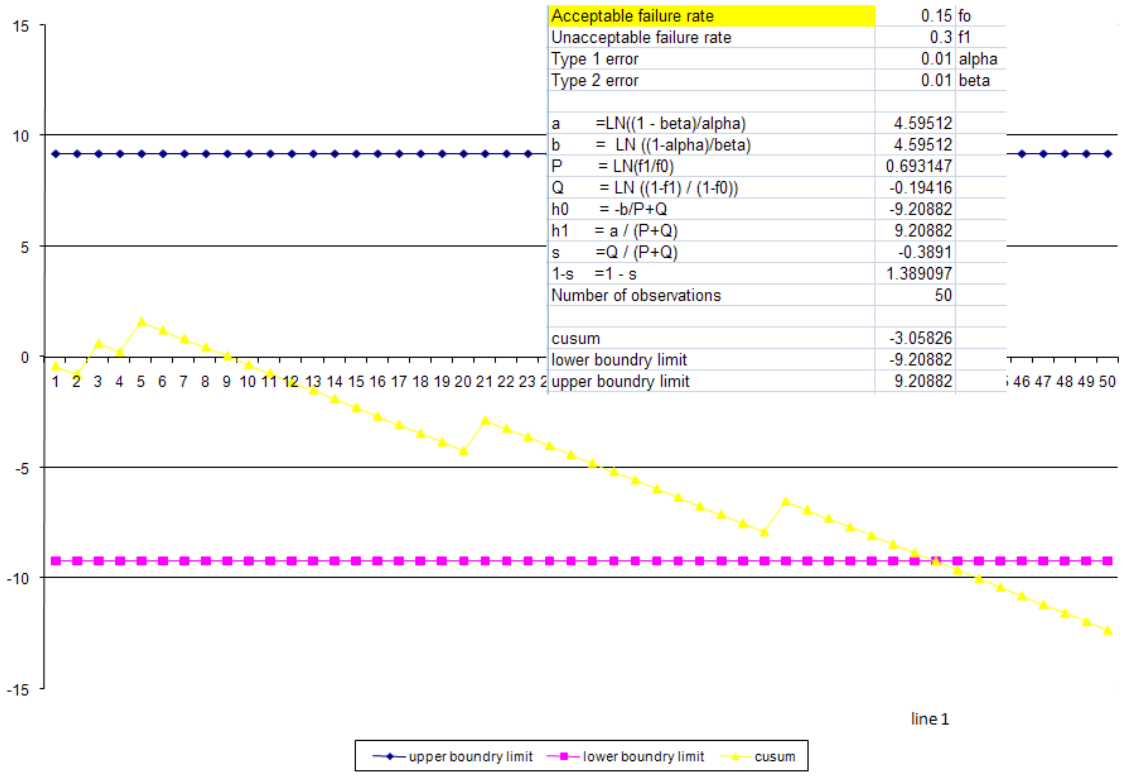

Figure 3. Cummulative Sum (CUSUM) graph. (Note that successes are plotted downward).