

CORRESPONDENCE

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Does Early Extubation ("Fast-tracking") of Coronary Artery Bypass Graft Surgery Patients Truly Decrease Perioperative Costs?: Appropriate Analysis of Direct Variable Costs

To the Editor:—Cheng *et al.*¹ are to be congratulated for completing a randomized, controlled clinical trial on the economics of "fast-tracking" coronary artery bypass graft (CABG) patients. Their landmark study provides evidence that early tracheal extubation after CABG surgery reduces elective case cancellation. Some hospitals cancel elective cases because of insufficient intensive care unit (ICU) capacity (e.g., shortage of ventilators). For these hospitals, the benefits of "fast-tracking" patients may be substantial. Decreasing ICU length of stay can permit more patients to have surgery and may increase hospital and physician revenue.

However, Cheng *et al.* also concluded that early tracheal extubation reduces overall hospital costs by 25%, mostly in nursing and ICU costs. We question the methodology used to come to this result. The authors correctly acknowledge that:

"Intensive care unit length of stay is a commonly used yardstick to measure cost indirectly. However, decreased ICU length of stay does not necessarily translate into cost savings unless variable costs are proportionately reduced."

From their tables 5 and 7,¹ these direct variable costs refer mostly to compensation for nurses and respiratory therapists. Yet, in their Methods section, Cheng *et al.* explain that "personnel costs for nursing (overtime or part-time costs) were based on the length of time the nurses spent performing a service multiplied by wages and fringe benefits." We interpret this statement to mean that the authors calculated direct variable costs as the product of hourly salary and ICU length of stay. We question this approach, unless all nurses caring for CABG patients in the ICU were working overtime or part-time. If all nursing and respiratory therapy personnel were working overtime or part-time, then this condition would dramatically limit the application of the authors' results to other institutions.

The use of overtime or part-time nurses or respiratory therapists to care for the CABG patients¹ increases the proportion of ICU costs that are direct-variable costs. Thus, the important issue is what proportion of the nursing and respiratory therapy costs are fixed or variable costs. Costs are variable only if staffing changes proportionally to patient volume and ICU length of stay. Time savings equate with budgetary savings only if the time savings cause a decrease in the number of scheduled staff. At other hospitals, variable costs have been found to account for only 47% of costs in the ICU.² If this is true, the real monetary savings of "fast-tracking" anesthesia may be less than those reported by Cheng *et al.*

Cheng *et al.* should calculate and test statistically the number of full-time equivalent (FTE) nursing and respiratory therapy positions decreased by rapid extubation. This step could be done easily, for example by using discrete-event computer simulation (*i.e.*, Monte Carlo analysis). The authors have data for the times of arrival and discharge of the patients included in the study. They know how many nurses and respiratory therapists were required each shift. Cheng *et al.*'s analysis of their data

considered how many nurses would be needed on average. However, having enough nurses "on average" is insufficient when scheduling ICU nurses and respiratory therapists. Nurses should be present to care for all of the patients. Thus, an appropriate statistical analysis would be to examine variation in the "nearly" peak number of patients in the ICU during each nursing shift. For early extubation to save money, it should decrease the "nearly" peak number of nurses and respiratory therapists needed to staff the ICU.

Variation in the peak numbers of patients and thus the necessary numbers of nurses results from two sources. To support their claims, the authors need to consider these sources of variation in their analysis. First, there can be variation in the number of patients having CABG each day. Second, there can be variation in patients' discharge times from the ICU. By completing a more detailed statistical analysis, the authors will determine the conditions during which their results can be generalized to other institutions. What is the necessary minimum daily volume of CABG patients for an ICU to gain from the decreases in time to discharge achieved by using early extubation? How does this minimum daily volume depend on the minimum number of personnel required to staff the ICU? For example, one respiratory therapist may always have to be present. Without addressing these CABG volume and ICU duration issues (*i.e.*, fixed *vs.* variable costs), the authors dramatically limit the importance of their findings.

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References

1. Cheng DCH, Karski J, Peniston C, Raveendran G, Asokumar B, Carroll J, David T, Sandler A: Early tracheal extubation after coronary artery bypass graft surgery reduces costs and improves resource use—a prospective, randomized, controlled trial. *ANESTHESIOLOGY* 1996; 85:1300-10
2. Macario A, Vitez TS, Dunn B, McDonald T: Where are the costs in perioperative care? Analysis of hospital costs and charges for inpatient surgical care. *ANESTHESIOLOGY* 1995; 83:1138-44

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