Commentary: What makes a cardiac surgical intensive care unit safe after midnight?

Leila Hosseinian, MD,^a and David L. Reich, MD^{a,b}

From the ^aDepartment of Anesthesiology, Perioperative, and Pain Medicine, Icahn School of Medicine at Mount Sinai, New York; and ^bThe Mount Sinai Hospital, New York, NY.

Disclosures: Authors have nothing to disclose with regard to commercial support.

Received for publication Sept 21, 2018; accepted for publication Sept 21, 2018; available ahead of print Nov 15, 2018.

Address for reprints: David L. Reich, MD, Horace W. Goldsmith Professor of Anesthesiology, Perioperative and Pain Medicine, Icahn School of Medicine at Mount Sinai, The Mount Sinai Hospital, 1 Gustave L. Levy Place, Box 1068, New York, NY 10029-6574 (E-mail: David.reich@m Mountsinai.org).

J Thorac Cardiovasc Surg 2019;157:1543-4

0022-5223/\$36.00

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<https://doi.org/10.1016/j.jtcvs.2018.09.082>

Dr Hosseinian leading ICU rounds after midnight.

Cost containment and value-based care are influencing cardiac surgery, with a particular focus on reducing postoperative mechanical ventilation time. The National Quality Forum includes ventilation <24 hours as a performance measure,¹ and the Society of Thoracic Surgeons is promoting extubation within 6 hours as a quality benchmark.² Clinical practices are adapting, with lower opioid dosing, avoidance of hypothermia, and nurse- and respiratory therapist-driven intensive care unit (ICU)-weaning protocols.³

In the setting of these quality metrics, clinicians are justifiably concerned that overnight tracheal extubation is potentially unsafe. In a multicenter cohort study (>90,000 patients across 165 ICUs), Gershengorn and colleagues⁴ showed a greater rate of ICU and hospital mortality in patients undergoing overnight extubation, yet only 4 of those were cardiac surgical ICUs. In contrast, there was not a greater likelihood of reintubation, length of stay, or mortality in a smaller cohort study by Tischenkel and colleagues⁵ (80% of patients extubated overnight were from cardiac surgical units in a single hospital system).

In this issue of the *Journal*, Krebs and colleagues⁶ report on the safety of overnight extubation in 19 cardiac surgical practices in 2 states. The primary analysis found no increased risk of surgical mortality, tracheal reintubation, or composite morbidity-mortality. The strengths of the study include an impressive cohort size (39,812 extubated within 24 hours; 52.1% between 18:00 and 06:00 hours) in a multicenter community practice setting. The subset of patients extubated between midnight (24:00) and 06:00 hours exhibited increased composite morbidity-mortality (odds ratio 1.18, $P = .001$), despite no difference in reintubation or mortality. Propensity score matching analysis would have given more assurance that the predictors of extubation were balanced among the (now 3) groups (06:00-18:00, 18:00-24:00, 24:00-06:00 hours) in the secondary analysis.

Central Message

Achieving safer cardiac surgical patient care overnight in ICUs is an important goal that is achievable with evidence-based guidelines that address staffing, training, and protocol-driven care.

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As a community-based study, lower case acuity was evident: primary nonreoperative coronary artery bypass grafting represented >70% of procedures; 5% were reoperations; and the Society of Thoracic Surgeons predicted rate of mortality was 1.1% to 1.3%. Future investigations should include additional extubation decision criteria, such as number of blood transfusions, use of inotropes, and left ventricular ejection fraction postcardiopulmonary bypass.

This study should be considered in the context of extensive variability in overnight cardiac surgical ICU practices. The safety of extubation and effective responses to deteriorating clinical status are likely influenced by ICU physician, physician extender, and nursing staffing models; staff training and competencies; and effective implementation of clinical protocols, such as enhanced recovery pathways.

The Society of Critical Care Medicine recommends in-house certified intensivist staffing in Level 1 critical care centers, although there is no evidence of consistently improved outcomes in medical or surgical ICUs.⁷⁻⁹ In cardiac surgical patients, however, in-house overnight intensivist coverage was associated with reductions in postoperative mechanical ventilation, transfusions, and hospital length of stay.^{10,11} The authors' institution has implemented a nighttime intensivist model and a nurse-driven ventilator-weaning protocol, which were associated with an improvement in the rate of extubations <6 hours postoperatively from 12% to 52% over several years.

Other centers have implemented fast track protocols and improved extubation times without the addition of overnight in-house physician coverage.³ Tele-ICUs may be a more cost-effective approach to extending ICU quality and safety, although data are limited.¹²

We extend our congratulations to Krebs and colleagues⁶ for increasing the evidence base that will lead eventually to evidence-based consensus guidelines for critical care staffing, training, and protocols.

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