

# Critical Need for Objective Assessment of Postsurgical Patients

**I**N this issue, Reynolds *et al.*<sup>1</sup> add to the legacy of anesthesiologist Virginia Apgar. Following her 1953 publication in an anesthesia journal of “A proposal for a new method of evaluation of the newborn infant,”<sup>2</sup> clinicians around the world rapidly adopted the simple, 10-point score she’d proposed. Until that time, assessment of neonatal condition had been purely subjective and highly variable, and her score was hailed as a striking advancement for providing an objective assessment that strongly correlated with the likelihood of infant mortality in the first month of life. The Apgar score enabled better decision-making in how intensively to care for a newborn, and improved communication among those caring for the child. The difference between caring for a child with a 5-min Apgar score of 10 and one with a score of 4 remains readily apparent. To this day, the score provides a key predictor of neonatal survival,<sup>3</sup> and obstetrics units rely on tracking and audits of patients with low Apgar scores to devise innovations to prevent poor neonatal outcomes. The effect on child mortality rates has been stunning. For this reason, our research team sought to develop a similar score for surgical patients.

Like newborn infants before 1953, patients coming out of surgery are assessed primarily subjectively, passed on to the care of team members with information only about “how everything went” and with no easy, practical metric for targeted improvement, despite mortality that may not occur for days or weeks afterward. Our early studies suggested that an Apgar-like score could be constructed by summing grades for the amount of blood lost, lowest blood pressure, and lowest heart rate during an operation.<sup>4</sup> This Surgical Apgar Score appeared to concisely capture a myriad number of factors that contribute to a patient’s condition after surgery: the patient’s overall fitness and acute health status coming into the operation, the intraoperative anesthesia management, and the magnitude and technical performance of the procedure. Furthermore, in our studies in general and vascular surgery, and in subsequent studies of a few other subspecialties, this score proved to be well correlated with the likelihood of death and serious complications within 30 days after surgery. (Of note, anesthesiologists Aldrete and Kroulik developed a commonly used, 10-point Postanesthetic Recovery Score to guide discharge from the recovery room,<sup>5</sup> but it was not designed to provide a validated prediction of the risk of major postoperative complications or evaluation of surgical outcome.)

Reynolds *et al.* perform an invaluable service in validating the score across a vast cohort of operations—123,864 proce-

dures in all.<sup>1</sup> In parallel to the Apgar score, the authors establish that there is strong correlation with mortality, in this case across a variety of surgical subspecialties. Even among specialties with weaker correlations, each point in increase in the Surgical Apgar Score corresponded to a reduction in odds of mortality of 30% or more. This study adds to a growing volume of literature suggesting that a patient’s condition during surgery is closely associated with the likelihood of death and major disability even weeks and months after the patient emerges from anesthesia. Findings in multiple institutions have now established that this metric may be no less useful than its predecessor.

So why has it not been adopted in practice? Even at the lead author’s institution, where scores are calculated electronically and included in brief surgical notes for all general and vascular surgery procedures, they are rarely actually used, whether to grade intraoperative stability and anesthetic management, to improve communication in patient handoffs, or to provide a target for clinical leaders seeking to improve surgical performance. There are several possible explanations. Accurate assessment and communication about patients coming out of surgery may be considered less critical than about newborns. (Surgical death rates and volumes are higher but they are not publicly reported for hospitals the way infant mortality is.) Education of doctors and nurses about how to use this tool, although simple, may be inadequate. In addition, there may be a desire for metrics customized to individual procedures or built from more complex risk models that provide more powerful prediction of mortality. (However strong the correlation with risk of death within 30 days, the score is nowhere near perfectly diagnostic.)

We suspect, nonetheless, that a major reason the Surgical Apgar Score is not used is that surgeons and anesthesiologists believe that their subjective impressions of patient condition are accurate—or at least no less accurate than this simplistic quantitative score. The next needed study is therefore one comparing the accuracy of clinical assessment of patients’ postsurgical risk of mortality and morbidity with that of the Surgical Apgar Score (and/or other measures). Other important questions remain unanswered. Are intraoperative hemodynamics just a marker of patient disease and intrinsic risk, or can surgeons and anesthesiologists improve scores and outcomes by minimizing blood loss and preventing hypotension and tachycardia? Could better preoperative management of

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patient comorbidities and planning to limit the magnitude of surgical procedures do the same? For patients with low scores, can we effectively intervene during the postoperative period to reduce poor outcomes?

These are not mere academic concerns. Each year, at least 150,000 patients die within 30 days after surgery in the United States alone, and a suspected 1 million die worldwide.<sup>6</sup> Recent research from Ghaferi *et al.*<sup>7</sup> shows that variability in surgical mortality between hospitals is primarily driven by their likelihood of failure-to-rescue—the inability not to avoid a complication but to recognize and rescue a patient from one that has occurred. Developing methods to promptly and accurately identify patients at greatest risk of serious complications, and interventions to improve their management and survival, are now critical public health concerns with thousands of lives at stake.

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