Applying the Surgical Apgar Score

“This patient is a 10. Everything went well.” Or “This patient is a 5. She will need close monitoring.” Before long, physicians and nurses may be using a numerical score like this when transferring patients from the OR to the next level of care.

Researchers have validated a 10-point Surgical Apgar Score that can be used to provide a quick report on how well a patient fared during surgery and the risk for major postoperative complications.

Patterned after the familiar Apgar score for newborns, the Surgical Apgar Score is derived from 3 intraoperative variables:

- estimated blood loss
- lowest mean arterial pressure
- lowest heart rate.

“With these 3 pieces of information, you can make a pretty good guess at how a patient might do in the first 30 days after the operation,” says Scott Regenbogen, MD, MPH, of the Harvard Medical School and Massachusetts General Hospital, Boston, the lead author of a report in the Archives of Surgery.

Predictors of complications

After evaluating dozens of variables, the researchers determined these 3 were the only independent predictors of 30-day major complications. The Surgical Apgar Score is intended to be a useful tool that can be used in “any setting without a lot of cost or difficulty,” Dr Regenbogen told OR Manager.

The study involved a sample of 4,119 general and vascular surgery patients from the National Surgical Quality Improvement Program (NSQIP) database at Massachusetts General.

An analysis showed that of 1,441 patients with scores of 9 or 10, only 72 (5%) developed major complications, and 2(0.1%) died within 30 days of surgery. In contrast, of 128 patients with scores of 4 or less, 72 (56%) developed major complications, and 25 (19.5%) died within 30 days. The researchers found the 3-variable Surgical Apgar Score achieved C statistics of 0.73 for major complications and 0.81 for deaths.

Ready to use

The tool is ready for clinical use, Dr Regenbogen says. The article outlines a number of applications. Surgical teams could use the Surgical Apgar score to give immediate feedback on a patient’s condition. The score can aid communication between surgical teams and the postanesthesia care unit and nursing unit. It could be used to assist in decisions about admitting patients to the ICU.

At one Boston teaching hospital that participated in the study, Dr
Regenbogen says, residents and nurses use the Surgical Apgar Score when transferring a patient after surgery.

“It’s a shorthand way of communicating the overall stability of the patient and success of the operation,” he says.

The score is being validated for other types of surgery, including total hip and knee replacement, radical cystectomy, and colon and rectal resection. A poster presented at the American Academy of Orthopaedic Surgeons meeting in February 2009 reported the Surgical Apgar Score is “strongly predictive” of major postoperative complications after total joint replacements. Data on colon and rectal resections presented at the American Society of Colon and Rectal Surgeons meeting in May 2009 shows the score also predicts which patients are likely to develop a late complication after they leave the hospital.

**A quality improvement tool**

The Surgical Apgar score can be used as an outcome measure for quality improvement and safety efforts, Dr Regenbogen notes.

For example, a surgical division chair might choose to review every elective operation with a score of less than 5 to try to understand what is going on with those operations. Or the chair might look at patients with scores of 8 or more who go to the ICU to see if that was an appropriate use of resources. The score does not allow for comparison among institutions, the authors note.

To evaluate its broader applicability, Surgical Apgar Scores were collected for all patients enrolled in the World Health Organization study of the Surgical Safety Checklist in 8 countries. Use of the checklist was shown to be linked to lower patient deaths and complication rates (March 2009 *OR Manager*). A report on the study’s results for the Surgical Apgar Score is being reviewed for publication.

“We have always looked at this as a way that hospitals with relatively low resource availability for quality monitoring might have a useful tool for their ORs,” Dr Regenbogen says. “The idea is that it can be used both by surgical teams in their care and by the administration in quality audits or attempts to make improvements.”

—Pat Patterson

**The 10-point Surgical Apgar Score**

<table>
<thead>
<tr>
<th>Surgical Apgar Score, No. of points</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Estimated blood loss, mL</td>
<td>&gt;1,000</td>
<td>601-1,000</td>
<td>101-600</td>
<td>≤100</td>
<td></td>
</tr>
<tr>
<td>Lowest mean arterial pressure, mmHg</td>
<td>&lt;40</td>
<td>40-54</td>
<td>55-59</td>
<td>≥70</td>
<td></td>
</tr>
<tr>
<td>Lowest heart rate/min</td>
<td>&gt;85&lt;sup&gt;a&lt;/sup&gt;</td>
<td>76-85</td>
<td>66-75</td>
<td>56-65</td>
<td>≤55&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
</tbody>
</table>

*Note: The Surgical Apgar Score is calculated at the end of any general or vascular surgical operation from the estimated blood loss, lowest mean arterial pressure, and lowest heart rate entered in the anesthesia record during the operation. The score is the sum of the points from each category.*

<sup>a</sup> Occurrence of pathologic bradycardia, including sinus arrest, atrioventricular block or dissociation, junctional or ventricular escape rhythms, and asystole, also receives 0 points for lowest heart rate.

**References**
