

## 5 tips to fast-track cases and improve anesthesia outcomes.

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# Maximizing Your Consciousness Monitor

Aspect Medical

**W**hen the University of California Irvine Medical Center first purchased an anesthesia consciousness monitor several years ago, the facility issued a press release touting the acquisition as “revolutionary.”

Cynthia Anderson, MD, UCI’s chairperson of the Department of Anesthesia, gushed that “it’s now possible to administer up to 30 percent less anesthetic than before while the patient remains in a state of deep sleep.”

Today, however, Dr. Anderson is not quite so enthralled. “We rarely use it, except for cardiac cases, certain TIVA (total intravenous anesthesia) techniques and when patients have a history of awareness during surgery,” she says.

What went wrong? “Cost has been the main issue,” she says, “plus two cases of awareness in cardiac cases, despite monitor readings to the contrary.”

It’s not uncommon to hear facility managers complain that the savings in drug costs do not make up for the equipment cost and that the consciousness monitoring equipment may not

speed anesthesia recoveries enough to recoup the cost on the back end of the case.

Providers also complain that the equipment does not sufficiently predict patient movement and even potential awareness, because data such as the Bispectral Index (BIS) lag 15 to 30 seconds behind “real time” while processing the algorithm.

Has a once-hot technology fizzled? Not at all, say several anesthesia providers who sing the praises for these devices. Here are five suggestions for maximizing the cost-saving potential for your consciousness monitoring equipment.

### 1 Expect a learning curve

Many give up on consciousness monitoring because they don’t stick with it during the long adjustment period before using it becomes second nature. “Learning to monitor by EEG, rather than primarily by vital signs, takes a good deal of time to master,” says Ira Rampil, MD, the director of clinical research at the State University of New York (SUNY) Stony Brook.

How long? At least 50 cases, says Barry Friedberg, MD, of Corona del Mar, Calif. “After about 30 cases, I looked at our outcomes and I saw little, if any, difference in the amount of anesthetic we used. But it soon clicked that I did not yet completely embrace the transition to differentiate cerebral from spinal cord-generated activity.”

Here’s the trick, he says: Recognize that there is a difference between movement due to awareness (meaning lack of

adequate sedation) and unconscious movement from a sufficiently sedated patient. For example, when monitoring primarily based upon traditional methods (such as heart rate, pulse oximetry and end-tidal CO<sub>2</sub>), it's common to administer more sedation when the patient moves intraoperatively. When using a consciousness monitor, however, if the provider knows from the monitor readout that the patient is adequately sedated, he needn't administer additional sedation, although additional analgesia (local or systemic) may be necessary. Without the ability to correlate a numerical value to the level of sedation, providers may be hard pressed to succeed in convincing the surgeon to inject more local analgesia.

The BIS permits the 'custom tailoring' of the anesthetic, especially propofol, to individual variation often lost when relying on per-body-weight regimens commonly used. 'Custom tailoring' eliminates outliers that can clog up a recovery room and cut into a facility's profit by increasing time to discharge and overtime hours.

2

**Identify awareness risks pre-operatively and adjust intraoperatively**

"Awareness, Anesthesia and Consciousness Monitoring with BIS," a study that examined potential awareness while using consciousness monitors, made several key findings:

**What's New in Consciousness Monitors?**

Some key developments in the consciousness monitoring market:

- **Aspect Medical Systems** filed a 510(K) application to revise the indications for use of the BIS monitor, based on the results of four intraoperative and mortality awareness clinical studies that conclude that consciousness monitoring significantly decreases rates of patient awareness during surgery and also decreases intraoperative mortality. According to the company, the domestic studies corroborate a Swedish study that showed a 78 percent decrease in awareness with consciousness monitoring compared with monitoring by vital signs alone.



- **Alaris Medical Systems** stepped out of the U.S. consciousness monitoring market. The company pulled the plug on the Auditory Evoked Potential (AEP) consciousness monitor in the domestic market, saying that the technology, which uses sound to assess anesthetic effects on the central nervous system, has not been embraced in this country. The AEP is available overseas.



- **Physiometrix**, the manufacturer of the Patient State Analyzer 4000 (PSA 4000), received FDA approval on a new PSArray electrode set. The new PSArray extends from temple to temple. Additionally, Physiometrix extended its U.S. and Canadian marketing agreements for the PSA 4000 with Baxter Healthcare.



- **Viasys Healthcare, Inc.**, the parent company of Nicolet Biomedical, which manufactures the hand-held SNAP consciousness monitor, continues to offer the real-time EEG device to interface with the Handspring Visor computer. Compatibility with other computer systems, such as the Palm Pilot, may still be in the works, but a company spokesperson would not comment on a timetable. The company recently released SNAP in German, Spanish, Italian and French.



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- As of March, 83 cases of potential awareness were reported; a rate of 1 per 60,000 cases.
  - In 33 cases of confirmed patient awareness, the EEG rating was higher than 60.
  - Awareness risks are higher in cardiac cases than any other.
  - Women seem to be at a higher risk than men.
- "Awareness is possible, but

unlikely, with a BIS-type monitor," says Linda Kovitch, CRNA, MSN, of Newton, Mass., who led the study, which Aspect Medical (the manufacturer of the BIS monitor) supported.

Many providers have a tendency to "over-correct" the problem, notes Dr. Rampil. Dr. Friedberg adds that patient movement with a BIS 60 to 70

during a procedural sedation case most often means that the patient is “light” from increased stimulation during the procedure. The solution — inject more local anesthetic and avoid agents such as more propofol, opioids or ketamine. “It’s a small correction,” says Dr. Friedberg. “Don’t use an anesthetic ‘shotgun’ if a ‘fly-swatter’ will suffice. The consciousness monitor lets you make these subtle adjustments.”

### 3 Take advantage of the EMG reading

Monitoring EMG (electromyographic) activity of the frontalis muscles is one way to overcome the fact that consciousness monitors can be “thrown” by high-frequency interference from electrosurgical devices or from facial muscle activity, says Dr. Friedberg. He recommends using EMG as the secondary trace.

A major benefit of the EMG reading is that the monitor displays it in real time, unlike the BIS, which lags 15 to 30 seconds behind real time. More importantly, it provides a direct visual clue to the provider. “A spike in the EMG almost always precedes patient movement [in spontaneously breathing patients],” says Dr. Friedberg.

### 4 Stop pain and PONV before they start

The only way to fast-track cases is to reduce post-op pain and PONV, and the best

way to do that is to use the equipment to plan pre-emptive strategies. Here are two approaches.

Indianapolis MD Brent Burke, who uses the BIS monitor, titrates just enough medication to get an EEG reading between 50 and 65. He uses a multi-modal anesthetic approach, combining light to moderate dosages of opioids, local anesthetic titration and NSAIDs. The results? Reduced intraoperative movement, post-op pain and PONV. His facility fast-tracks such a high percent of its cases that it more than makes up for the increased equipment costs with greatly reduced PACU costs. It eliminated the Phase I PACU area and arranged 24 “step-down” PACU private rooms around the perimeter of the nursing station, where the PACU nurse can provide Phase I care if necessary.

Dr. Friedberg, meanwhile, bases his propofol-ketamine technique around consciousness monitoring (with BIS) and avoids opioids entirely. In his plastic surgery cases, he gradually titrates the propofol to a BIS 70 to 75 rating before administering a dissociative (50 mg) dose of ketamine and then maintains levels of 60-70 for the case. “This makes ketamine a predictable agent and lets you avoid opioids,” he says. “Eliminating opioids obviates the need for anti-emetics, even in patients with histories of PONV.”

### 5 Adapt the monitor to new procedures

Some complain that the sensors in consciousness monitors can not only get thrown off during electro-surgery (the new BIS XP platform is less disturbed), but that they can obstruct the surgeon. This is particularly true in facial plastic surgery. Dr. Friedberg says that you often can use consciousness monitoring during these “problem” cases, but it takes a bit of creative planning. For example, during an endoscopic browlift or rhytidectomy, gently prep over the sensor, taking care not to get the prep solution into the juncture of the sensor and the cord. During a laser resurfacing case, the provider can keep the patient hooked up to the consciousness monitor while the surgeon makes three passes over the lower facial area, then remove the sensors and switch over to traditional monitoring when the surgeon is ready to move to the forehead.

### Pay for themselves

This is not to say that you can’t achieve good anesthesia outcomes without consciousness monitoring equipment. But when you stick with it over time and learn the nuances of the equipment, experts say, the devices eventually pay for themselves. ■

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