The clinical and economic advantage of NuVasive Clinical Services™
NuVasive® is the only medical device company that can offer minimally disruptive products and procedures for the spine, intraoperative neuromonitoring (IOM) technology, and a comprehensive suite of clinical services.
Intraoperative Neuromonitoring (IOM) offers insight into the nervous system during spinal, nerve, and brain-related surgeries. Use of IOM facilitates the surgical process and can reduce surgical risk by providing critical information and alerts to surgeons of potential harm or compromise to the spinal cord or neural structures.

ADVANCING PATIENT CARE AND SURGICAL ECONOMICS

Current and emerging data illustrate nerve injury is the 3rd most common complication (4.4%) in spine surgery¹ and the 2nd leading cause for increased hospital stay (132% increase).² Additionally, in-hospital complications increase hospital costs, on average, by 234%.³

The use of IOM allows for insight into the functional integrity of a patient’s nervous system during surgery, which leads to better decision making and ultimately, better medicine.

TOP SPINE SURGERY COMPLICATION RATES¹

<table>
<thead>
<tr>
<th>Complication</th>
<th>Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wound infection</td>
<td>2.0%</td>
</tr>
<tr>
<td>Neurologic</td>
<td>6.0%</td>
</tr>
<tr>
<td>Pulmonary</td>
<td>8.0%</td>
</tr>
<tr>
<td>Dysrhythmia</td>
<td>10.0%</td>
</tr>
</tbody>
</table>

AVERAGE HOSPITAL STAY BY COMPLICATION²

<table>
<thead>
<tr>
<th>Complication</th>
<th>Days</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td>5</td>
</tr>
<tr>
<td>UTI</td>
<td>10</td>
</tr>
<tr>
<td>Neurologic</td>
<td>15</td>
</tr>
<tr>
<td>Pulmonary</td>
<td>20</td>
</tr>
</tbody>
</table>
NuVasive Clinical Services™ (NCS) is the nation’s largest provider of intraoperative neuromonitoring services, covering the full range of spine, brain, and other surgical procedures. As part of the NuVasive® family, NCS is the only IOM service provider that can partner with hospitals to provide comprehensive and competitive procedural offerings.

**450+** Neurophysiologists

**25+** Neurologists

**90,000+** Cases per Year
The NCS Difference

| QUALITY | • Joint Commission accredited  
• Leading educational program for neurophysiologists  
• Dedicated, board-certified neurologists interpreting real-time data |
| --- | --- |
| SERVICE | • 24/7 scheduling support  
• Operational effectiveness and quality assessment reporting  
• Detailed IOM data collection and reporting |
| TECHNOLOGY | • Comprehensive IOM modalities (MEP, SSEP, EMG, BAERs, EEG, etc.)  
• NVM5® Platform: IOM + computer-assisted technologies (Bendini®, NuvaMap® O.R.) |
| COMMUNITY | • Participation with GPOs and hospital organizations for standardized and affordable care  
• Routinely publish research in IOM  
• Medical philanthropic missions to developing nations |

**BREADTH OF SERVICE**

- **BASIC**
  - EMG, SCREW TESTING

- **COMPLEX**
  - SSEP, MEP TESTING
  - EEG, CORTICAL MAPPING
PEOPLE
The NCS neurophysiologist team consists of rigorously trained professionals aiming to provide the highest-quality intraoperative neuromonitoring service possible and is supported by an industry-leading training and educational program.

**TRAINING AND EDUCATION**

- NCS neurophysiologists have the nationally recognized Certification of Neurophysiologic Intraoperative Monitoring (CNIM) or they are CNIM eligible. Many have advanced degrees in neuroscience, biomedical engineering, or allied health.
- Extensive internal training and continuing education programs.
  - All courses are fully auditable and eligible for continued education.
- Partnerships with multiple universities to provide fellowship training sites for audiology students.

**WHY CERTIFICATIONS MATTER**

While not required by every IOM company, professional credentials are now recognized as the standard for ensuring competency and quality of care. Specific credentials for IOM are CNIM (Certification in Neurophysiologic Intraoperative Monitoring) and D. ABNM (Diplomat of the American Board of Neurophysiologic Monitoring).
NCS Team

OVERSIGHT NEUROLOGISTS

NCS neurophysiologists located in the operating room work as a team with highly experienced supervising neurologists who oversee the interpretation of the neurophysiological data gathered during surgery via broadband, real-time transmission of signals and instant communication.

OVERSIGHT SERVICES

• 25+ board-certified neurologists with additional training and board certification in clinical neurophysiology
• Additional NCS IOM training, including written/oral exams
• Mandatory proctoring and peer-review process
• Extensive IOM expertise and experience
• Scope of practice limited to IOM
• Use of proprietary software, allowing real-time data analysis
• Each neurologist generates IOM reports for his/her cases
• Quarterly QA performance reviews

CLINICAL RESEARCH

• Multiple publications on intraoperative monitoring techniques, quality assurance/safety, and analysis of IOM alerts.
• Research projects, including alert analysis during pediatric spinal deformity, false-positive findings in transcranial electric motor-evoked potential monitoring when using inhalational anesthesia, and quality assurance and performance improvement in IOM.
• Ph.D neuroscientists on staff to collaborate and assist medical institutions and their physicians with research endeavors as it pertains to the field of IOM.
| L. APB ADM | 132 µV Ø | R. APB ADM |

**TECHNOLOGY**
NVM5 is the only device to combine intraoperative neuromonitoring (IOM) and computer-assisted surgery (CAS) technology into a single platform, specifically designed to support the unique requirements of spine surgery.

**THE NVM5® PLATFORM**

- Predictable intraoperative rod bending, customized to the patient’s anatomy
- Minimized screw pull-out forces
- Precise alignment adjustments

**SURGEON-CONTROLLED NEUROMONITORING**
- Immediate audible/visual feedback
- Real-time nerve proximity and location
- Clinically validated, automated alerts
- Procedurally integrated instruments

**REAL-TIME ALIGNMENT MEASUREMENTS**
- Intraoperative assessment of spinal alignment
- Objective, real-time measurements on imported C-arm images
- Color-coded alerts for fast interpretation

**PATIENT-SPECIFIC ROD BENDING**
- Predictable intraoperative rod bending, customized to the patient’s anatomy
- Minimized screw pull-out forces
- Precise alignment adjustments
CHALLENGES

REVISION SURGERIES
- Malaligned patients: 10x risk of reoperation
- Breached pedicle screws: Top cause of revision
- Poorly bent rods: Up to 47% rate of screw failures

COMPLICATIONS AND HOSPITAL STAY
- Neural injury: 3rd most common complication and 2nd leading cause for increased stay
- Open posterior procedures require longer recovery

INFECTION
- Hospital-acquired infections average 4% to 5% in U.S.
- Surgical site infection is the most common (1% to 4%)

INCREASED COST
- In-hospital complications increase hospital costs, on average, by 23.4%
- The average O.R. cost to a hospital is approximately $80 to $133 per minute

LONGER O.R. TIMES
- Variable, delayed neuromonitoring
- Laborious manual rod bending
- Subjective, iterative alignment assessment

NVM5® SOLUTIONS

• NuvaMap® O.R.: Quantitative intraoperative alignment assessment
• Dynamic Screw Testing: Proactive pedicle breach avoidance
• Bendini: 60% reduction in residual screw forces

• XLIF® Real-time, Directional EMG: Nearly 2/3 reduction in neural complications compared to direct dissection
• MEP/SSEP Monitoring: Highly effective (70-100%) at detecting neural injury
• Multi-modality Neuromonitoring: Reduces risk of neural complications by 49.4%
• XLIF Hospital Stay: 1-3 days compared to 3-6 days with open posterior procedures

• Surgeon-driven Platform: Numerous technologies, one device, fewer vendors in the O.R.
• Augmented Intraoperative Information: Supports faster, less disruptive MAS® procedures

• Multi-modality Neuromonitoring: Reduces hospital cost by $63,387 per neurological deficit averted
• Efficient IOM and Rod Bending: Helps reduce hardware waste and O.R. time. Thirty-minute reduction can lead to $2,400 to $3,990 in savings

• Automated Nerve Testing: Fewer attempts to place screws; faster XLIF nerve detection
• Bendini: Opportunity to reduce rod bending/placement time by up to one hour in large multi-level procedures
NCS Technology

ADVANCED IOM SERVICES

NCS employs advanced technology to facilitate the physiological assessment of neural structure integrity and to map neural anatomy during complex procedures.

• Cortical mapping
• Motor mapping
• Sensory mapping
• Language mapping

• Peripheral nerve monitoring
• Rhizotomy
• Baers (brainstem auditory evoked responses)

• VEPs (visual evoked potentials)
• Cranial nerve monitoring
• Intraoperative EEG
• Cortical perfusion monitoring
As part of the NCS service offering, an annual performance report can be supplied to each hospital and facility, allowing for a complete and objective evaluation of the operational effectiveness and clinical efficacy of your IOM service.

**TOPIC** | **METRIC** | **PERFORMANCE GOAL**
--- | --- | ---
Monitoring orders | Incidence of orders (which may include EMR order entry or scanned NCS order sheet) documented in writing. | 100%
Actionable data | Percentage of cases that required the surgeon to be alerted due to a change in data. | Within 3% of NCS benchmark average by case type
Technical failures | Monitoring incidence for the following reasons: (1) anesthetic effect (2) excessive noise. | <2% of cases
Missed cases | Incidence of booked cases for which NCS personnel did not attend. | <0.1%
Reporting times | Percentage of postoperative reports delivered >72 hours from the end of the case. | <25%
Equipment failures | Monitoring incidence for the following: Equipment malfunction. | <1% of cases
NP documentation | % of cases rated excellent, adequate, or inadequate by oversight neurologist. | <5% Inadequate
Service Line Partnership

FIRST-IN-CLASS SERVICE, BEST-IN-CLASS TECHNOLOGY

- Flat case rates for standard modalities – improves cost forecasting
- Diversified platforms – traditional and NVM®
- Other specialty accessories priced separately
- Value pricing based on case volume
- Additional savings available for long-term and exclusive status
- Significant savings on proprietary NVM platform with NCS services

GROWTH, PARTNERSHIP, SAVINGS

By combining NCS with NuVasive® products and procedures, your hospital will increase cost-saving opportunities year round
- Greater savings with higher commitment level
- Tiered growth rebate based on achieving spend target
- Reduces hardware vendors, consolidates IOM provider
- Rebate inclusive of hardware, biologics, and neuromonitoring

<table>
<thead>
<tr>
<th>Annual Revenue Growth</th>
<th>Rebate on Growth</th>
</tr>
</thead>
<tbody>
<tr>
<td>TIER III</td>
<td>$100,000</td>
</tr>
<tr>
<td></td>
<td>XX%</td>
</tr>
<tr>
<td>TIER II</td>
<td>$500,000</td>
</tr>
<tr>
<td></td>
<td>YY%</td>
</tr>
<tr>
<td>TIER I</td>
<td>$1,000,000</td>
</tr>
<tr>
<td></td>
<td>ZZ%</td>
</tr>
</tbody>
</table>

This concept is for illustrative purposes only; actual rebate and growth targets may vary.
CHANGING LIVES FROM THE INSIDE OUT.

1,004,001

LIVES TOUCHED...AND COUNTING!


4 Tohmehe AG, Isaacs RE, Dooley ZA, et al. Long construct pedicle screw reduction and residual forces are decreased using a computer-assisted rod bending system. *J Spine Neurosurg* 2014;52.


