

# **NuVasive Clinical Services**<sup>™</sup>

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SIVE

The clinical and economic advantage of NuVasive Clinical Services

#### NuVasive® Technology and Service



NuVasive<sup>®</sup> 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

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 surgery<sup>1</sup> and the 2nd leading cause for increased hospital stay (132% increase).<sup>2</sup> Additionally, in-hospital complications increase hospital costs, on average, by 234%.<sup>3</sup>

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 RATES**<sup>1</sup>

#### AVERAGE HOSPITAL STAY BY COMPLICATION<sup>2</sup>



#### **NCS Organization**



NuVasive Clinical Services<sup>™</sup> (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<sup>®</sup> family, NCS is the only IOM service provider that can partner with hospitals to provide comprehensive and competitive procedural offerings.









# The NCS Difference

BASIC

off lines

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

COMPLEX



# CINICASIVE Clinical Services





#### NCS Team

# **NEUROPHYSIOLOGISTS**

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.





#### NCS Technology

## THE NVM5° **PLATFORM**

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.





SCREW TEST AND **NERVE MONITORING** 



SPINAL CORD MONITORING



#### SURGEON-**CONTROLLED NEUROMONITORING**

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



- 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<sup>4</sup>
- Precise alignment adjustments

#### NCS Technology

## CHALLENGES

#### **REVISION SURGERIES**

- Malaligned patients: 10x risk of reoperation<sup>5</sup>
- Breached pedicle screws: Top cause of revision<sup>6</sup>
- Poorly bent rods: Up to 47% rate of screw failures<sup>7</sup>

#### COMPLICATIONS AND HOSPITAL STAY

- Neural injury: 3rd most common complication and 2nd leading cause for increased stay <sup>1,2</sup>
- Open posterior procedures require longer recovery

- NuvaMap<sup>®</sup> O.R.: Quantitative intraoperative alignment
- Dynamic Screw Testing: Proactive pedicle breach avoidance

assessment

- Bendini®: 60% reduction in residual screw forces<sup>4</sup>
- XLIF<sup>®</sup> Real-time, Directional EMG: Nearly 2/3 reduction in neural complications compared to direct dissection<sup>8</sup>
- **MEP/SSEP Monitoring:** Highly effective (70-100%) at detecting neural injury<sup>9</sup>
- Multi-modality Neuromonitoring: Reduces risk of neural complications by 49.4%<sup>10</sup>
- **XLIF Hospital Stay:** 1-3 days,<sup>11</sup> compared to 3-6 days with open posterior procedures<sup>12,13</sup>

# NVM5° SOLUTIONS

JUVASI



#### INFECTION

- Hospital-acquired infections average 4% to 5% in U.S.  $^{\rm 14-16}$
- Surgical site infection is the most common (1% to 4%)<sup>15</sup>
- **Surgeon-driven Platform:** Numerous technologies, one device, fewer vendors in the O.R.
- Augmented Intraoperative Information: Supports faster, less disruptive MAS<sup>®</sup> procedures



#### **INCREASED COST**

- In-hospital complications increase hospital costs, on average, by 234%<sup>17</sup>
- The average O.R. cost to a hospital is approximately \$80 to \$133 per minute<sup>18-20</sup>
- **Multi-modality Neuromonitoring:** Reduces hospital cost by \$63,387 per neurological deficit averted <sup>10</sup>
- **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<sup>18-20</sup>



#### LONGER O.R. TIMES

- Variable, delayed neuromonitoring
- Laborious manual rod bending
- Subjective, iterative alignment assessment

- 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





#### **NCS Reporting Services**



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 NVM5®
- Other specialty accessories priced separately
- Value pricing based on case volume
- Additional savings available for long-term and exclusive status
- Significant savings on proprietary NVM5 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



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!



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<sup>4</sup>Tohmeh 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;S2.

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<sup>6</sup>Tsai T-T, Lee S-H, Niu C-C, et al. Unplanned revision spinal surgery within a week: a retrospective analysis of surgical causes. BMC Musculoskeletal Disorders 2016;17:28.

<sup>7</sup>Paik H, Kang DG, Lehman RA, et al. The biomechanical consequences of rod reduction on pedicle screws: should it be avoided? Spine J 2013;13(11):1617-26

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<sup>10</sup>Ney JP, van der Goes DN, Watanabe JH. Cost-effectiveness of intraoperative neurophysiological monitoring for spinal surgeries: beginning steps. *Clin Neurophysiol* 2012;123(9):1705-7.

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<sup>13</sup>Park Y, Ha JW. Comparison of one-level posterior lumbar interbody fusion performed with a minimally invasive approach or a traditional open approach. Spine 2007;32(5):537-43.

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<sup>15</sup> Lissovoy G, Fraeman K, Hutchins V, et al. Surgical site infection: incidence and impact on hospital utilization and treatment costs. Am J Infect Control 2009;37(5):387-97.

<sup>16</sup>Glance LG, Stone PW, Mukamel DB, et al. Increases in mortality, length of stay, and cost associated with hospital-acquired infections in trauma patients. Arch Surg 2011;146(7):794-801.

<sup>17</sup>Kalish RL, Daley J, Duncan CC, et al. Costs of potential complications of care for major surgery patients. Am J Med Qual 1995;10(1):48-54.

<sup>18</sup>Shippert RD. A study of time-dependent operating room fees and how to save \$100,000 by using time-saving products. Am J Cosmet Surg 2005;22(1):25-34.

<sup>19</sup>Macario A. What does one minute of operating room time cost? J Clin Anesth 2010;22(4):233-6.

<sup>20</sup>Watkins IV RG, Gupta A, Watkins III RG. Cost-effectiveness of image-guided spine surgery. Open Orthop J 2010;4:228-33



To order, please contact your NuVasive<sup>®</sup> Sales Consultant or Customer Service Representative today at: **NuVasive, Inc.** 7475 Lusk Blvd., San Diego, CA 92121 USA • phone: 800-475-9131 fax: 800-475-9134 **NuVasive UK Ltd.** Suite B, Ground Floor, Caspian House, The Waterfront, Elstree, Herts WD6 3BS UK phone: +44 (0) 208-238-7850 fax: +44 (0) 207-998-7818

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