

# Intraoperative Neuromonitoring questionnaire

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| --- |
| **Questions Types** |
| \* Mandatory information | * Multiple answers allowed
 |
| * Only one answer allowed
 | \_\_ please specify |

## PRELIMINARY DATA

|  |  |
| --- | --- |
| **Neuromonitoring date \*** | **Neuromonitoring specified as \*:**  |
| *dd/mm/yyyy* | * Surgeon only used hand-held or automated device
* In-room neuromonitorist independently recorded tests
* In-room neuromonitorist independently recorded tests and Surgeon also used hand-held or automated device
 |

### Institution/Hospital

|  |  |  |
| --- | --- | --- |
| **Operating rooms \*** | **University affiliated \*** | **Neurosurgery and/or orthopedic spine fellowship \*** |
| * < 10 operating rooms
* 10 – 20 operating rooms
* 21 – 30 operating rooms
* 30 operating rooms
 | * Yes
* No
 | * Yes
* No
 |

### Model of Care

|  |
| --- |
| **Model of Care \*:** |
| * PhD neurophysiologist in operating room throughout case
* MD neurophysiologist in operating room throughout case
* Technologist or physiologist in room throughout case, in room PhD neurophysiologist part of case
* Technologist or physiologist in room throughout case, in room MD neurophysiologist part of case
* MD neurophysiologist not routinely in operating room but personally and immediately available
 | * PhD neurophysiologist not routinely in operating room but personally and immediately available
* Technologist or physiologist reporting directly to surgeon; no PhD or MD neurophysiologist availability
* Technologist or physiologist reporting to out of hospital/online MD supervising neurophysiologist
* Technologist or physiologist reporting to out of hospital/online PhD supervising neurophysiologist
* Surgeon driven (or automated) neuromonitoring only
 |

|  |
| --- |
| **Planned maintenance anesthetic \*:**  |
| * Primarily inhaled agent
 | * Intravenous supplemented by inhaled agent
 | * Total intravenous anesthesia
 | * Unknown
 |

|  |
| --- |
| **Pre-op limb and/or walking neurological deficit \*:** |
| * Yes
 | * No
 |
| If YES,**Sensory deficit*** Yes

**Motor deficit*** Yes

**Walking deficit*** Yes
 | if YES: * one upper limb
* both upper limbs
* one lower limb
* both lower limbs

if YES: * one upper limb
* both upper limb
* one lower limb
* both lower limbs

if YES: * Cannot walk
* Can walk with appliance and/or assistance
* Can walk with fair or poor coordination or limp
 | * No
* No
* No
 |

|  |
| --- |
| **High-risk findings on pre-op imaging:** |
| * None
* “Severe” (absolute/critical) stenosis at spinal cord and/or cauda equina level
* T2 MRI intramedullary signal at operated spinal cord level
 | * Coronal or sagittal plane Cobb measurement ≥ 80°
* Other high risk finding *(Specify)*

*\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** Unknown
 |

## MEP and SEP data

|  |
| --- |
| **MEP monitored \*** |
| * Yes

If YES: | * No

If NO,*:** Not attempted because not indicated
* Not attempted because of patient factors
* Not attempted because not ordered or declined by surgeon
* Attempted but MEPs not recordable
 |
| **Total intravenous anesthesia used during MEP acquisition \*** |
| * Yes
 | * No
 |
| **Partial or complete neuromuscular blockade used during critical MEP acquisition \*** |
| * Yes
 | * No
 |
| **When first MEP recorded, timing**  |
| * Before and after positioning
 | * After positioning

but before incision | * After incision or

later in case |
| **Further optimized anesthesia and/or blood pressure management requested** |
| * Yes
 | * No
 |
| if YES, further optimized anesthesia implemented | * Yes
 | * No
 |
| **Before crucial surgical actions, MEPs recorded from all limbs/myotomes at risk** |
| * Yes

if YES, | * No

if NO, were the non-elicitable MEPs from weak limb(s)? |
| * Optimal MEPs (> 100 µV and good trial to trial reproducibility)
 | * Acceptable MEPs

(< 100 µV but good trial to trial reproducibility) | * Suboptimal MEPs

(poor trial to trial reproducibility) | * Yes
 | * No
 |

|  |
| --- |
| From the end of exposure to the beginning of closure, please select the best overall estimate of the number of MEP trials per hour. Concurrent left and right body recordings = one trial:  |
| **Estimated Bilateral MEP Frequency** \* |
| * 6 or more bilateral MEPs per hour
 | * 4-5 bilateral MEPs per hour
 | * 1-3 bilateral MEPs per hour
 | * Less than 1 bilateral MEPs per hour
 |

### Upper SEPs

|  |
| --- |
| **Upper SEPs were monitored**  |
| * Yes

if YES, | * No
 |
| **Recorded before and after positioning** |
| * Yes
 | * No
 |
| **Trial to trial reproducibility BEFORE crucial surgical actions**  |
| * Excellent
 | * Good
 | * Fair
 | * Poor
 |

### Lower SEPs

|  |
| --- |
| **Lower SEPs were monitored**  |
| * Yes

if YES, | * No
 |
| **Recorded before and after positioning** |
| * Yes
 | * No
 |
| **Trial to trial reproducibility BEFORE crucial surgical actions**  |
| * Excellent
 | * Good
 | * Fair
 | * Poor
 |

## Warning Criterion (WC)

|  |
| --- |
| **Major MEP WC Definition: spinal cord \*** |
| * at least 50% amplitude decrease
 | * at least 65% amplitude decrease
 | * at least 80% amplitude decrease
 | * Disappearance

(100% loss) | * Other
 |
| If other, please specify:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |

|  |
| --- |
| **Major MEP WC Definition: root, plexus \***  |
| * at least 50% amplitude decrease
 | * at least 65% amplitude decrease
 | * at least 80% amplitude decrease
 | * Disappearance

(100% loss) | * Other
 |
| If other, please specify:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |

## MEP ALARM(S): CONTECT, ACTION, RECOVERY

### Alarm 1

|  |
| --- |
| **Warning Criterion (WC) met?\*** *(Alarm occurred)* |
| * Yes
 | * No
 |
| **If YES, Was the alarm anesthesia and/or technically related \*** |
| * Yes
 | * No
 |
| **If YES, add another alarm?** *(up to 3 alarms reportable)* | **If NO,** **Surgeon informed and acknowledged \*** |
| * Yes
 | * No
 | * Yes
 | * No
 |
| *(If yes, report as another alarm below)* |  | **If No,**  |
| * Surgeon deferred response or delayed acknowledgment
 | * Not sure surgeon heard or

understood alarm |
| **MEP WC: limbs affected \***  |
| * one upper limb
 | * both upper limbs
 | * one lower limb
 | * both lower

limbs |
| **Surgical context** |
| * Positioning body; head/neck; upper/lower limb
 | * Surgeon action/maneuver
 | * Inadequate blood pressure, perfusion, and/or oxygenation
 | * Unknown or Other
 |
| **Intervention \***  |
| * None
 | * Adjusted or reversed surgeon action
 | * Re-positioned
 | * Corrected blood pressure, perfusion and/or oxygenation
 |
| * Surgical pause
 | * Aborted surgery
 | * Wake up test
 |  |

|  |  |  |
| --- | --- | --- |
|  |  | **Complete or partial MEP recovery before surgery end \*** |
| * Yes

**I**f YES,  | * No
 |
| * Complete (all affected MEPs no longer met WC)
 | * Partial (improvement but one or more MEPs still meet WC)
 |
| **Add another alarm? \*** *(up to 3 alarms reportable)* |
| * Yes

*(If yes, report as another alarm below)* | * No
 |

### Alarm 2

|  |
| --- |
| **Warning Criterion (WC) met?\*** *(Alarm occurred)* |
| * Yes
 | * No
 |
| **If YES, Was the alarm anesthesia and/or technically related \*** |
| * Yes
 | * No
 |
| **If YES, add another alarm?** *(up to 3 alarms reportable)* | **If NO,** **Surgeon informed and acknowledged \*** |
| * Yes
 | * No
 | * Yes
 | * No
 |
| *(If yes, report as another alarm below)* |  | **If No,**  |
| * Surgeon deferred response or delayed acknowledgment
 | * Not sure surgeon heard or

understood alarm |
| **MEP WC: limbs affected \***  |
| * one upper limb
 | * both upper limbs
 | * one lower limb
 | * both lower

limbs |
| **Surgical context\*** |
| * Positioning body; head/neck; upper/lower limb
 | * Surgeon action/maneuver
 | * Inadequate blood pressure, perfusion, and/or oxygenation
 | * Unknown or Other
 |
| **Intervention \*** |
| * None
 | * Adjusted or reversed surgeon action
 | * Re-positioned
 | * Corrected blood pressure, perfusion and/or oxygenation
 |
| * Surgical pause
 | * Aborted surgery
 | * Wake up test
 |  |
| **Complete or partial MEP recovery before surgery end \*** |
| * Yes

**I**f YES,  | * No
 |
| * Complete (all affected MEPs no longer met WC)
 | * Partial (improvement but one or more MEPs still meet WC)
 |
| **Add another alarm? \*** *(up to 3 alarms reportable)* |
| * Yes

*(If yes, report as another alarm below)* | * No
 |

### Alarm 3

|  |
| --- |
| **Warning Criterion (WC) met?\*** *(Alarm occurred)* |
| * Yes
 | * No
 |
| **If YES, Was the alarm anesthesia and/or technically related \*** |
| * Yes
 | * No
 |
| **If YES, add another alarm?** *(up to 3 alarms reportable)* | **If NO,** **Surgeon informed and acknowledged \*** |
| * Yes
 | * No
 | * Yes
 | * No
 |
| *(If yes, report as another alarm below)* |  | **If No,**  |
| * Surgeon deferred response or delayed acknowledgment
 | * Not sure surgeon heard or

understood alarm |
| **MEP WC: limbs affected \*** *(multiple answers allowed)* |
| * one upper limb
 | * both upper limbs
 | * one lower limb
 | * both lower

limbs |
| **Surgical context \*** |
| * Positioning body; head/neck; upper/lower limb
 | * Surgeon action/maneuver
 | * Inadequate blood pressure, perfusion, and/or oxygenation
 | * Unknown or Other
 |
| **Intervention \*** |
| * None
 | * Adjusted or reversed surgeon action
 | * Re-positioned
 | * Corrected blood pressure, perfusion and/or oxygenation
 |
| * Surgical pause
 | * Aborted surgery
 | * Wake up test
 |  |
| **Complete or partial MEP recovery before surgery end \*** |
| * Yes

**I**f YES, | * No
 |
| * Complete (all affected MEPs no longer met WC)
 | * Partial (improvement but one or more MEPs still meet WC)
 |

## WARNING CRITERION WC

|  |
| --- |
| **Major SEP WC Definition \*** |
| * at least 50% amplitude decrease
 | * amplitude reduction from recent

pre-change values exceeding variability | * Other
 |
| If other, please specify:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |

## SEP ALARM(S): CONTEXT, ACTION, RECOVERY

### Alarm 1

|  |
| --- |
| **Warning Criterion (WC) met?\*** *(Alarm occurred)* |
| * Yes
 | * No
 |
| **If YES, Was the alarm anesthesia and/or technically related \*** |
| * Yes
 | * No
 |
| **If YES, add another alarm?** *(up to 3 alarms reportable)* | **If NO,** **Surgeon informed and acknowledged \*** |
| * Yes
 | * No
 | * Yes
 | * No
 |
| *(If yes, report as another alarm below)* |  | **If No,**  |
| * Surgeon deferred response or delayed acknowledgment
 | * Not sure surgeon heard or

understood alarm |
| **SEP WC: limbs affected \***  |
| * one upper limb
 | * both upper limbs
 | * one lower limb
 | * both lower

limbs |
| **Surgical context** |
| * Positioning body; head/neck; upper/lower limb
 | * Surgeon action/maneuver
 | * Inadequate blood pressure, perfusion, and/or oxygenation
 | * Unknown or Other
 |
| **Intervention \***  |
| * None
 | * Adjusted or reversed surgeon action
 | * Re-positioned
 | * Corrected blood pressure, perfusion and/or oxygenation
 |
| * Surgical pause
 | * Aborted surgery
 | * Wake up test
 |  |
| **Complete or partial SEP recovery before surgery end \*** |
| * Yes

**I**f YES,  | * No
 |
| * Complete (all affected SEPs no longer met WC)
 | * Partial (improvement but one or more SEPs still meet WC)
 |
| **Add another alarm? \*** *(up to 3 alarms reportable)* |
| * Yes

*(If yes, report as another alarm below)* | * No
 |

### Alarm 2

|  |
| --- |
| **Warning Criterion (WC) met?\*** *(Alarm occurred)* |
| * Yes
 | * No
 |
| **If YES, Was the alarm anesthesia and/or technically related \*** |
| * Yes
 | * No
 |
| **If YES, add another alarm?** *(up to 3 alarms reportable)* | **If NO,** **Surgeon informed and acknowledged \*** |
| * Yes
 | * No
 | * Yes
 | * No
 |
| *(If yes, report as another alarm below)* |  | **If No,**  |
| * Surgeon deferred response or delayed acknowledgment
 | * Not sure surgeon heard or

understood alarm |
| **SEP WC: limbs affected \***  |
| * one upper limb
 | * both upper limbs
 | * one lower limb
 | * both lower

limbs |
| **Surgical context \*** |
| * Positioning body; head/neck; upper/lower limb
 | * Surgeon action/maneuver
 | * Inadequate blood pressure, perfusion, and/or oxygenation
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 |
| **Intervention \*** |
| * None
 | * Adjusted or reversed surgeon action
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 | * Corrected blood pressure, perfusion and/or oxygenation
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| * Surgical pause
 | * Aborted surgery
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 |  |
| **Complete or partial SEP recovery before surgery end \*** |
| * Yes

**I**f YES, | * No
 |
| * Complete (all affected SEPs no longer met WC)
 | * Partial (improvement but one or more SEPs still meet WC)
 |
| **Add another alarm? \*** *(up to 3 alarms reportable)* |
| * Yes

*(If yes, report as another alarm below)* | * No
 |

### Alarm 3

|  |
| --- |
| **Warning Criterion (WC) met?\*** *(Alarm occurred)* |
| * Yes
 | * No
 |
| **If YES, Was the alarm anesthesia and/or technically related \*** |
| * Yes
 | * No
 |
| **If YES, add another alarm?** *(up to 3 alarms reportable)* | **If NO,** **Surgeon informed and acknowledged \*** |
| * Yes
 | * No
 | * Yes
 | * No
 |
| *(If yes, report as another alarm below)* |  | **If No,**  |
| * Surgeon deferred response or delayed acknowledgment
 | * Not sure surgeon heard or

understood alarm |
| **SEP WC: limbs affected \***  |
| * one upper limb
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limbs |
| **Surgical context \*** |
| * Positioning body; head/neck; upper/lower limb
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 | * Inadequate blood pressure, perfusion, and/or oxygenation
 | * Unknown or Other
 |
| **Intervention \*** |
| * None
 | * Adjusted or reversed surgeon action
 | * Re-positioned
 | * Corrected blood pressure, perfusion and/or oxygenation
 |
| * Surgical pause
 | * Aborted surgery
 | * Wake up test
 |  |
| **Complete or partial SEP recovery before surgery end \*** |
| * Yes

**I**f YES,  | * No
 |
| * Complete (all affected SEPs no longer met WC)
 | * Partial (improvement but one or more SEPs still meet WC)
 |

## CO-DIAGNOSTICS

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **2 dimensional(Conventional C-arm)**  | **3 dimensional (Isocentric C-arm, O-arm, intraoperative CT, or navigation)** | **Robot guided screw implantation or other surgical maneuver** | **Surgeon directed/driven hand-held and/or automated neuromonitoring device** | **Stagnara (wake-up) test** |
| * Yes
* No
 | * Yes
* No
 | * Yes
* No
 | * Yes
* No
 | * Yes
* No
 |