VITAL SIGNS

ICP = Intracranial Pressure

1. CDE Variable	ICP = Intracranial pressure AvICP = Average daily ICP HighICP = Highest daily ICP
2. CDE Definition	Intracranial pressure
3. Recommended instrument for assessment	Preferred approaches to ICP monitoring are by ventricular or intraparenchymal catheters. Values are expressed in mmHg.
4. Description of measure	Intracranial pressure
5. Permissible values	-10 to 99 (-10 to 300) *The range presented represents the range of plausible values. Values outside this range may be queried. The numbers given between brackets, represent the range of possible values, including extreme situations. Values outside these ranges, will be queried immediately.*
6. Classification: Basic / Intermediate / Advanced	Basic: record the average ICP on a daily basis. The average does not need to be the mathematical average of multiple measurements, but rather the value most representative of this 'daily' period. In addition, we recommend to document the highest ICP; periods of artifactually high ICP levels (for example calibration) or short duration ICP increases due to coughing and/or straining should be excluded when determining the highest ICP. Intermediate/advanced: record hourly values. We recommend to take readings at a fixed time point, for example the last minute of the hour. Exclude values which may be artifactually increased or high due to coughing and/or straining.
7. Procedure	ICP should be monitored continuously, preferably by an intraventricular or intraparenchymal catheter.
8. Comments / Special instructions: We recommend zeroing the ICP monitor at the level of the foramen of Monro. Cerebral perfusion pressure can be calculated as: MABP – ICP. It is recommended to relate all hourly data to date and time of injury, as being the only fixed time event across patients. The same format for recording ICP can also be applied to other monitoring modalities, such as brain tissue oxygen tension, jugular saturation and CBF measured by thermal diffusion. The choice to document the highest or lowest daily value is dependent on the monitoring modality. When hourly values of ICP are recorded (intermediate/advanced) we recommend to additionally capture information on the summary TIL (see template on Therapy Intensity Level). This will permit identification of changes in ICP and CPP directed therapy on a daily basis. We do not recommend recording this on an hourly basis, but rather at three, four or six hour intervals.	
9. Rationale / justification: Monitoring for and treating raised ICP is an important element in the management of	

patients with severe TBI.

10. References:

Guidelines for the management of severe traumatic brain injury. VIII. Intracranial pressure thresholds. *J Neurotrauma*. 2007;24 Suppl 1:S55-8

Vik A, Nag T, Fredriksli OA, et al. Relationship of "dose" of intracranial hypertension to outcome in severe traumatic brain injury. *J Neurosurg*. Oct 2008;109(4):678-684

Recommended time for assessment:

Basic: record on a daily basis as required by protocol.

Intermediate/advanced: record hourly values as long as intensive monitoring is required; we would advise as a minimum day 1 to day 5.

VITAL SIGNS

ICPMonit = Intracranial Pressure Monitoring - Procedures

1. CDE Variable	ICPMonit
2. CDE Definition	This variable presents details on ICP monitoring techniques and procedures employed. Date and time of start (implantation) of ICP monitoring and end of ICP monitoring are recorded, as well as the device used and reason for stopping the monitoring.
3. Recommended instrument for assessment	N/A
4. Description of measure	Date/time: calendar, clock Device/reason for stopping: categorical; unique entry.
5. Permissible values	**Date and time of start/end of monitoring:** - DD-MMM-YYYY; HH:MM 99-999-9999 if unknown **Device used:** - ventriculostomy - intraparenchymal - epidural - subdural - other please specify **Reason for stopping:** - clinically no longer required - monitor/catheter failure - patient considered unsalvageable - patient died - unknown
6. Classification: Basic/Intermediate/Advanced	Identical
7. Procedure	N/A
8. Comments/Special instructions:	
9. Rationale/justification: Recording the duration of ICP monitoring is essential to interpreting ICP results and standardisation of coding. The reliability and comparability of measured values may in part depend on the device used. Documentation of the reason for stopping monitoring is relevant when interpreting measured values and their relation to therapy intensity.	
10. References: Guidelines for the management of severe traumatic brain injury. VII. Intracranial pressure monitoring technology. *J Neurotrauma*. 2007;24 Suppl 1:S45-54	

Recommended times for assessment: Complete this data element upon termination of ICP monitoring.

VITAL SIGNS

ICPProblem = Problems With ICP Monitoring

1. CDE Variable	ICPProblem ICPProblemText = Description of daily ICP monitoring problems ICPRevised = ICP monitor revision ICPAccurate = ICP values are accurate ICPArtifactText = Description inaccurate ICP values ICPTxHeld = ICP treatment withheld
2. CDE Definition	This section describes any problems with ICP monitoring which may lead to inaccurate (interpretation of) measured values.
3. Recommended instrument for assessment	N/A
4. Description of measure	Binary/categorical (multiple entries permitted).
5. Permissible values	ICPProblem: 'yes' or 'no' ICPProblemText: - accidental catheter removal - catheter obstruction/failure - suspicion of inaccurate measurement ICPRevised: 'yes' or 'no' ICPAccurate: 'yes' or 'no' ICPArtifactText: free text ICPTxHeld: 'yes' or 'no'
6. Classification: Basic / Intermediate / Advanced	ICPProblem/Text, ICPRevised, ICPTxHeld: identical ICPAccurate + ICPArtifactText: intermediate and advanced
7. Procedure	
8. Comments / Special instructions: To be completed on a daily basis.	
9. Rationale / justification: Measured values may be influenced by catheter malfunction. It is therefore highly important to document possible problems in ICP monitoring. The interpretation of high ICP values is different if active ICP lowering treatment has been discontinued in situations where a patient is considered unsalvageable. Information captured within this module is therefore essential towards interpretation of measured values.	
10. References: *Smith M*. Monitoring intracranial pressure in traumatic brain injury. *Anesth Analg*. Jan 2008;106(1):240-248	

Recommended time for assessment: Daily as long as ICP monitoring is required.