AONeurom Curricula

Neurotrauma
A framework for educational planning
Curriculum Planning Committee

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Further information for all chairpersons and faculty regarding implementation of the curricula is available in the AONEuro Faculty Center at www.aoneuro.org
AONeuro’s mission to continuously set standards in postgraduate medical education and to foster the sharing of medically guided expertise in a worldwide network of healthcare professionals to improve patient care means we must have a quality approach to developing educational offerings for our multispecialty community.

**Our new curricula:**

- Provide comprehensive frameworks for our education in selected areas of practice in cranial neurosurgery
- Establish a competency-based approach to developing all educational activities
- Define learning outcomes that should be achieved by clinicians to improve care based on patient problems
- Establish quality standards in our educational activities

**To optimize your educational experience, we need these curricula to:**

- Ensure our events are designed to address the patient problems and the needs of our target audiences
- Address all stages of your career: from training, to early years in practice, to when you are an expert
- Integrate the latest science of education for designing, implementing, and evaluating quality education
- Provide measurable results from an outcome-driven approach

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**This document contains three sections:**

1. **How do we develop the curricula?** P 4–5
2. **The neurotrauma curriculum** P 6–9
3. **Implementing the curricula (Instructional Design)** P 10–13
How do we develop the curricula?

We develop the curricula for our specific topics by forming planning committees to apply the most up-to-date development and implementation processes from the AO Education Institute (summarized in this document).

Backward planning

Our surgeon planning committee identified the patient problems that must be addressed and the performance these problems demand of the surgeon. They then defined competencies (abilities) that describe what the surgeon or healthcare professional must be able to do to address these problems. Based on the competencies, educational activities were then designed to achieve the intended learning outcomes. The entire process is called backward planning and results in competency- and outcomes-based education.

Competency-based education

Our processes and output all center on the four key elements of competency-based education:
AO principles of education

The 7 Principles of Education defined by AO are the foundation of our high-quality education. Our faculty development programs promote the application of these principles as a basis for all planning and delivery.

1. Based on needs
2. Motivates to learn
3. Relevant
4. Interactive
5. Provides feedback
6. Promotes reflection
7. Leads to verifiable outcomes

Faculty development

Our comprehensive programs for faculty, chairpersons, and educational leaders ensure that all faculty are provided with the support they need to implement the curricula and to achieve their educational goals.

Team approach

A key feature of AO’s approach is to bring together experts from the clinical topic and from education. Target learners are represented in the team approach: participant feedback and evaluation data ensure events are adapted and updated to meet your needs.

Educational events (courses, webinars, etc) that are implemented to the required standards and criteria will carry the competency-based curriculum brand to show that our quality approach has been applied.
Patient and clinical problems

**Brain injury**
- Bleeding
- Contusion
- Swelling

**Fractures**
-Depressed skull fracture
- Compound, linear, branched fractures
- Skull-base fracture
- Craniocervical junction fracture

**ICP increase**

**CSF leakage**

**Life-threatening issues**
- Depressed consciousness
- Difficulty breathing
- Low blood pressure
- Penetrating head injury
- Circulation
- Additional injuries
  (isolated trauma vs polytrauma)

**Technical problems**

**Rescue chain**

**Timing of decisions and interventions**

**Pre-existing conditions**
- Eg. hypertension

**Organization/the system**
- Who manages the patient?
- Referrals, specialists, etc.
- Decision making
- Availability of facilities

**Surgical, iatrogenic complications**
- Identification, management, avoidance
- Control vital functions

**Complications**
- Hydrocephalus
- Post-trauma epilepsy
- Long term, functional disability
- Infection
- Morphological problems, aesthetics

**Competencies**

Based on the patient and clinical, the planning committee identified the following competencies (abilities) as a framework for all AONeuro educational offerings for neurotrauma.

| 1 | Perform basic assessment in the emergency situation |
| 2 | Integrate into interdisciplinary management |
| 3 | Decide appropriate investigations, interpret the results, and react appropriately |
| 4 | Select and perform operative procedures |
| 5 | Select and perform nonoperative procedures |
| 6 | Manage ICP |
| 7 | Prevent, identify, and manage complications |
| 8 | Organize rehabilitation transfer and follow-up |
| 9 | Apply guidelines specific to neurotrauma |
| 10 | Communicate with the patient, relatives, and colleagues |
## Learning outcomes (per competency)

### Competency 1: Perform basic assessment in the emergency situation
- Gather all relevant information
- Perform emergency scanning (triage)
- Describe and perform ATLS
- Apply the ABC system
- Apply GCS (and extended GCS)
- Apply advanced triage system
- Describe interdisciplinary polytrauma management
- Consider advanced neuroimaging

### Competency 2: Integrate into interdisciplinary management
- Know the local “system” and integrate yourself into this system
- Establish a team structure
- Establish continuous weekly trauma boards/meetings
- Participate in conflict management
- Know your possibilities and limitations
- Manage and participate in leadership
- Know the availability and capacity of ICU and OR
- Use resources with care

### Competency 3: Decide appropriate investigations, interpret the results, and react appropriately
- Diagnose the various pathologies in neurotrauma
- Perform basic neurological examination
- Describe the classification of neurotrauma
- Apply classification systems
- Describe the indications for various imaging modalities
- Choose the appropriate imaging and interpret the results
- Correctly interpret and document all results and findings
- Perform invasive investigations (and be aware of the unknown)
- Recognize the potential role of advanced neuroimaging
- Recognize the potential role of biomarkers
- Describe the parameters for monitoring
- Be aware that the patient can change
- Describe basic intensive care management
- Recognize that continuous monitoring is necessary
- Perform precise evaluation
- Know your limits
- Be flexible in changing treatment
- Don’t be afraid to ask for advice
## Learning outcomes (per competency)

### Competency 4: Select and perform operative procedures (see below)

<table>
<thead>
<tr>
<th>Knowledge</th>
<th>Skill</th>
<th>Attitude</th>
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</thead>
<tbody>
<tr>
<td><strong>Operative procedures</strong></td>
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<tr>
<td><strong>Major focus</strong></td>
<td></td>
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<tr>
<td>• Elevation of depressed skull fracture</td>
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<tr>
<td>• Decompressive craniectomy A) Frontal; B) Lateral; C) Posterior fossa</td>
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<tr>
<td>• Dural repair incl. dural substitutes A) Cranial; B) Spinal</td>
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<tr>
<td>• Frontal sinus management A) Open; B) Endoscopic</td>
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<tr>
<td>• Penetrating head injury (low/high velocity)</td>
<td></td>
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<tr>
<td>• Reconstruction A) Cranioplasty; B) Bone flap handling; C) Dura</td>
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<td></td>
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<tr>
<td>• Nerve injury A) Optic nerve; B) Facial; C) Cavernous sinus syndrome</td>
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<td></td>
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<tr>
<td>• Vascular injury A) Endovascular; B) Microsurgical</td>
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<tr>
<td>• Skull base reconstruction</td>
<td></td>
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<tr>
<td>• Evacuation of a traumatic mass/lesion</td>
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<tr>
<td>• Shunt</td>
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</tbody>
</table>

| Minor focus | | |
| • Soft tissue management and debridement | | |
| • Remove foreign bodies | | |
| • Burr hole | | |
| • ICP/multifunctional probe | | |
| • Parenchymal probe | | |
| • Epidural probe | | |
| • Intraventricular probe | | |
| • Subdural probe | | |
| • Lumbar drain | | |
| • Halo jacket/traction | | |
| • Tracheostomy | | |
| • Thoracic tube | | |

### Competency 5: Select and perform nonoperative procedures

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### Competency 6: Manage intracranial pressure (ICP)

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</thead>
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<td></td>
<td></td>
</tr>
<tr>
<td><strong>Major focus</strong></td>
<td></td>
<td></td>
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<tr>
<td>• Elevate intracranial pressure (ICP)</td>
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<tr>
<td>• Recognize various probes</td>
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<tr>
<td>• Describe the indications for ICP monitoring</td>
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<tr>
<td>• Discuss operative vs nonoperative management</td>
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<tr>
<td>• Explain key issues regarding ventilation, sedation, osmotics, positioning, CSF drainage</td>
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<tr>
<td>• Describe the correct size and extension of decompressive craniectomy dural graft</td>
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<tr>
<td>• Place ICP bolt and EVD</td>
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<tr>
<td>• Make a burr hole</td>
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<tr>
<td>• Manage a non-functioning EVD</td>
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<tr>
<td>• Perform transcranial and ultrasound (TCD, US)</td>
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<tr>
<td>• Perform a decompressive craniectomy dural graft</td>
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<tr>
<td>• Choose the appropriate probe</td>
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<tr>
<td>• Place a probe properly</td>
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<tr>
<td>• Recognize the value of multifunctional probes</td>
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<tr>
<td>• Puncture a ventricle</td>
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<tr>
<td>• Evacuate a hematoma/contusion</td>
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<tr>
<td>&quot;Go big or go home&quot; (ensure adequate size and extension of craniectomy)</td>
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<tr>
<td>You must accept night shifts</td>
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</tbody>
</table>
## Learning outcomes (per competency)

### Competency 7: Anticipate, identify, and manage complications
- Explain mass-occupying lesions
- Recognize malfunctioning EVD, hydrocephalus
- Recognize infection
- Recognize vascular complications
- Perform adequate clinical examinations and investigations
- Select appropriate treatment and apply it in a timely manner
- Expect the unexpected
- Recognize that no information is without importance
- Participate in Morbidity and Mortality (M&M) rounds
- Describe and identify epilepsy
- Describe and identify iatrogenic complications
- Describe and identify CSF leakage
- Perform dural repair
- Describe and identify spinal cord complications
- Describe and identify complications of long-term ICU
- Describe and identify morphological problems
- Perform a shunt procedure and manage shunt revision

### Competency 8: Organize rehabilitation, transfer, and follow-up
- Be familiar with infrastructure in nearby neuro rehab
- Explain the importance of follow-up data for clinical studies
- Follow-up for detection of late complications
- Perform a shunt procedure and reimplant bone flap
- Assess and reassess the patient adequately
- Maintain follow-up contact with rehab colleagues
- Describe outcome measures and scales
- Use outcome measures and scales
- Describe the socioeconomic aspects of care

### Competency 9: Apply guidelines specific to neurotrauma
- Describe ATLS/ABC guidelines
- Describe the recommendations for brain trauma management
- Recognize age-specific guidelines
- Describe the guidelines for spinal injuries
- Describe the guidelines for brain death
- Apply evidence-based medicine (EBM) in decision making
- Be aware of legal obligations
- Be familiar with SOPs
- Apply/implement standard operating procedures (SOPs)
- Describe existing clinical trials
- Describe ongoing clinical trials
- Run a clinical trial in neurotrauma

### Competency 10: Communicate with the patient, relatives, and colleagues
- Explain the value of communication and establish rules for communication
- Communicate effectively
- Recognize communication mistakes, miscommunication, lack of communication
- Provide care with social competence
- Be reachable for patient and relatives
- Document everything
Our educational offerings

Educational modalities

The diagram below shows our typical educational modalities within AO. Planning is typically carried out by the region or international group who then assigns a chairperson or lead presenter to the educational event.

Target audience

The intended audience for any individual event is decided during the planning process. The lists below represent the main healthcare professionals who manage the patients in our field. AONeuro promotes interdisciplinary learning whenever possible.

Surgeons
- Neurosurgeons
- CMF surgeons
- ENT surgeons
- Surgical oncologists
- Orbital surgeons
- Interventionalists

Physicians
- Neuroradiologists, neurologists
- Oncologists, radiooncologists
- Intensive care physicians
- Anesthesiologists
- Pain specialists
- Pediatric specialists

Other healthcare professionals
- ORP
- Rehabilitation professionals
- Technicians
Instructional Design: developing your scientific program

Option A
Select an approved template and adapt for your needs and region

1. Select template from Faculty Center

2. Select and adapt optional content

<table>
<thead>
<tr>
<th>Modules (over 2 days)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduction</td>
</tr>
<tr>
<td>Basics of neurotrauma</td>
</tr>
<tr>
<td>Diagnostics and pathologies</td>
</tr>
<tr>
<td>ICP management</td>
</tr>
<tr>
<td>Treatment</td>
</tr>
<tr>
<td>Practical exercises</td>
</tr>
<tr>
<td>Managing complications</td>
</tr>
<tr>
<td>Postoperative care (optional)</td>
</tr>
<tr>
<td>Guidelines in neurotrauma (optional)</td>
</tr>
<tr>
<td>Clinical trials (optional)</td>
</tr>
</tbody>
</table>
Option B
Develop a new program for the course, webinar, etc

1. Select the following for your target audience:
   - Patient problems
   - Competencies

2. Define learning objectives appropriate for the intended level of outcomes (see diagram)

3. Select appropriate educational methods (lectures, case discussions, practical exercises)

4. Build modules and finalize all times

<table>
<thead>
<tr>
<th>Module 4</th>
<th>ICP management</th>
</tr>
</thead>
<tbody>
<tr>
<td>04:00-04:05</td>
<td>Overview</td>
</tr>
<tr>
<td>04:05-04:15</td>
<td>ICP monitoring</td>
</tr>
<tr>
<td>04:10-04:30</td>
<td>Interactive case discussion: Increased ICP (nonoperative case)</td>
</tr>
<tr>
<td>04:30-04:45</td>
<td>Interactive case discussion: Increased ICP (operative case)</td>
</tr>
<tr>
<td>04:45-05:00</td>
<td>Questions and discussion</td>
</tr>
</tbody>
</table>

5. Create your program proposal

6. Submit for review to apply for the Competency-based curriculum stamp
Resources

For faculty

- AONeuro website http://www.aoneuro.org/
- Implementation guide for chairpersons
- Case libraries
- Online modules and documents from faculty development educational programs
- Evaluation and assessment reports system
- AONeuro Newsletter

For participants

- AONeuro website http://www.aoneuro.org/
- AO Surgery Reference
- Webinars and webcasts (scheduled and archived)
- Books and book chapters
- Online videos
- AONeuro Newsletter

All materials are available in our Faculty Center.