

# Emergency Neurological Life Support®:

## Introduction

**Aimee Aysenne, MD/MPH<sup>1</sup>, Jennifer Christine Munoz Pareja, MD<sup>2</sup>,  
Rachel Hausladen, CRNP<sup>3</sup>, Christopher Morrison, PharmD, FNCS,  
FCCM<sup>4</sup> and ENLS Writing Group<sup>5</sup>**

*<sup>1</sup> Department of Clinical Neurosciences, Tulane University, School of Medicine*

*<sup>2</sup> Department of Pediatric Critical Care, University of Miami, Miller School of Medicine*

*<sup>3</sup> Neurocritical Care Division, University of Maryland Medical Center*

*<sup>4</sup> Resource Pharmacist, Northside Hospital Cherokee*

*<sup>5</sup> See Table 1*

---

## Abstract

*Emergency Neurological Life Support®(ENLS): Fifth Edition, Updates in the Approach to Early Management of a Neurological Emergency.*

The ENLS course presents a stepwise approach to clinical care in the “golden hour(s)” of a neurocritical care emergency.

The 15 ENLS topics span the broad range of neurologic emergencies and cover aspects of general emergency medicine and critical care that need to be specifically tailored to the patient with acute nervous system illness or injury.

Each module contains an initial algorithm, a checklist of important clinical points, a list of information needed for communication to improve transitions across care settings, clinical pearls, recommendations for practice in resource limited settings and more.

ENLS is relevant for a wide array of care providers, from prehospital to specialist. Content is research-based and is updated every two to three years.

---

# 1 Background

The purpose of the *Emergency Neurological Life Support*® (ENLS) certification course is to improve care during the first hours of contact for patients with acute neurological emergencies. The structure of the ENLS course is based on the concept that a standardized approach to diagnosis, stabilization, early workup and timely management will improve functional outcomes for these neurologically critically ill patients. Special attention is placed on timely collection of relevant data and effective communication to various care providers throughout the continuum of acute care management.

The 15 ENLS modules span the broad range of neurologic emergencies and include modules detailing aspects of general emergency medicine and critical care with specific instructions for patients with acute nervous system illness or injury. The modules are meant to be applicable for clinicians and medical personnel from diverse training backgrounds including prehospital, nursing, pediatric care and pharmacy.

The basic structure of ENLS education was created by Dr. Wade Smith and Dr. Scott Weingart who were the inaugural chairs of the ENLS writing committee. The original ENLS algorithms and supporting manuscripts were published in *Neurocritical Care* in July of 2012 and presented at the Neurocritical Care Society Annual Meeting in the Fall of 2012. Since then, the curriculum has been updated to reflect the most up-to-date information every 2 to 3 years. The latest Version 6.0 manuscripts are included herein as supplementary material. Each protocol topic and authors are listed in Table 1.

**Table 1:**  
ENLS Writing Group

<b>Protocol</b>	<b>Authors</b>
<b>Introduction</b>	Aimee Aysenne, MD, MPH Jennifer Christine Munoz Pareja, MD Rachel Hausladen, CRNP Christopher Morrison, PharmD
<b>Approach to the Patient with Coma</b>	Michael R. Halstead, MD, MPH Prem A. Kandiah, MD
<b>Intracranial Hypertension and Herniation</b>	Paulomi Bhalla, MD J. Spencer Dingman, PharmD Aimee Aysenne, MD, MPH
<b>Airway, Breathing and Mechanical Ventilation</b>	Thomas L. Delmas, MD Gentle S. Shrestha, MD, FNCS Aimee Aysenne, MD, MPH
<b>Resuscitation Following Cardiac Arrest</b>	Marc Alain Babi, MD Kara Melmed, MD
<b>Acute Non-Traumatic Weakness</b>	Ivan Da Silva, MD, PhD Sharon O. Wietstock, MD, MSc

<b>Protocol</b>	<b>Authors</b>
<b>Acute Ischemic Stroke</b>	Christopher Green, MD Hannah Breit, MD Fiona Lynch, MD Josephine Tenii, PharmD, BCPS, BCCCP Melissa G. Chung, MD
<b>Intracerebral Hemorrhage</b>	Craig A. Williamson, MD Gabriel V. Fontaine, PharmD, MBA, BCPS, BCCCP, FNCS, FCCM
<b>Subarachnoid Hemorrhage</b>	Lara L. Zimmerman, MD Shraddha Mainali, MD, FNCS
<b>Traumatic Brain Injury</b>	Roy A. Poblete, MD Kristen M. Shaw, DNP, AGACNP-BC
<b>Traumatic Spinal Cord Injury</b>	Berje Shammaasian, MD, MPH Neha S. Dangayach, MD, MSCR
<b>Spinal Cord Compression</b>	Remi Okwechime, MD, MPH Ryan Martin, MD
<b>Status Epilepticus</b>	Dionne E. Swor, DO Ryan A. Waybright, PharmD, BCCCP
<b>Meningitis and Encephalitis</b>	Vikram Dhawan, MD William L. Todd, Jr., DNP, AGACNP- BC,FNP-C Aimee Aysenne, MD, MPH
<b>BRAIN Care: Broad-reaching Acute Interventions in Neurocritical Care*</b>	Vasisht Srinivasan, MD, FACEP Morgan Lippitt Prust, MD Chethan P. Venkatasubba Rao, MD, FNCS
<b>Pharmacotherapy Pearls</b>	Abdalla A. Ammar, PharmD, FNCS, FCCM, BCCCP, BCPS Mehrnaz Pajoumand, PharmD Karla Resendiz, PharmD, BCPPS, BCCCP

**\*New in version 6.0**

The ENLS training and certification can be taken either as a live course given by accredited trainers, or through on-line self-study on the ENLS training website (<https://www.neurocriticalcare.org/NCS-Learning-Center/ENLS>). Certification is valid for two years. Currently, the ENLS curriculum has been taken by over 17,000 trainees, and over 500 live courses have been held in over 34 states and 33 countries.

A new curriculum for trainers with best practices and tips from experienced ENLS trainers was inaugurated at the 2018 NCS annual meeting with the goal of building a pool of knowledgeable trainers who uphold a uniform and high standard of training. Train the Trainer course remains available online (<https://www.neurocriticalcare.org/NCS-Learning-Center/ENLS/Train-the-Trainer>). The slide decks and certification questions

have also been extensively rewritten to be concordant with the manuscript while adhering to standardized question-writing formats. All of this represents unprecedented growth and considerable progress toward educating neurocritical care and emergency providers with the goal of improving clinical care for patients with acute neurological emergencies.

The ENLS modules represent a stepwise approach to clinical care in the “golden hour(s)” of a neurocritical care emergency. Each revised module contains an initial algorithm, a checklist of important clinical points, clinical pearls, and a list of information needed for communication to improve transitions across care settings. This information is presented in full length manuscript formats, abbreviated protocols available online, and in slide decks that are designed for use within the ENLS modules. Furthermore, ENLS is a tool for longitudinal learning as participants have access to the modules, manuscripts and references throughout their certification.

## **2 Changes in ENLS Version 6.0**

The ENLS program was designed to be updated to reflect best practice. Accordingly, trainee and ENLS instructor feedback is highly valued. This feedback has been incorporated to help shape ENLS Version 6.0. The ENLS Version 6.0 content has been updated acknowledging the multidisciplinary and collaborative chain of care from prehospital providers, nursing and pharmacists to physicians and advance practice providers in various specialties caring for adult and pediatric neurocritical patients. Special attention is paid to the pregnant patient when applicable.

Independent algorithms for resource limited settings were designed with direct input and leadership from colleagues who practice in these settings. Our intent was not to address all the variations in international practice for each disease state but to be more inclusive to global practice variations. To further enhance the content and make it relevant to a broad multidisciplinary and international audience, four working groups, namely pharmacists, nursing, pediatric neurointensivists and global physicians, reviewed each manuscript and provided suggestions for content. We encourage learners to use the ENLS algorithms as a framework on which any relevant local practice guidelines can be incorporated.

### ***2.1 Highlights of ENLS Version 6.0***

- A new module – BRAIN: Broad Reaching Acute Interventions in Neurocritical Care – focuses on neurological emergencies when resources are unavailable, both pre-hospital & in geographically resource limited regions.
- Updated diagnostic, management algorithms & checklists of “to-do” items in the first few hours of neurological emergencies.
- New resource limited ENLS algorithms.
- Revised pharmacotherapy manuscript with relevant medications as well as the addition of alternative medications to reflect global variability.
- Updated cases added to each manuscript.
- Revised assertion evidence format for slide decks has proven to be an effective way to learn technical information.
- Added cross references between modules for related topics.

- Attention to both internal consistency amongst manuscripts & external consistency with published guidelines from the Neurocritical Care Society as well as other societies involved in emergency & critical care of patients.

ENLS is indebted to the numerous authors of each chapter, as well as the nursing, pediatric, pharmacotherapy, and global considerations reviewers who worked to assure the revisions met expectations for quality and content. The authors are listed in Table 1, and the reviewers are listed in Table 2.

In conclusion, this revised version of ENLS continues to provide an algorithmic approach to the early stages of clinical care for patients with acute neurological emergencies while meeting the educational needs of a variety of providers involved in neurocritical care. It will also serve as a springboard for ongoing education and improvements in the quality of clinical care for these patients across the globe.

**Table 2**  
Manuscript Reviewers

<b>Working Group</b>	<b>Name</b>
<b>Nursing</b>	
<i>Lead</i>	Ebonye Green, DNP, ACNPC-AG, CNRN, SCRNP, FNCS Kimberly Ichrist, AG-ACNP DNP Angela Nelson, DNP, RN, CCRN, ACNP-BC, FCCM, FAANP JJ Baumann, MS, RN, CCNS, FNCS Jennifer Freund, MSN, ACNP
<b>Pharmacotherapy</b>	
<i>Lead</i>	Leslie Hamilton, PharmD, FCCP, FCCM, BCPS, BCCCP Amina George, PharmD, BCCCP Roxana Dumitru, PharmD, BCCCP, BCPS Brooke Barlow, PharmD Michael Erdman, PharmD Chelsea Wamsley, PharmD
<b>Global Considerations</b>	
<i>Lead</i>	Yasser Abulhasan, MBChB, FRCPC, FNCS Sylvia Bele, MD Sepideh Chagharvand, MD Vanessa Salasky, MD Gary Hunter, MD, FRCPC Mhd Ezzat Zaghloleh, MD
<b>Pediatrics</b>	
<i>Lead</i>	Marlina Lovett, MD Melissa Chung, MD Bradley De Souza, MB, BCh, BAO Nicolas Chiriboga, MD Karla Resendiz, PharmD, BCPPS, BCCCP