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NEUROCRITICAL CARE SOCIETY

SPECIAL ARTICLE

Emergency Neurological Life Support: Fourth Edition, Updates in the Approach to Early Management of a Neurological Emergency

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Background

The purpose of the Emergency Neurological Life Support (ENLS) certification course is to focus on improving 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 of the same to various care providers throughout the continuum of acute care management.

The 14 ENLS modules span the broad range of neurologic emergencies and include modules detailing aspects of general emergency medicine and critical care that need to be specifically tailored to the patient with acute nervous system illness or injury. An example of this is the "Airway, Ventilation and Sedation" module. Furthermore, the modules are meant to be applicable for clinicians and medical personnel from diverse training backgrounds such as prehospital, nursing, 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 (NCS) Annual Meeting in the fall of 2012. Currently, the ENLS curriculum has been taken by over 17,000 trainees. The ENLS training and certification can be taken either as a live course given by accredited trainers or by online self-study on the ENLS training website (http://www.neurocriticalcare.org) and is valid for 2 years. Currently, over 500 live courses have been held in over 34 states and 33 countries. ENLS content is currently available in three languages including English, Spanish, and Japanese. 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. The ENLS version 4.0 and updated case-based slide decks will be released at the 2019 Annual Meeting. The certification questions have also been extensively rewritten to be concordant with the manuscript while adhering to standardized question-writing formats. All of this represents an 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. Furthermore, ENLS is a tool for longitudinal learning as participants have access to the modules, manuscripts, and references throughout their certification.

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Changes in ENLS Version 4.0

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 4.0. The ENLS version 4.0 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. To enhance the content and make it relevant to a broad multidisciplinary and international audience, we formed five review groups, namely prehospital providers, pharmacists, nursing, pediatric neurointensivists, and global physicians. They were tasked with shaping the respective sections of each manuscript with practical and current content while ensuring consistency within and among manuscripts. Our intent was not to address all the variations in international practice for the different diseases. We have discussed major practice variances (e.g., availability of diagnostic testing or the type of medications used). We encourage learners to use the ENLS algorithms as a framework on which any relevant local practice guidelines can be incorporated.

Highlights of ENLS version 4.0 are:

- Updated diagnostic and management algorithms
- Management protocol which summarizes how the module is to be used
- Checklists of "to-do" items in the first few hours
- Expanded sections for prehospital providers, nursing, and pediatrics
- Updated pharmacotherapy manuscript with new medications, removal of less relevant medications, and the addition of alternative medications to reflect global variability
- Updated/new figures and neuroimaging
- Clinical pearls and take-home points
- Detailed communication tables with sample scenarios to use when transitioning care from prehospital to emergency department (ED) and from ED to neurocritical care unit.
- Starred references in the bibliography section highlighting key papers along with a short description of their importance
- Attention to both internal consistency among manuscripts and external consistency with published guidelines from the Neurocritical Care Society as well as our sister societies involved in emergency and critical care of these patients

ENLS Version 4.0 includes updates related to the recent guidelines for the management of traumatic brain injury from the Brain Trauma Foundation [1]. Acute ischemic stroke (AIS) care has evolved considerably in the last few years, and the AIS manuscript has been extensively rewritten to reflect current practice guidelines from the American Heart Association regarding thrombolytic candidacy, rapid imaging to identify large vessel occlusion and salvageable tissue, especially in late window presentation of AIS for endovascular therapy suitability [2]. The use of targeted temperature management has continued to evolve in this setting, and recent changes have been incorporated into the resuscitation after cardiac arrest module. The traumatic spinal cord injury (TSI) manuscript outlines optimal limitation of spinal movement and options for airway assessment, and stabilization in the prehospital setting. The meningitis/encephalitis module references the latest European Society of Clinical Microbiology and Infectious Diseases guidelines of 2016 [3].

ENLS is indebted to the authors and reviewers who worked to assure the revisions met expectations for quality and content. The authors and reviewers are listed in Tables 1 and 2. Special gratitude is given to Becca Stickney, Connie Hayden, and Maria Russo, who provided guidance, management, and administrative support during the revision process.

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.

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Electronic supplementary material
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