

# PONS Pharmacotherapy Of Neurocritical Care Series



## PONS OVERVIEW

The Pharmacotherapy of Neurocritical Care Series (PONS) is a curriculum-based eLearning series comprised of various neuropharmacotherapy topics presented by experts in the field of neurocritical care. The target audience includes individuals practicing in all medical disciplines, particularly those who are interested in furthering their neuropharmacotherapy knowledge. This series can be used to update primary providers on the topic, or be utilized to facilitate topic discussions among trainees. Each session includes a library of annotated references used during the presentation.



“I would recommend the PONS series for anyone interested in learning about, or even refreshing, some of the more common topics in neurocritical care. I enjoy being able get my continuing education hours from a reputable source and to complete the lectures and modules at my own pace.”

Sheila Serra Arackal, RN, MSN, AGACNP-BC

# WHO CAN BENEFIT FROM THE PONS?

## **Critical Care/Emergency Department Pharmacy Residency Directors**

PONS is a great way for residency directors in critical care and emergency medicine to cover neurocritical care topics commonly encountered in the neurocritical care environment in a thorough evidence based manner. The topics presented are commonly required discussion topics as part of PGY-2 residency training. Directors can rest assured that these topics are presented by clinicians practicing in the area with sufficient clinical experience to interpret and present the information at an appropriate level.

## **Critical Care/Emergency Department Pharmacy Residents**

Commonly, pharmacy residents may have difficulty finding balanced, evidence based information on neurocritical care topics. PONS meets this need by compiling the encountered clinical issues that are unique to the neurocritical care population in one, easy to access location. Prior to or during rotations, residents can select topics to prepare them for their upcoming experience or supplement the material being taught clinically on rounds or during topic discussions. Also, PONS can point the residents in the right direction when it comes to reviewing relevant literature and selecting literature to make the best clinical decisions. In addition, residents can use PONS to broaden their knowledgebase when neurocritical care rotations are not directly available as part of their training.

## **Critical Care/Emergency Department Pharmacists**

PONS is an easy way for busy critical care and emergency department pharmacists to supplement their existing knowledge. While evidence is always changing, PONS can be utilized to update pharmacists on the current thinking on the subject matter. All topics provide an extensive bibliography that pharmacists can use to review and build their personal library on a topic. The continuing education option of PONS allows pharmacists to grow their knowledge in the field while satisfying their continuing education requirements. PONS is also a great way for pharmacists to help facilitate learning by providing material that can assist in the teaching of their student clerkship or residency trainees.



**“PONS has served as a good refresher for a variety of neuropharmacotherapeutic topics. It covers material that is applicable to everyday clinical practice.”**

Mehrnaz Pajoumand, PharmD, BCPS



“The PONS course offered by NCS was a great option for continuing education learning specific to Neurocritical Care. It was a good mix of new information along with being a good refresher of information I had previously learned. I would highly recommend it to anyone who wants to keep up to date with pharmacology.”

Julie Anne Kieliszak, CNS, NP

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### **Staff Pharmacists**

Hospital staff pharmacists may find the PONS beneficial for reviewing core neurocritical care topics and for learning about more controversial topics. PONS lectures are reviewed at least annually and updated as needed, so the staff pharmacist can feel confident that the information provided is current. The staff pharmacist may also find the PONS useful when precepting students and residents or when preparing for board certification.

### **Advanced Practice Providers (Nurse Practitioners and Physician Assistants)**

Advanced practice providers will find that the PONS provides practical pharmacotherapy information that can be applied to every day practice when caring for patients with neurologic injury or disease. The continuing education can also be used for pharmacology credit towards license and certification renewal.

### **Critical Care/Emergency Department Staff Nurses**

Patients with critical illness and neurologic injury require frequent monitoring. Enhanced knowledge of drug therapies commonly prescribed in this population can facilitate recognition of potential adverse effects when treating patients at the bedside. Additionally, the PONS presentations can be used by Stroke Certified Registered Nurses (SCRNs) to obtain continuing education credits necessary for re-certification.

### **Critical Care/Emergency Department Nurse Educators**

The PONS presentations are useful tools that can be used to aid in the development of pharmacotherapy curriculum for staff nurses. The focused content of each PONS presentation permits in-depth teaching of critical neurologic conditions.

### **Neurointensivists**

Serves as a resource by providing up-to-date information on neuropharmacotherapy. Available on demand for review when convenient with or without CME

### **Emergency Department Physician**

Serves as a resource by providing up-to-date information on neuropharmacotherapy. Available on demand for review when convenient with or without CME

### **Neurocritical Care Fellowship Directors and Neurology Residency Directors**

The PONS presentations provide a comprehensive update on all relevant and common topics in the Neuro ICU. It can be used as a Bootcamp for new Neuro ICU fellows and can serve as a weekly series for the group to review pharmacotherapy topics.





## VOLUME I

### **Acute Blood Pressure Control Following Intracerebral Hemorrhage**

**Description:** Spontaneous intracerebral hemorrhage (ICH) is associated with high rates of morbidity and mortality. Elevated blood pressure at presentation is one of the factors that has been consistently associated with worse outcomes in ICH. Associations between elevated systolic blood pressure with rebleeding and hematoma enlargement have been made, sparking interest in acute intensive blood pressure lowering as a potential therapeutic target. Recently published and ongoing clinical trials are beginning to shed some light on appropriate blood pressure management in acute intracerebral hemorrhage. This session will explore in depth the literature addressing acute blood pressure lowering following acute ICH including linkage to outcomes, considerations in limiting blood pressure variability, and therapeutic intervention.

**Contributor:** Denise Rhoney, PharmD, FCCP, FCCM, FNCS

### **Antithrombotic Reversal in Patients With Intracranial Hemorrhage: A Review of the Guidelines**

**Description:** This presentation provides an overview of recently released guidelines on antithrombotic reversal in the setting of ICH. Includes recommendations and preferred approaches to reversing the effects of warfarin, dabigatran, oral Xa inhibitors, unfractionated and low molecular weight heparins, pentasaccharides, thrombolytics, and antiplatelets in the setting of ICH.

**Contributor:** John J. Lewin, PharmD, MBA, FASHP, FCCM, FNCS

### **Diabetes Insipidus**

**Description:** This presentation provides an overview of the identification and treatment of central diabetes insipidus in neurocritically ill patients. Signs and symptoms, diagnostic criteria, and common treatments of diabetes insipidus will be reviewed. The presenter describes the pathophysiology of diabetes insipidus, identifies the most common disease states and medical conditions associated with diabetes insipidus in the neurocritical care population, and outlines the signs, symptoms, common diagnostic criteria and appropriate treatment plans for patients with acute diabetes insipidus.

**Contributor:** A. Shaun Rowe, PharmD, BCPS

### **Get it in Your Head! Introduction to Intraventricular and Intrathecal Drug Delivery**

**Description:** This presentation provides an overview of essential concepts related to medication delivery into the central nervous system. Physiologic barriers, available routes of administration, and desirable physiochemical medication characteristics are reviewed. The presenter discusses barriers to medication entry into the central nervous system, the rationale for intraventricular (IVT)/intrathecal (IT) administration, and the physiochemical characteristics and practical considerations for administration of IVT/IT medication.

**Contributor:** Jennifer Bushwitz, PharmD, BCPS, BCCCP



“Each PONS presentation provides practical and useful information about core topics in neurocritical care. The material is presented in an easy-to-understand manner, making it a helpful learning tool across the spectrum from student to experienced healthcare professional. The PONS presentations can be used as an adjunct to teaching, literature evaluation, or as a refresher for practitioners who may not regularly encounter these complex disease states. I am early in my career as a clinical pharmacist and often reference the PONS series when caring for patients with neurological issues in the Medical Intensive Care Unit.”

Katherine Roberts, PharmD



**“As an Advanced Practice Registered Nurse, PONS has allowed me to maintain my certifications in nursing by listening to the webinars and receiving CE credit.”**

Cynthia Bautista, PhD, RN, CNRN, SCRNP, CCNS, ACNS-BC, FNCS

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### **Hyponatremia**

Description: This presentation discusses the importance of recognizing and treating hyponatremia in the acute neurologically injured patient. The benefits and limitations of various treatment strategies are reviewed. The presenter describes the incidence and consequences of hyponatremia in common acute neurological disorders and compares/contrasts cerebral salt wasting syndrome and syndrome of inappropriate antidiuretic hormone (SIADH) in this population. An evaluation of the benefits and limitations of various treatment strategies commonly employed is discussed.

Contributor: Theresa Human, PharmD, BCPS, FNCS

### **ICU Management of Myasthenia Gravis: This Weakness is Getting on My Nerves!**

Description: This presentation reviews ICU management of myasthenia gravis including pharmacologic and non-pharmacologic therapy as well as unique considerations for the care of myasthenic patients. The presenter identifies characteristics of myasthenia gravis (MG) patients that require intensive care unit (ICU) management, defines myasthenic crisis (MC), discusses pharmacologic and non-pharmacologic management strategies for MC, and describes other unique considerations for the care of MG patients in the ICU.

Contributor: Katleen Chester, PharmD, BCPS

### **Management of Status Epilepticus: Breaking Bad!**

Description: This presentation covers the changes to the definition of status epilepticus as described in the current NCS guidelines. The presenter discusses the time frame in which aggressive treatment for SE is recommended, describes the treatment strategies for SE based on the NCS guidelines, and identifies management options for refractory status epilepticus.

Contributor: Gretchen Brophy, PharmD, BCPS, FCCP, FCCM, FNCS

### **Osmotic Therapy for Elevated Intracranial Pressure**

Description: This presentation reviews the various osmotic agents used for the treatment of elevated intracranial pressure. Commonly held beliefs and the current clinical evidence for agents such as hypertonic sodium chloride and mannitol are addressed. The presenter describes the mechanism(s) of action of osmotic therapy agents, evaluates the place in therapy for osmotic agents, and recommends specific monitoring strategies for osmotic agents.

Contributor: Aaron Cook, PharmD, BCPS

### **Paroxysmal Sympathetic Hyperactivity**

Description: This presentation reviews the symptomatology of paroxysmal sympathetic hyperactivity (PSH) and agents utilized in pharmacologic management. The presenter describes the proposed pathophysiology of PSH, discusses common cause of PSH, and reviews symptomatology of PSH and pharmacologic treatment strategies for management.

Contributor: Kristy N. Greene, PharmD, BCPS, BCCCP

### **Targeted Temperature Management (TTM) Effects on Drugs and Shiver Control**

Description: This presentation provides an overview of the effects of targeted temperature management (TTM) on drugs in neurocritically ill patients. The basics of TTM, pharmacokinetic changes during TTM, common drug dosing recommendations, and pharmacological shiver control is reviewed. The presenter explains TTM and uses, describes the effects of TTM on pharmacokinetics (PK), summarizes the effects of TTM on commonly used drugs, discusses dilemmas of TTM and critical illness effects on drugs, and reviews shiver control.

Contributor: Christopher Morrison, PharmD, BCCCP



“PONS has changed the way I teach pharmacy residents at my practice site. I use the program to help the residents learn about a topic and to familiarize them with the available literature. This leads to discussions about our practice and the patient population we encounter. I would encourage everyone involved in clinical training to take a look.”

Jeffrey Mucksavage, PharmD, BCPS

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### **Venous Thromboembolism Prophylaxis: Translating Evidence into Clinical Practice**

Description: The purpose of this presentation is to provide practitioners with up to date information on the data regarding the effects of various prophylaxis regimen on DVT/PE rates in Neurocritical care patients. The presenter translates evidence into clinical practice and addresses how clinical challenges may affect the current best practice for reducing DVT/PE rates. The presenter discusses risk factors associated with venous thromboembolism (VTE) in neurocritical patients, reviews the Neurocritical Care Society VTE Prophylaxis guideline, and discusses the clinical challenges of VTE Prophylaxis.

Contributor: Keri S. Kim, PharmD, MS, CTS, BCPS

### **Wading in the Weeds: Cannabis Use in the Hospital**

Description: The use of medical marijuana is growing rapidly in the United States. This presentation, in an interview format, discusses the data on the therapeutic uses of cannabis for medical conditions of interest to the neurocritical care clinician. In addition, the program discusses the evolving landscape of use of this medicinal and the practical concerns of which healthcare professionals should be aware. The presenter explains the status of marijuana legislation in the United States, describes the content and pharmacology of cannabis, discusses clinical studies using medical marijuana that have been performed in patients with neuropathic pain, epilepsy, and muscle spasm related to multiple sclerosis. The pharmacokinetic differences between different cannabis dosage forms are discussed, as well as potential drug interactions and other patient safety issues that may occur with the use of MMJ.

Contributors: Laura Borgelt, PharmD, FCCP, BCPS and Jeffrey Mucksavage, PharmD, BCPS



## VOLUME II

### **Control of Shiver During Targeted Temperature Management (TTM)**

Description: This presentation provides an overview of thermoregulatory control and defense mechanisms, pathophysiology of shivering, consequences related to shivering, and non-pharmacological and pharmacological management of shivering. The presenter explains normal thermoregulation, describes thermoregulatory defense mechanisms such as shivering, and discusses non-pharmacological and pharmacological management of shivering.

Contributor: Mehrnaz Pajoumand, PharmD, BCPS

### **Neurostimulants in the Neurointensive Care Unit**

Description: This presentation reviews selected neurostimulants and their utility in facilitating motor recovery after stroke or improving the level of consciousness, cognitive, or behavioral symptoms after traumatic brain injury in neuro ICU patients. The presenter defines neurostimulants and their pharmacological effects, explains the rationale for the use of neurostimulants in neuro ICU patients, and evaluates literature supporting the use of selected neurostimulants for specific indications in neuro ICU patients.

Contributor: Salia Farrokh, Pharm.D., BCPS, BCCCP

### **Beyond the Horizon: Exploring the Next Frontier in Anticoagulation Reversal**

Description: This presentation reviews and evaluates current and future agents as specific reversal antidotes for direct oral anticoagulants (DOACs) when major or life-threatening hemorrhage is occurring or there is a need for emergent surgery. The DOACs include the direct thrombin inhibitor dabigatran and the factor Xa inhibitors rivaroxaban, apixaban, and edoxaban. This presentation takes an in depth look at how DOACs affect laboratory parameters and evaluates how antidotes play a role in the reversal strategy for the anticoagulation effects produced by the DOACs. Idarucizumab, andexanet alfa, and ciraparantag are discussed and clinical applicability reviewed as it pertains to anticoagulation reversal in the presence of DOACs.

Contributor: Ruben Santiago, PharmD, BCPS

### **Alteplase for Acute Ischemic Stroke: Updates and Issues**

Description: The criteria used to select patients for alteplase therapy in acute ischemic stroke has been recently reviewed and updated based on available data and expert opinion. Many of the restrictions for alteplase use have been revised to allow more potential patients to receive the benefits of thrombolysis while still maintaining overall safety. This presentation reviews several of these updates as well as review clinical implications of dosing issues that may be encountered when using alteplase. The use of intra-arterial alteplase for targeted treatment of stroke is also discussed and compared to the intravenous route. Finally, a discussion of two adverse effects from alteplase – intracranial hemorrhage and angioedema – outlines management strategies.

Contributor: Eljim P. Tesoro, PharmD, BCPS

### **LDL in Intracerebral Hemorrhage: How Low Can You Go?**

Description: Subgroup and post-hoc analyses of large randomized controlled trials have demonstrated an association between statin use and intracerebral hemorrhage (ICH). In this presentation, data regarding the association between low LDL, statin use, development of ICH, and outcome after ICH are explored.

Contributor: Andrea Tully, PharmD, BCPS, BCCCP

### **Management of Super Refractory Status Epilepticus**

Description: Super refractory status epilepticus (SRSE) is a neurologic emergency that requires prompt recognition and aggressive treatment. Although guidelines recommend early initiation of continuous intravenous (cIV) anesthetics, the optimal dosing, monitoring, titration and weaning strategy for these agents is unknown. Moreover, a preferred algorithm including when to add concomitant antiepileptics (AEDs) versus when to initiate cIV anesthetics is controversial due to the lack of high quality clinical evidence. This presentation reviews the available cIV medications used for RSE and help clinicians develop an algorithm for the treatment of RSE that can be individualized for complex patients. Following the presentations, clinicians should be aware of the emergent nature of RSE as well as treatment options, appropriate monitoring, and approach to clinical controversies.

Contributor: Karen Berger, PharmD, BCPS, BCCCP



“The Pharmacotherapy of Neurocritical Care Series (PONS) is an excellent way to stay up-to-date or learn about important and controversial topics from leaders in the field. The sessions were high yield, presented well and left me feeling prepared for my daily practice. Personally, I also enjoyed the list of references for further reading. Highly recommended for everyone, from resident to attending.”

Tobias B. Kulik, MD

# CME, PRICING, ACCESS, AND CONTACT INFORMATION



## **Continuing Education**

This activity is accredited for a maximum of 9.5 continuing education hours for pharmacists, nurses, and physicians.

## **Accreditation Statement**

In support of improving patient care, this activity has been planned and implemented by Cine-Med and the Neurocritical Care Society. Cine-Med is jointly accredited by the Accreditation Council for Continuing Medical Education (ACCME), the Accreditation Council for Pharmacy Education, and the American Nurses Credentialing Center (ANCC), to provide continuing education for the healthcare team. Cine-Med verifies that sound education principles have been demonstrated in the development of this educational offering as evidenced by the review of its objectives, teaching plan, faculty, and activity evaluation process. Cine-Med does not endorse or support the actual opinions or material content as presented by the speaker(s) and/or sponsoring organization. Cine-Med adheres to accreditation requirements regarding industry support of continuing medical education. Disclosure of the planning committee and faculty's commercial relationships will be made known at the activity. Speakers are required to openly disclose any limitations of data and/or any discussion of any off-label, experimental, or investigational uses of drugs or devices in their presentations. All Cine-Med and Neurocritical Care Society employees in control of content have indicated that they have no relevant financial relationships to disclose.

## **Pricing**

PONS presentations can be purchased with continuing education (CE) credit, or without. Presentations can also be purchased individually or as a bundle. Bulk discounting is available for institutions purchasing 10 or more PONS CME packages. Please visit the website for more pricing information.

NCS members enjoy access to FREE PONS non-CME presentations!

## **Access**

[www.neurocriticalcare.org/PONS](http://www.neurocriticalcare.org/PONS)

## **Contact Us**

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952-377-8825

