

# HOSPITAL PHYSICIAN®

## NEUROLOGY BOARD REVIEW MANUAL

### STATEMENT OF EDITORIAL PURPOSE

The *Hospital Physician Neurology Board Review Manual* is a peer-reviewed study guide for residents and practicing physicians preparing for board examinations in neurology. Each manual reviews a topic essential to the current practice of neurology.

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## Traumatic Brain Injury: Rehabilitation Neurology

### Editors:

**Alireza Atri, MD, PhD**

*Instructor in Neurology, Harvard Medical School; Assistant in Neurology, Massachusetts General Hospital, Boston, MA; Neurologist, Geriatric Research Education & Clinical Center, Veterans Administration Medical Center, Bedford, MA*

**Tracey A. Milligan, MD**

*Instructor in Neurology, Harvard Medical School; Associate Neurologist, Brigham and Women's and Faulkner Hospitals, Boston, MA*

### Contributor:

**Anthony J.W. Chen, MD**

*Assistant Professor, Department of Neurology, University of California San Francisco and Veterans Administration Medical Center, San Francisco, CA*

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## Traumatic Brain Injury: Rehabilitation Neurology

Anthony J.W. Chen, MD

### INTRODUCTION

Traumatic brain injury (TBI) affects an estimated 1.4 million individuals in the United States each year.<sup>1</sup> Although the injuries are acute, functional deficits that result from TBI may produce tremendous chronic physical, emotional, and financial burdens on individuals, families, and health care systems. TBI is a leading cause of long-term disability in the United States.<sup>2,3</sup> Studies suggest that up to 2% of the US population lives with disabilities resulting from brain injury.<sup>1,4,5</sup> Individuals with TBI are at risk for being unable to live independently. Surveillance for TBI across 14 states showed that approximately one third of patients continue to require assistance with daily activities 1 year after injury.<sup>6</sup> For patients hospitalized for TBI, cognitive status is a major factor in determining whether individuals are discharged to institutions.<sup>7</sup>


Care for patients with TBI is a major part of neurology practice. TBI is one of the most common neurologic diagnoses in the United States.<sup>8</sup> The role of the neurologist varies in different practice settings, ranging from acute emergency services to care in rehabilitation or community outpatient settings. TBI is marked not only by an acute injury superimposed on a prior baseline neurologic state, but also by dynamic post-injury factors that may encourage or hamper functional recovery over the long term. An important goal of neurologic TBI care is to identify and manage these factors to maximize functional outcome.

Neurologic deficits caused by TBI are not unique to trauma per se, but certain patterns of dysfunction are more common with TBI than other causes of injury. While these patterns are partially explained by traditional neurologic localization of focal cerebral lesions, the localization approach has left many TBI sequelae poorly explained. As illustrated by the cases presented in this manual, sources of dysfunction in the course of TBI may be complex and varied, involving not only the pathophysiology of direct impact injury, including shearing forces, but also subsequent medi-

cal complications, changes in physical, cognitive, and social status, reactive and layered emotional responses to a new personal status, and medications and other medical management decisions. It is important for the neurologist to understand the multifaceted nature of TBI and participate in the multidisciplinary approach to evaluation and management that many patients with TBI require. This review is focused primarily on rehabilitation-related neurologic care and closed-head injury, with consideration of aspects of care in the post-acute to chronic stages of recovery.

### SEVERE INJURY: INJURY RATINGS, NEUROLOGIC LOCALIZATION, AND PROGNOSIS

#### CASE PRESENTATION I

 Responding to a 911 call, an emergency medicine technician (EMT) finds a 25-year-old man on the street outside a building where a party had spilled over to a third floor balcony. Witnesses say that the patient stepped out for fresh air and tripped when additional crowds pushed onto the balcony. On initial assessment, the EMT documents no eye opening, incomprehensible vocalizations, and an extensor motor response to pain. The patient remains unconscious for 4 days. He then begins opening his eyes and responding to his environment, including following commands, but he remains disoriented and confused until 2 weeks after this injury. A neurologist is asked to formulate a prognosis for this patient's eventual functional outcome to help prepare the family regarding expectations for his recovery.

- **What information derived from the acute injury period may help with formulating a prognosis for recovery?**

Estimating prognosis based on acute injury factors is an imprecise but reasonable start. The severity of initial injury (mild, moderate, or severe) correlates with long-term functional outcomes at a broad level. Glasgow Coma