

# HOSPITAL PHYSICIAN®

## NEUROLOGY BOARD REVIEW MANUAL

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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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## Neuropsychological Evaluation in Clinical Practice: Overview and Approach

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## Neuropsychological Evaluation in Clinical Practice: Overview and Approach

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### INTRODUCTION

Neuropsychology is a science dedicated to understanding the intricate relationship between human behavior and the brain. Neuropsychologists and neurologists often work hand in hand, as neuropsychology can be used to enhance, expand, or support neurologic diagnoses in both clinical and research contexts. This manual, the first of a 2-part review of neuropsychology, provides an overview of the practice of neuropsychology, focusing on the goals of a neuropsychological evaluation, its methods, the cognitive domains assessed, and the interpretation of test results in an adult population. The second manual will demonstrate the application of fundamental concepts of neuropsychology in clinical practice by presenting the evaluation, counseling, and treatment recommendations for cases covering a broad spectrum of disorders, including an example of a neuropsychological evaluation of a child.

### GOALS OF NEUROPSYCHOLOGICAL EVALUATION

Historically, the goal of a neuropsychological evaluation has been localization of lesions in patients who experience changes in cognition and/or behavior.<sup>1</sup> In the 1960s, Alexander Luria provided an outline for the clinical application of neuropsychology, describing its fundamental task as the qualitative analysis and evaluation of symptoms for “local diagnosis of brain damage.”<sup>2</sup> The lesion method can be traced back to the mid 1800s and publication of early case reports documenting the effects of brain damage on behavior. A well-known early case is that of Phineas Gage, a railroad worker who developed marked changes in personality and behavior after sustaining a significant frontal lobe injury. More recently, this method has been applied in in-depth experimental studies of patients such as HM, who underwent bilateral removal of a portion of the medial temporal lobes for intractable epilepsy, resulting

in a dense anterograde amnesia.<sup>3</sup> To accomplish this goal of associating behavioral or cognitive impairment with the location of a lesion, early formalized methods of neuropsychological assessment related patterns of test scores obtained on a set battery of tests to specific brain regions (eg, Halstead-Reitan Battery<sup>4</sup>). Less emphasis has been placed on this goal since the advent of sophisticated neuroimaging techniques, including magnetic resonance imaging (MRI), functional MRI, positron emission tomography, computed tomography, and magnetoencephalography.<sup>5</sup> Instead, neuropsychologists use the results of neuroimaging in conjunction with findings from the neuropsychological evaluation to better understand the patient’s cognitive profile and the underlying neurologic basis of the patient’s behavior.<sup>6</sup>

In current practice, there are 4 major goals of neuropsychology:

- 1. Assessment of a patient’s cognitive status across a range of domains to determine cognitive strengths and weaknesses.** In many cases, the underlying etiology for a change in cognitive functioning is known, such as a neurologic injury (eg, a cerebrovascular accident, traumatic brain injury [TBI]) or neurologic disease (eg, epilepsy or Parkinson’s disease). Within this context, the neuropsychological evaluation can provide information regarding the extent and nature of the patient’s cognitive deficits and identify areas of functioning that have been preserved. This information can be used to guide patient care and treatment planning. Cognitive domains that are typically assessed within a neuropsychological evaluation include intellectual functioning, attention, frontal/executive functioning, memory, language, visual perception, sensorimotor functions, and emotional functioning.
- 2. Assistance in addressing questions pertaining to differential diagnosis.** Patients may be referred for neuropsychological testing to investigate an underlying etiology for changes in cognitive functioning that have been noticed by the patient, a family member, or a physician. In these cases, the patient’s performance across a range of measures and cognitive