CHAPTER 1

Dementia

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Introduction

Dementia is defined as a loss of intellectual functions, such as remembering, thinking, and reasoning of sufficient severity to interfere with a person's daily functioning. From the point of view of many of the third-party payers, it can be viewed as increasing the burden of care. For example, if a person requires a CNA to assist him to go to the bathroom, that would be an increase in the burden of care. Medicare would pay the occupational therapist to increase the ability of the person to go to the bathroom, independently, thus decreasing the person's burden of care. In the long run, it would be less expensive for the payer to reimburse the occupational therapist than it would be for the payer to reimburse a CNA to assist the person every time he had to go to the bathroom for the rest of his life. As a result, decreasing the burden of care becomes an important part of the role of the rehabilitation specialist be they physical therapy, occupational therapy or speech-language pathology.

The person diagnosed with dementia has many related difficulties, such as problems with information processing, receptive and expressive language, activities of daily living, instrumental activities of daily living (like check writing), and behavior problems. In many instances, the behavioral problems presented by the person with dementia are directly related to the fact that the person has difficulties with ADL, language, information processing, etc. Certainly those difficulties can change the way the person views interaction with the rest of the world. In addition, the person may also have behavioral problems due to the medications or lack of medications prescribed for this person. This is a subject that will be dealt with further in this book. The person may also exhibit behavioral difficulties due to the fact that he may be treated as "demented" rather than his more specific diagnosis such as Lewy body, Parkinson's, Alzheimer's, etc. Each specific type of dementia has its own unique behavioral characteristics as well as its own memory difficulties and therapeutic strategies. There are many types of dementia. To bundle all of these diagnoses into one diagnosis called "dementia" represents an inadequate approach to viewing this person and setting up treatment strategies for this particular person. The resulting therapeutic strategies initiated for this person can only be grossly defined, as the particular diagnosis is not represented. To view the person as a particular diagnosis, such as Alzheimer's, Lewy body, or Huntington's disease, allows the rehabilitation clinician the ability to refine the therapeutic strategies and approach to this person (Rush, 2004; Genesis 2006).

Major and Minor Neurocognitive Disorders

The Diagnostic and Statistical Manual of Mental Disorders (DSM) is used for diagnosis by professionals in mental health. The DSM-5 eliminates the term "dementia" and replaces it with the terms major and minor neurocognitive disorders. It was believed that the term dementia was stigmatizing with elderly individuals. In addition, the term dementia was not well accepted by younger individuals with disorders such as HIV dementia. Neurocognitive disorders are noted for their acquired decline in cognition in one or more cognitive domains. Importantly, the decline in cognition must be objectively observable and noted on cognitive measures such as neuropsychological testing. The neurocognitive disorders can affect a variety of abilities, such as learning, attention, memory, social cognition, perception and language, (Grohol, 2014, Siberski, 2012).

A major neurocognitive disorder is defined as following:

- Objective evidence of significant decline in cognitive abilities from previous levels of performance in one or more cognitive domains (learning, memory, executive function, attention, social cognition, and perceptual-motor abilities).
- The significant decline can be based on concerns from a knowledgeable person, the individual's concern or concerns of the clinician. Test scores are two or more standard deviations below the norm (below the 3rd percentile).
- The deficits in cognition interfere with independence (i.e. requiring assistance with instrumental activities of daily living, managing medications).
- The deficits in cognition do not occur conclusively with delirium.
- The cognitive deficits are not explained by other mental disorders such as schizophrenia and depression.

A minor neurocognitive disorder is defined as following:

- A modest decline in cognition from previous levels of performance in one or more cognitive domains based on a knowledgeable informant or individual concerns as well as the clinician. Neuropsychological test performance typically results in one or two standard deviations below the norm (16th percentile).
- The cognitive deficits are not sufficient to interfere with instrumental activities of daily living (i.e. managing medications, paying bills). The deficits, however, may require compensatory strategies, accommodation, or individual greater effort in order to maintain independence
- The deficits in cognition are not primarily attributable to mental disorders such as schizophrenia.
- The deficits in cognition do not occur exclusively with delirium.

Following the determination of whether the individual has a major or minor neurocognitive disorder, the clinician must then determine the etiological subtype, such as Alzheimer's disease, Lewy body dementia, Parkinson's disease, etc. The individual then may be described as a major neurocognitive disorder due to Alzheimer's disease (Grohol, 2014, Siberski, 2012).

Mild Cognitive Impairment

Mild cognitive impairment (MCI) represents a syndrome characterized by decline in cognition greater than expected for the person's educational level and age. Prevalence of MCI ranges from 3 to 19% of individuals greater than 65 years of age. Some individuals with MCI can exhibit stable cognitive functioning. Approximately 50% of MCI individuals, however, progress to dementia in half a decade. MCI can be considered a risk factor for dementia, leading to preventative activities to control risk factors such as systolic hypertension.

There are several subtypes to MCI including age associated cognitive decline (AACD), amnesic MCI (MCIa), cognitive impairment not dementia (CIND) and age associated memory impairment (AAMI). The amnesic subtype has a high risk for Alzheimer's disease.

The diagnostic process for MCI involves several cognitive domains focusing on semantic and episodic memory. No pharmacological therapy at this point is capable of delaying a progression of MCI to dementia. Short-term pharmacological symptomatic benefits can be seen, however, with acetycholinesterace inhibitors such as Aricept and Exelon. Therapeutic treatment usually includes an objective neuropsychological evaluation, counseling, and use of both direct and indirect therapeutic interventions described later in this book (Feldman & Jacova, 2013, Gauthier et al., 2006).

Neurodegenerative Dementia

Dementia has been defined as multiple cognitive deficits manifested by impairment in memory as well as by one or more of the following cognitive problems:

- Executive functioning difficulties (i.e., organizing, abstracting, planning, sequencing)
- Apraxia
- Agnosia
- Aphasia

CHAPTER 2

Memory and Dementia

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This chapter provides a model for evaluating and working with memory. The need to assess memory is important for several reasons. The results of a memory assessment guide the development and implementation of treatment goals, serves as a baseline to compare improvements, provides information for the design of compensatory strategies, and guides discussions with families (Sander, 2007). When clinicians have a thorough understanding of both the impaired and the spared memory systems in each individual with dementia, they are able to select and develop effective interventions. Human beings have a number of memory systems: sensory, working, declarative, and non-declarative systems. Each of these systems depends upon the integrity of different neuroanatomical structures. The memory systems are also reflective of the particular diagnosis of the person along with their staging level (Mahendra & Apple, 2007).

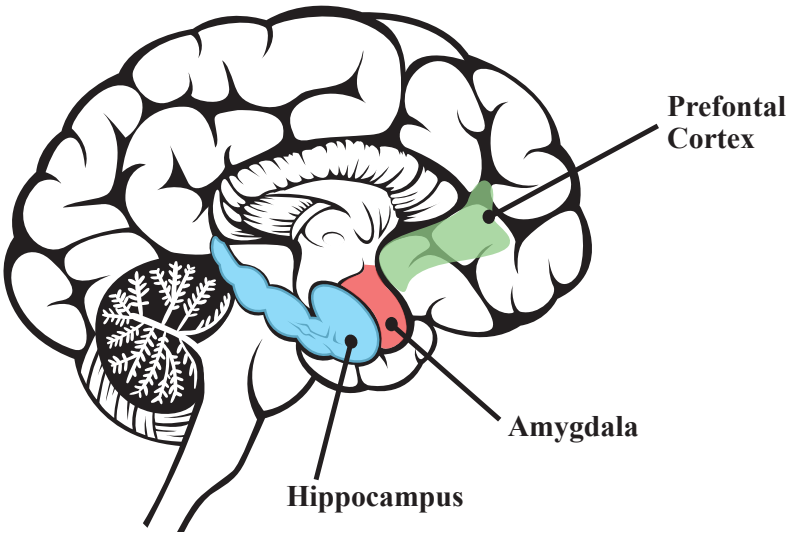
No one area of the brain controls the entire memory process. The temporal lobe is active in functions, such as language comprehension, organizing verbal information, long-term memory, affective behavior, personality, auditory and visual perception and auditory and visual attention (Vogel et al., 2000; Berube, 2002; Carl et al., 2014).

The Hippocampus and Amygdala

The **amygdala** is part of the limbic system and is involved with emotional memory. This form of memory can strengthen episodic memory and can play a significant role in reducing the amount of items that are forgotten after learning (Emilien et al., 2004). For example, finding out that you have a test tomorrow on material you have not studied can be emotional at best. At that point norepinephrine can flood the limbic system, increasing focus and attention and consequently memory, allowing you to study hard for the examination.

The **hippocampus** is also located in the temporal lobe. This organ is a part of the limbic system. The hippocampus is critical for short term memory functioning. It plays a role in long-term memory as well as spatial navigation. The hippocampus and medial temporal lobe play an important role in episodic information storage. The hippocampus is one of the first areas of damage in diseases such as Alzheimer's. Subsequently, people with AD will have difficulty with episodic memory. The person that suffers damage to the medial temporal lobe, frontal lobe and hippocampus will

exhibit amnesia (Carl et al., 2014). The role of the hippocampus is quite extensive involving areas such as recall memory, recognition memory, semantic memory and episodic memory (Emilien et al., 2004). The right hippocampus is involved with recall of visual information, whereas the left hippocampus is involved with verbal information. As a result, removal of the right hippocampus in the case of a person with multiple seizures will result in recall difficulties involving visual information (Parente & Harriman, 2003).



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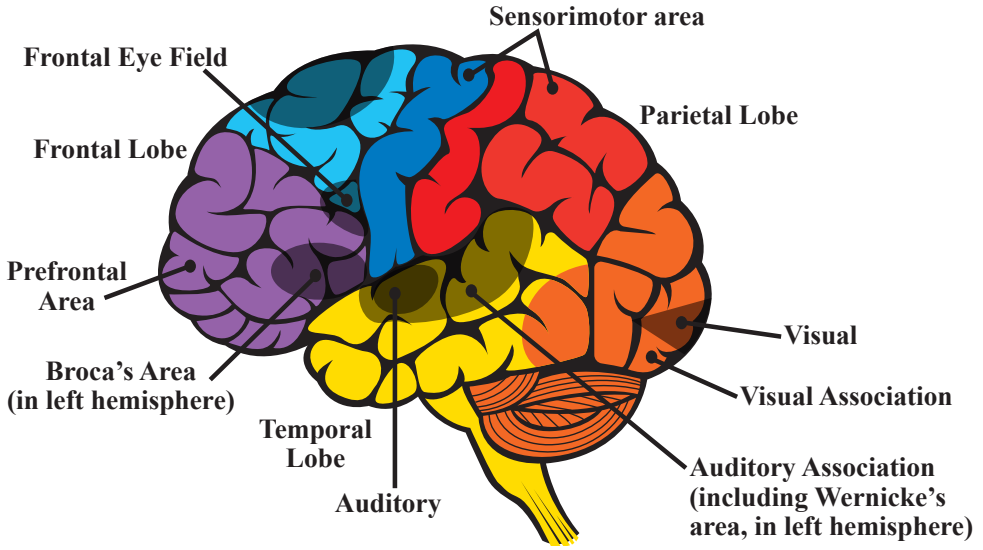
Parietal Lobe

Memory retention and retrieval is affected by damage to the parietal lobe. Different memory functions are affected depending on where the damage is located in the parietal lobe. For example, left parietal-temporal damage will affect short-term retention of verbal information while right parietal-occipital damage will affect short-term retention of nonverbal information. Short-term memory loss may be affected by damage to the junction of the parietal and occipital lobes. In this case, the person may be able to recall information presented with auditory stimuli and not visual stimuli (Parente & Herrimann, 2003).

Frontal Lobe

The frontal lobe is responsible for a number of functions such as problem solving, impulse control, memory and motor function. Other functions include expressive language, facial expression, fine motor upper body movement and motor chaining.

The right frontal lobe is responsible for nonverbal activities, whereas the left frontal lobe is involved with language. The frontal lobe also functions in setting time markers involved in past and present as well as organizing and sequencing functions. **Anterograde** as well as **retrograde** amnesia is a result of frontal lobe damage. Proactive interference is also seen with frontal lobe damage. In this case, the person has difficulty learning new information because of confusion with old information. Frontal lobe damage is also associated with risk taking, noncompliance with rules, reduced associated learning, repeated speech patterns, and difficulty interpreting environmental feedback. Other activities associated with the frontal lobe include executive functions, long-term episodic memory and spatial orientation (Leonard et al., 1988; Brown, 1972; Kuypers, 1981; Parente & Herrimann, 2003; Drewe, 1975; Emilien et al., 2004; Carl et al., 2014).



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Process of Memory

The process of memory first involves **encoding**. Encoding is the processing of material that will be learned. Encoding maybe the first step in forming or creating a memory. It is critical when teaching a person to emphasize the depth of encoding. The deeper the material to be learned is encoded, the more success the person will have in storing and recalling materials. A number of variables, such as sensory memory deficits, attention or concentration deficits, hearing and vision deficits, and frontal lobe deficits, can negatively affect encoding. The mechanics of encoding can range from simple repetitive rehearsal to complex organization of the information to be retained. The most effective way to encode new information is generally to associate that information with previously learned information. The role of the clinician is to