

**When Speech and Language Therapists have to deal with  
cognitive impairments in Patients with Multiple Sclerosis...  
...How to adjust the intervention?**

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**This booklet has been compiled by the Special Interest Group (SIG) on Communication and Swallowing of Rehabilitation in Multiple Sclerosis (RIMS). It is for those Speech and Language Therapists involved in MS rehabilitation and care, who aspire to better understand how cognitive disorders impacts on their interventions, and how they may deliver more effective speech therapy to those who have cognitive deficits.**

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## 1. Introduction: Why this booklet?

Increasing numbers of studies now focus on **Cognitive deficits** (CD) in Multiple Sclerosis (MS). Despite the great variability in the assessment methodology, a **prevalence rate up to 70%**<sup>1-7</sup> has been identified. Cognitive impairments have been shown at **all stages and in all subtypes of the illness**<sup>1-7</sup>. This means that patients may experience cognitive dysfunctions even in the early stages of the disease course, when there is little to no physical disability. The clinical presentation of CD may vary among patients, from mild to rare severe impairments resembling dementia<sup>3,7</sup>. Regardless of the degree of physical disability, illness duration, disease course and demographic variables, CD may have a strong **impact on Quality of Life** and a **reduction in daily life activities**.

CD can be very **heterogeneous** from a patient to another<sup>3,8</sup>. The cognitive domains most frequently impaired in MS are **attention, speed of information processing, memory, executive functions and visuo-spatial perception**<sup>1-6</sup>. **Fatigue** is a common symptom of MS that can be a result of MS itself or it can occur as an adverse effect of treatments<sup>9</sup>. Fatigue may be strongly related to the variability and the severity of cognitive disorders<sup>10,11</sup>. **Depression** and other psychological dysfunctions too have a high prevalence in MS and they can interact with CD in a complex way<sup>11-13</sup>. In particular, CD may interfere with the patient's ability to develop effective coping strategies<sup>12</sup>.

CD may **interfere with both on communication and swallowing abilities**<sup>14-16</sup>, and affect Speech and Language Therapists (SLT) daily clinical interactions with patients. Moreover CD may influence the relationship between patients and their environment.

This brochure will summarize the main features of cognitive, communicative and swallowing deficits in MS, and set out the interrelated relationship between these three areas. It will focus on the consequences experienced during the daily practice with patients and provide useful recommendations when setting the treatment goals.

**It is for those Speech and Language Therapists involved in MS rehabilitation and care, who aspire to better understand how cognitive disorders impacts on their interventions, and how they may deliver more effective speech therapy to those who have cognitive deficits.**

### 1.1 Communication

**Communication** is the **complex activity of conveying information** through the exchange of thoughts or messages by speech, visual signs, writing or behaviour. Communication is a complex phenomenon involving many domains ; the ability of understanding what other people are saying or wishing to express, the ability to convey the intentions and the goals of what is being said, the content of the message and its utterance or motor execution. It implies the presence of a sender, a receiver and a communication channel between them. It involves the ability not only to understand and express messages, but also to filter and adapt the content of messages, according to the speakers and the environment.

### 1.1.1 *Speech*

Speech is the verbal means of communicating. It consists of articulation, voice and fluency. **Articulation** refers to how speech sounds are made. **Voice** is the use of the vocal folds and breathing to produce sound. **Fluency** is the rhythm of speech.

### 1.1.2 *Language*

Language is the human capacity for acquiring and using complex systems of communication both orally and written, expressive and comprehensive.

### 1.1.3 *High level language functions and pragmatics*

**High Level Language skills** refer to those skills that go beyond basic vocabulary, word form, and grammar skills, and **allow adjusting utterances to the required social, work or relationships demands**. In addition to other areas, high-level language skills include development of an advanced vocabulary, understanding word relationships, paraphrasing, reasoning, and developing the ability to look at things from another individual's perspective

**Pragmatic abilities** go beyond language itself and **refer more to contextual factors** that are relevant in giving the message the exact intended meaning. These abilities include appropriate selection of words, prosody, volume of voice, distance from another person and the place and time to say one thing. The correct management of these aspects enables understanding of another speaker's intended meaning and to convey our own intended meaning.

## 1.2 *Swallowing*

The World Health Organization defines swallowing as the function of clearing the food and drink through the oral cavity, pharynx and esophagus into the stomach at an appropriate rate and speed. Commonly, there are three stages in which the swallowing process is divided. The **oral phase** consists in sucking, chewing, and moving food or liquid into the throat. During the **pharyngeal phase** the swallowing reflex starts, the food is squeezed down the throat, and the airways close to prevent food or liquid aspiration and the choking of the upper esophageal sphincter. In the **esophageal phase** the bolus is transported down the esophagus into the stomach with the peristaltic wave of contraction that propagates down the esophagus.

## 2. **What are the most frequent cognitive disorders observed in PwMS?**

Cognitive impairments in MS are highly variable; both in severity and the nature of dysfunction. Studies have shown that MS patients may exhibit deterioration in **executive functions , attention, memory and visuo-spatialskills**<sup>1-7</sup>. A significant deterioration in the **speed of information processing** is also common in MS

### 2.1. **Executive Functions**

It is generally accepted that executive functions comprise of **planning and problem solving, inhibition, organization, flexibility, reasoning and abstraction skills**. These functions allow adaptation to new situations within the environment.

### 2.1.1 *Planning*

Planning is required in problem-solving situations and is based on the ability to develop a coherent sequence of actions to achieve a given objective. It is therefore necessary to have a balanced representation of a situation, develop a set of appropriate strategies and monitor the effectiveness of action taken. Disorders at this level may, for example, result in an **inability to organize and plan movements**.

### 2.1.2 *Problem Solving*

Problem solving disorders may lead to difficulties in the process of identifying and implementing a solution to a problem. It is often difficult for PwMS to develop clear strategies. **Disorders of reasoning, planning and judgment appear in abstract and complex activity** where a number of operations are required to reach a final synthesis, such as arithmetic problems or explaining proverbs<sup>17</sup>.

### 2.1.3 *Flexibility*

Flexibility difficulties are frequent and show an **inability to control the allocation of attentional resources** to move from a sequence of behavior to another. The difficulty may lie in moving the attentional focus, or in the flexibility with which the PwMS exercises that control.

### 2.1.4 *Abstract Reasoning*

Abstract reasoning disorders may be manifested in a **difficulty in analyzing information and solving problems** on a complex, thought-based level. PwMS may encounter **problems** in different skills such as **forming theories** about the nature of objects, ideas, processes. Also, it may be **difficult to apply knowledge** in problem-solving using theory, metaphor, or complex analogy and to **understand relationships** between verbal and non verbal ideas.

### 2.1.5 *Inhibition*

Inhibition is the ability to **resist to non-pertinent information**. Thanks to this ability people are able to act or talk without being disturbed by non-pertinent information, thoughts or behaviours. It helps us **getting rid of previous information** that is no more relevant for the situation. Inhibition disorders may lead to impulsive behaviours and responses. It can also influence other cognitive domains (flexibility, attention,...).

## 2.2 *Attention*

Attentional functions (**alertness, selective, sustained and divided attention**) are cognitive components **frequently altered in MS**<sup>5,8,62</sup>. However, it is not possible to be certain whether alteration is specific to attentional functions or is the consequence of multiple factors such as fatigue or a deficit in the working memory<sup>17</sup>. These attention disorders arise from an inability to concentrate for long periods of time, or rapid cognitive fatigability in tasks requiring significant

attentional mobilization and / or the involvement of other cognitive functions consuming attentional resources.

## 2.3 Memory

Although cognitive impairment is variable, memory is the cognitive function that tends to be **systematically affected** in MS; particularly **long-term memory** and **working memory**<sup>17</sup>. Working memory is also generally the first troublesome cognitive function<sup>19</sup>. It is still not clear whether verbal memory is also compromised<sup>20</sup> and there remains some disagreement on the nature of these difficulties. Some authors postulate a difficulty in retrieving information stored in long-term memory even if storage and encoding skills are preserved; whereas others report the opposite<sup>21</sup>.

## 2.4 Speed of information processing and Working memory

**Slow speed of information processing** is very common in these PwMS<sup>5,8,62</sup>. This cognitive impairment in MS is central and can either be the cause of other cognitive disturbances, or amplify them. Even when the cognitive cost required is minimal, PwMS demonstrate responses that are slower and less accurate compared to normal population<sup>19</sup>. The slowdown in the speed of information processing can affect working memory. When information is **presented too quickly**, these disorders increase in impact. **Working memory** that has not enough time to properly store the information before processing becomes **rapidly overloaded**<sup>17</sup>. On the other hand when the speed is adapted, the performance gets better. This because additional time would enhance encoding information in memory<sup>22</sup>.

## 2.5 Spatio-temporal Orientation

**Difficulties** in spatio-temporal orientation; the **representation of the body schema** in relation to the environment or the use of spatio-temporal abstract words may be observed in PwMS<sup>23</sup>. There can be **confusion between left and right, weaknesses in reading maps**, diagrams. There can also be **difficultly in determining one's own location** in an environment whether it is familiar or not.

## 2.6 Visuo-spatial perception

**Visuo-spatial perception** refers to the mental function involved in distinguishing by sight the relative position of objects in the environment or in relation to oneself. Visuo-spatial skills include mental imagery and navigation, distance and depth perception, and visuo-spatial construction. It has been found to be one of the most **frequently affected cognitive domain** in MS<sup>18</sup>. Many areas have been described as impaired; **visual object recognition, visual perception and discrimination**<sup>6</sup>. However there is a paucity of information about visuo-spatial perception, because of the difficulty in accurate assessment against the backdrop of frequent visual sensory losses in PwMS.

## 2.7 Awareness

Awareness is the state or ability to perceive, to feel, to have the knowledge of, or to be conscious of events, objects, or sensory patterns. In this level of consciousness, sense data can be confirmed by an observer without necessarily implying understanding. Awareness refers to a **consciousness** of internal or external events or experiences, that is thought by some to separate human and non-human animals. **Patients may underestimate** the importance of the **trouble**. This can lead to a **dichotomy between the patient's self-evaluation** of the trouble and the **objective assessment** of the therapist or the observations of the family.

## 3. Which troubles can be related to cognitive disorders in SLT practice?

### 3.1 Communication

**A wide range of communication disorders** found in MS have been described and they may be occur early in the disease course<sup>24,25</sup>. Communication disorders may include changes in the **speech, language, pragmatics** and **high level language**<sup>16,26</sup>.

Even mild impairment of communication abilities may have significant impact on relevant aspects of the life of a PwMS; employment, personal and social life<sup>27-29,63</sup>. Communication disorders get worse when combined with pain, fatigue<sup>30-32</sup> or depression, and also personal or environment conditions<sup>28</sup>. Communication disabilities have been shown to reduce participation<sup>29</sup> as defined by the *World Health Organization's* (W.H.O.) *International Classification of Functioning Disability and Health* (I.C.F., 2011) and lead to **isolation, depression and loss of independence**<sup>33</sup>. Communicative disorders may reduce the patients' compliance to treatments<sup>34</sup> and hence the validity of the rehabilitation itself.

#### 3.1.1 Speech

In MS, damage of the central nervous system (CNS) can create disturbance of the muscular control over the speech mechanism and this is known as dysarthria. It can bring problems in oral communication due to paralysis, weakness or incoordination of the speech musculature.

The reported **prevalence** of dysarthria in MS varies between **40 and 55 %**<sup>26, 35-36</sup>. The variation in the incidence depends on the severity, duration, and stage of the disease progression.

Dysarthria can occur at various stages of the disease but in general speech disturbance is uncommon in the initial stage and tends to occur as later manifestation. Initially the speech disorder is mild and the severity increases progressively with greater degree of neurological involvement; it is more pronounced in individuals in whom the disease process involves a greater number of neurological systems.

Dysarthria can cause a decrease of the intelligibility of the person's speech. In some cases it occurs only in complex situations (surrounding noise, group conversations). In extreme cases it can prevent oral communication and can prevent from having even easy conversation (anarthria, aphonia).

Some PwMS do not have overt speech difficulties but may early show deficits of some of its components, such as tongue movement capacity or respiratory and phonatory function.

Since speech and swallowing share some anatomical structures and some physiological mechanisms, speech disorders can be associated with swallowing disorders.

It has been shown a strong correlation between the degree of dysarthria in MS and the cognitive-linguistic deficit<sup>26</sup>.

CD may prevent PwMS from adopting effective strategies and behaviors to deal with dysarthria. Dysarthria in MS can be spastic, ataxic or, often, both spastic and ataxic.

**Ataxic dysarthria** is characterised by disturbances in motor co-ordination and causes mainly articulatory and prosodic disorders.

**Spastic dysarthria** is linked to hypertonia and spasticity and leads to a slow and imprecise speech, hoarseness and hypophonic voice and a weak pulmonary capacity.

**Combined dysarthria** (ataxic and spastic) mixes the deficits of the first two.

The main symptoms of speech disturbances in MS are :

**Imprecise articulation** (dysarthria) : speech can be slow and slurred, with imprecise vowels and consonants, sudden breakdowns or excessive length of sounds. These difficulties are caused by slowness and weakness of tongue movements, and also to a lesser extent, by difficulties related with movement of lips and jaws.

**Voice abnormalities** (dysphonia) : there are different types of voice disturbances : harshness, breathiness, hoarseness and strained-strangled voice. The voice intensity may be low and decrease with fatigue. In some cases the person can produce only short utterances. These disturbances are caused by abnormalities of breathing and of the laryngeal system. Deficits in breathing may consist of poor breath support and lack of breath control for speech. Deficits in the laryngeal system may be caused by hyper- or hypofunction. Sometimes, the voice has an excessive nasal resonance.

**Abnormal speech melody** (dysprosody) : PwMS may show prosodic disturbances, such as slowness or excessive velocity ; poor or excessive pitch variation ; and excessive variation of loudness. These disturbances are caused by reduced breathing control, by laryngeal and articulatory dysfunction or by poor co-ordination between these components.

Speech is the verbal mean of communicating. It consists of articulation, voice and fluency. **Articulation** refers to how speech sounds are made. **Voice** is the use of the vocal folds and breathing to produce sound. **Fluency** is the rhythm of speech.

### 3.1.2 Language

Language is the human capacity for acquiring and using complex systems of communication both orally and written, expressive and comprehensive.

#### 3.1.2.1 *Word-finding disturbances*

Among brain language systems, lexical access is a process that selects and retrieves word from the mental lexicon. Lexical access difficulties, such as **naming** and **word fluency deficits**, are an early and frequent phenomenon in MS<sup>37-39</sup>. Some authors attributed naming deficits to a degradation of the existing lexical pool. More recently, some authors have suggested that naming deficit may be ascribed to an inefficiency of the strategies that retrieve the appropriate word from lexicon, rather than a failure of the semantic knowledge<sup>39</sup>.

#### 3.1.2.2 *Aphasia*

Many aspects of language that may be impaired in MS have been described, together with different kind of aphasia syndromes, but acute **aphasia** seems to be a **rare clinical feature** in MS<sup>40-43</sup>. It has been described as a symptom of acute inflammatory exacerbations of left-

hemisphere white matter lesions. Aphasia may also appear in the context of a severe cognitive impairment<sup>44</sup>.

### 3.1.3 High-level language and pragmatics

Although heterogeneous signs and symptoms are described in MS literature, there is still slight disagreement as to the nature of communication disorders in MS. High-Level Language (HLL) and pragmatics disorders have not been adequately investigated in MS until now. Tests and batteries currently available are often insufficiently sensitive to detect HLL deficits in MS. However in daily practice it is common to observe that there is a **wide range of communication disturbances** that **go beyond language**, refer to an **abnormal use of language** relative to the situation, and involve HLL and pragmatic abilities.

#### 3.1.3.1 Verbal initiative

Some PwMS may have **difficulty on initiating conversation**, even with speakers they are very familiar with. Some cannot provide prompt answers when required, and may not be able to express a judgment or an opinion when it is needed.

#### 3.1.3.2 Participation in conversations

PwMS may find it **hard to follow conversations**, especially in complex situations, such as in noisy places, on group conversation, on telephone or while doing something else. Changes in participation were attributed to a variety of factors, including changes in speech, language and cognition, as well as fatigue, depression, social support, visual changes and limited mobility<sup>22</sup>.

#### 3.1.3.3 Turn taking

Some PwMS may **not have insight into the implicit alternation between talker and listener**. This means they may talk when it is not their turn, overlapping others who are still talking, or remain quiet when they are asked to take part to conversation. Very often they report difficulties in locating their turn in group conversations because others are quicker or speak louder.

#### 3.1.3.4 Comprehension disturbance

Although profoundly significant disturbances of comprehension are not common in MS, some **difficulties** may occur in the **understanding of long and complex messages**. Some authors relate this to slow information processing<sup>45</sup>, whereas others attribute it to a poor working memory. Together with these deficits, PwMS may have **difficulties in understanding the implied meanings of sentences and make inappropriate inferences**<sup>46</sup>. Some patients may **get a wrong interpretation of subtlety of language**, such as on absurd or ambiguous sentences and metaphors.

#### 3.1.3.5 Message accuracy

PwMS may give **information** that is neither correct nor **completely accurate**. Their listeners then misunderstand and **misinterpret** their messages or they assume the wrong impression about what they are saying.

### 3.1.3.6 Pertinence

Some PwMS may produce inappropriate **answers** that are **not related** to the question asked. They may show a poor topic maintenance, leading to tangential **lack of internal coherence**. They may choose **content** which is **not adequate** or is inappropriate for the situation and risks being interpreted as being rude or embarrassing.

### 3.1.3.7 Completeness of information

Sometimes PwMS are **unable to be as informative as necessary**, giving **insufficient information**, and leaving out important details. Or they may say too much; giving **excessive and redundant information**. They may become excessively repetitive and go over and over the same conversation or carry on talking for too long about the same issue.

### 3.1.3.8 Speech style

PwMS may show **difficulties in selecting a speech style** appropriate to the immediate situation and the listener they are talking to. This means they may not be able to choose the right lexical register or the suitable tone of voice. Their discourses may be **poor of lexical cohesion**.

## 3.2 Swallowing

**Oropharyngeal dysphagia occurs from 33% to 43%** of the MS population<sup>47</sup>. This prevalence increases with rising disability to reach 65% in the most severely disabled subjects (EDSS 8-9)<sup>48</sup>. It has been found that dysphagia could also affect 15% PwMS with mild disability. The most serious complications caused by dysphagia are malnutrition and aspiration pneumonia; one of the leading cause of death in MS<sup>49</sup>.

The most common MS-related swallowing disorders in the oral and pharyngeal domains are:  
Deficit in bolus preparation caused by the hypotonia and incoordination of oro-facial muscles.

**The delay in triggering the pharyngeal swallow**, which is the most common problem seen in MS patients, can cause particular difficulties with liquid swallowing, including aspiration<sup>50</sup>. When the pharyngeal swallow is delayed, liquid may splash from the mouth into the pharynx. Because motor control of the pharynx has not been activated by the brainstem, the airway remains open and the upper oesophageal sphincter remains closed, causing liquid that enters the pharynx to splash into the open airway and be aspirated.

**Reduced hyo-laryngeal elevation** can contribute to weakened closure of the airway during the swallow and to reduced clearance of material from the pharynx, because the hyolaryngeal elevation is reduced which decreases upper oesophagus opening into the oesophagus thereby causing residue after the swallow and possible aspiration.

**Reduction in tongue base activity and/or pharyngeal wall contraction** reduces the pressure generated during the swallow, allowing residual food to remain in the pharynx and be aspirated when the patient resumes breathing.

These disorders may be mild, without causing any significant difficulties such as aspiration or inefficient swallow, but they can be more severe and require therapeutic (behavioural) management<sup>50</sup>.

#### 4. How can SLT adjust Speech and Language therapy?

The **management** of a PwMS is **complex**. A broad range of cognitive, communicative and swallowing impairments have been described. There is a strong relationship between these areas of impairment and it is clear that **SLT interventions** on communication and swallowing disorders are **influenced by cognitive functioning**. **Therapy** cannot be focused on a specific disorder, regardless of cognitive deficits and must **consider the patient as a whole**. A **multidisciplinary approach is essential** in realising the goal of optimal participation as defined by the World Health Organization's (W.H.O.) International Classification of Functioning Disability and Health (I.C.F., 2011). The following recommendations aim to set realistic treatment goals that integrate with daily practice.

##### Speak clearly!

If the intelligibility of speech is affected, promote meaningful conversation by utilising a **calm location** and avoiding external distractions. Guide PwMS to **speak slowly and clearly**, with **short and simple sentences** and **key words**; this enables PwMS to infer clearly what they want to impart. **Maintain eye contact** whilst talking and **indicate when you do not understand**, do not deceive about your understanding. Finally; **do not hurry the patient**.

##### Facilitating word finding

**When language is affected**, PwMS may encounter difficulties in retrieving words. By using **facilitation means** enables avoidance of stress and frustration. For example; if a PwMS cannot find the word "brush"; you can shape your lips as if you produce the sound [b] or produce the first letter or syllable of the word ("B" or "Bru"). You can also create a simple sentence that ends with, or contains, the searched word. ("for not having hair in a mess, I need a..."). Finally you can **provide a definition** of the requested word.

##### Involve PwMS in conversations

For some participation may be reduced; it is fundamental to **increase the motivation** to communicate and participate. It is key to actively **involve PwMS in conversations** on topics they are interested in, and may have a contribution to make. **Create the time** and **space** to participate and then positively value the contributions and opinions made.

##### Respect the turn of speech

A **mutual cooperation** on conversation is very important, however PwMS may not be able to respect the existing alternation between the role of talker and the role of the listener; **request they respect the turn of** each participant so that everyone will respect theirs. If the PwMS cuts across a word, **ask him/her to wait until you have finished** your sentence. Encourage

them to **pay attention to interlocutor's reactions** so as to understand when he/she can talk or not.

### Reformulate and rephrase

The content of PwMSs' discourse may not be adequate or suitable to the situation. Explain **why** his/her responses are not consistent or clear, and are not complete enough for you to understand. **Ask PwMS to reformulate** the sentences; otherwise you can **rephrase** what has been said by **synthesizing** and a reaffirming if it corresponds to what he/she meant.

### All you need is.... Time

Always take into account the slowdown in processing speed: **do not impose time constraints**, give time to patients to understand, to think, to do, to speak. **Give time** for them to integrate information.

### The sound of Silence

Additional **time** allows **enhanced encoding information** into memory function. It is necessary to insert silence time to ensure that the instruction has been completely understood and to enable the PwMS adequate opportunity to provide the right answers and execute the given instructions.

### Keep it simple

Abstract reasoning difficulties can be minimized during SL therapy session using **short and syntactically simple sentences**. Use **clear and concise language** with **concrete terms**. It is also better to **avoid** using unnecessary **metaphors** that make demands on **inferential abilities**.

**Repeat instructions** if necessary.

It is important that activity should focus on **reduction of unnecessary complication thus avoiding additional stress to PwMS**.

### Less is better

**Minimizing information load** will prevent excessive mental effort. It is effective to **agree one simple activity at a time** so that a PwMS can **concentrate their attention on a single task**. It is helpful to **avoid many people trying to communicate all at the same time**.

### Avoid fatigue

Fatigue is one of the most disabling symptoms of MS and influencing and negatively affecting performance. It is important to remember that **PwMS need to rest regularly with breaks; not only between different activities, but within the activity itself**. **Tasks should not last too long or be too arduous**. It is also important to include self reported evaluation by PwMS in treatment strategies.

### Attention, please!

PwMS may encounter difficulties in judiciously allocating attentional resources between several tasks when they occur simultaneously. They may even struggle to sustain concentration on a singular task. These difficulties are directly related to the episodic extreme fatigue experienced by PwMS.

### Remember...

Memory impairments may interfere with successful completion of exercises and may result in PwMS not being able to remember SLT instructions and forgetting their daily exercises. The phonological loop is weakened in some PwMS. In the presence of significant deterioration there can be loss of understanding of exercises instructions: some information may be only partially encoded, some completely lost. Then it is necessary to facilitate memory processes by **teaching** the PwMS **effective encoding and retrieval strategies**. It can be useful to use **semantic cues** to facilitate the easy use of memory. Finally it is imperative to consider that reduced learning capacity will hinder the use of an alternative communication device.

### To be or not to be

A **lack of awareness** is certainly one of the biggest obstacles to deal with. PwMS may not be compliant with an intervention because they **cannot understand and share the objectives of the therapy**. A lack of motivation can be prejudicial for daily implementation. It may be appropriate to **vary the daily exercises** in SLT sessions.

Some PwMS may have difficulty in identifying their mistakes. As mentioned above for example; during conversations it is appropriate to encourage patients to **pay attention to their interlocutor's reactions**. In this way they are empowered to implement different strategies to improve the quality of their contribution. **Recording** spontaneous speech as well as therapy sessions could also be suitable.

Flexibility and planning disorders, regardless of the SLT aspect work, can also interfere with therapy, . It may be difficult for PwMS to execute instructions, by showing **perseverative behaviors**. It can be difficult to switch from one exercise to the other and to deal with multiple instructions. It is important to **allow pacing of the implementation of different strategies of facilitation**: for example, write time-ordered clear instructions, visible one at a time.

### Eating

PwMS may encounter difficulties during swallowing realized by both voluntary and automatic actions set sequentially in time. For example, it may not be easy to chew food before swallowing. A lack of chewing will lead to the formation of a non-homogeneous bolus that will result in a problematic dissemination and transportation throughout the oral cavity and pharynx. MS may lead to alterations in sensitivity (as well as motor disorders) that can result in a disrupted, delayed or even absent swallowing reflex. Finally; the abnormal opening of the upper oesophageal sphincter of the oesophagus can prevent the smooth passage of the bolus into it.

Implementation of **compensation strategies** can be hindered by the presence of cognitive disorders and it is important to consistently **repeat instructions and key advice**; for example, **encouraging** adequate chewing.

It is important to make sure the PwMS is in a **peaceful location** in order to concentrate on food intake and **time constraints should not influence** mealtime.

It is important to ensure that the PwMS is enjoying an **adequate and comfortable sitting position**. Finally it is prudent to avoid **talking incessantly, or asking too many questions, to the PwMS** during a meal. This avoids excessive distraction and minimises the need for verbal responses whilst eating. It is important to recognise and value the social interaction of sharing food together and endorse this with minimal verbal speech and maximum body language

## **5. Conclusion**

MS is extremely variable with a unique clinical presentation for each individual. It is necessary that the aims of the treatment for that individual are established by the multidisciplinary rehabilitation team (doctors, nurses, speech and language therapists, neuropsychologists, psychologists, physiotherapists, occupational therapists, social workers, etc) in order to work towards a common goal.

It is not tenable to work with, and through, language and communication without involving other ubiquitous cognitive functions.

The aim of this booklet is to give SLP key information about the impact of cognitive disorders on speech therapy in MS. The most common disorders are discussed and succinctly described . The booklet is designed to enable any SL therapist interested in accruing knowledge about cognitive disorders in MS to implement effective interventions for PwMS. The ultimate goal is to **improve the “here and now” quality of life for PwMS and their families.**

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## 6. References

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