

### **What is Executive Function (EF)?**

Executive functions (EF) are complex mental skills and abilities that help us to manage our attention and behaviour so we can achieve our goals.

EF involve abilities such as:

- starting tasks
- planning tasks
- paying attention
- holding information in our mind while using it for a short period of time (e.g. remembering numbers as we dial a phone number)
- stopping inappropriate actions
- multitasking
- solving problems
- monitoring our own progress and adjusting our approach in new or unexpected situations
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We use EF every day during common activities such as dressing or preparing a meal, as well as more difficult activities related to work and leisure.

EF can be affected by a stroke. A person who has had a stroke may have difficulties with simple self-care activities (e.g. grooming, dressing) and/or more complex activities (e.g. cooking, grocery shopping, driving, childcare, return to work) that require EF.

### **How frequent are EF problems after a stroke?**

EF problems are very common, and happen in 19% to 75% of people after a stroke.

### **What are the potential consequences of EF problems?**

When a person has EF problems after stroke it can affect their ability to do familiar activities such as caring for themselves, managing their home, working and driving a car. It can also affect a person's ability to respond to new or unexpected situations.

For example, a person with EF problems might have difficulty preparing a meal because they forget to gather the correct ingredients or they mix up the order of steps when putting the foods together. They might forget to turn a hotplate on before cooking, or to turn the hotplate off after cooking. They might burn the meal because they got distracted during cooking.

As another simple example, a person with EF problems after stroke might have difficulty meeting up with a friend because they cannot figure out what time they need to leave their own house to get to the meeting place on time, or get distracted by another activity on his/her way to the meeting place.

There are strategies and approaches that can be used to help people with EF problems after stroke.

### **Can EF problems caused by a stroke be treated?**

There are three different treatment approaches for EF problems after a stroke. They aim to:

1. Restore the EF abilities affected by a stroke
2. Teach strategies to compensate for EF abilities affected by the stroke
3. Use external aids or environmental modifications
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These approaches are described below.

#### **1. Restoring EF abilities that have been affected by a stroke**

This approach involves practicing the skills you have difficulty with until you see improvement. Interventions may involve computer-based training or face-to-face training with a therapist.

Computer-based training can be used to train skills such as:

- working memory: the ability to hold information in our mind and work with it for a short period of time (e.g. dialing a phone number or doing mental calculations)

- dual task: the ability to coordinate two tasks at once (e.g. turning the steering wheel and pressing the gas pedal at the same time while driving).
- Computer activities to work on these skills use numbers, letters, words, and shapes, and also simulate daily life tasks.

NOTE: Don't be concerned if you are not familiar with computers – these programs work quite simply and your therapist will show you how to use them easily.

Face-to-face training with the therapist can be used to train skills such as:

- verbal working memory: the ability to hold verbal information in our mind and work with it for a short period of time (e.g. reading long sentences). Training for verbal working memory uses different activities such as word spelling or sorting a series of words into alphabetic order.

## **2. Teaching strategies to compensate for EF abilities affected by the stroke**

This approach may involve learning and applying strategies to solve everyday problems and to handle everyday situations in a more structured way.

Specific treatments that are being tried in recent years to help people with EF problems after a stroke include:

Problem-solving training, where the person learns to make use of a common every day task they are comfortable with to help them learn other similar tasks – by comparing one to the other and identifying similarities in “how to” perform the task.

Goal Management Training, where the person learns to take time to stop while doing an activity in order to reflect on the goal of their task and to self-monitor their performance. This training often includes some written materials, interactive tasks, a discussion with your clinicians of real-life concerns you are experiencing when doing specific tasks since your stroke etc.

Cognitive Orientation to daily Occupational Performance (CO-OP) approach, where your clinician helps you identify strategies that will make it easier for you to achieve

goals that have become more difficult since your stroke. For example, you may find it harder to remember to organize your week and get to your scheduled appointments. Your clinician would help you to come up with strategies that work for you to make these activities easier to do.

### **3. Teaching the use of external aids / environmental modifications**

This may involve using paging systems, step-by-step checklists or environmental modifications in order to complete daily activities:

Electronic paging systems consist of reminders sent to standard pagers to assist with memory & planning. You would receive electronic prompts to carry out tasks you want to accomplish such as taking medication or remembering appointments.

Paper and pencil checklists: With the clinician's help, you would make a list of each step or task that needs to be done. You would tick off each task/step once it has been done and record the total time taken to complete the task.

Environmental modifications consist of changes to everyday objects or settings (e.g. use of a dosette box for medication, labelling things around the home or workplace, etc.).

#### **Which EF treatments work?**

There is limited but encouraging evidence to suggest that people with stroke can benefit from retraining specific EF abilities (e.g. computer-based training of working memory) and using compensatory strategies (e.g. problem-solving strategies, goal management training, paging systems). These strategies may improve different aspects of EF and, possibly, a person's ability to accomplish daily activities.

#### **Who provides the treatment?**

Occupational therapists (OT), neuropsychologists and speech language pathologists can provide this therapy at an acute care hospital, rehabilitation centre, or private clinic.

**Are there any side effects/risks to EF treatments?**

There are no specific risks and/or side effects involved in EF treatment post-stroke. You are encouraged to take breaks as needed and respect your level of fatigue when participating in EF training. Your treating health care professional will adjust the training according to your needs and abilities.

*Information on this web site is provided for informational purposes only and is not a substitute for professional medical advice. If you have or suspect you have a medical problem, promptly contact your professional healthcare provider.*