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Activity Demands of the Dynavision 2000 for a Patient Recovering from a Stroke

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The *Occupational Therapy Practice Framework: Domain and Process* (AOTA, 2008), hereafter referred to as the *Practice Framework*, describes seven aspects of the occupational therapy paradym. These seven aspects are context, activity demands, areas of occupation, client factors, performance skills, and performance patterns (AOTA, 2008). Of these seven aspects, activity demands was chosen as the subject for this reflection paper because Mercy Medical Center-North Iowa has a therapy activity not common in smaller hospitals, the Dynavision 2000 (Dynavision 2000), hereafter called the Dynavision. In the *Practice Framework,* activity demands is further subdivided into the seven aspects of (a) objects and their properties, (b) space demands (relates to physical context), (c) social demands (relates to social environment and cultural contexts), (d) sequence and timing, (e) required actions and performance skills, (f) required body functions, and (g) required body structures (AOTA, 2008, Table 3, p. 226). In this paper I will examine each aspect of the activity demands of the Dynavision (Dynavision 2000) on a 78 year old male who is recovering from a right hemispheric stroke.

Objects and their Properties

The properties of the Dynavision, as described by its promotor, Performance Enterprises of Markham, Ontario, Canada, are as follows:

> The Dynavision is approximately 5 foot by 4 foot board containing 64 small red square target buttons arranged in five nested rings. Each button covers a single small light bulb which illuminates randomly when the device is in use. An L.E.D. (light emitting diode) display is situated just above the center of the training surface. The board is wall mounted and adjustable to accommodate users of different heights. A computerized display panel, printer, and membrane control panel are situated on the left hand side of board. The control panel has 37 operating keys,

which control four modes, six light speeds, three working areas, four quadrants, 1-7 digits with displays of 1 to .1 second and run times of 30, 60 or 240 seconds (Dynavision 2000).

The Dynavision covers a large portion of the wall in the room. The machine is the grey color typical of high tech objects. When it is on the test mode, each ring of lights turns on sequentially from outer to inner at a speed of about one second for the whole sequence. This can cause nausea in some patients, so I leave it on only long enough to check that the lights are all working.

Space Demands

The Dynavision has its own room, approximately 10' by 12' in size, with no windows for natural light. The room has both standard ceiling lights and recessed lights. A dimmer switch controls the recessed lights. Dimmed light prevents disorientation when the ceiling lights are off during trials. The machine generates heat. I typically leave the room door open to provide better ventilation. The room is at the end of a hall, so outside noise is infrequent. A tone sounds each time a button lights.

Social Demands

There are few social demands to the activity. I make sure the patient can physically reach all of the light buttons, prior to starting the activity. I explain what to expect with each mode, such as "Follow the lights with your eyes" or "The light will stay on until you touch it" or "You will have two seconds to touch each light before it goes on to the next." The patient was able to tell me when he needed to sit, rather than stand, or when he needed a rest break. Occasionally, a student observed a treatment, which added a quality of competitiveness. Most often, the patient competed with himself, working to improve his scores. His goal was to achieve a score high enough to qualify for a driver's assessment. He probably experienced a high social demand to be the primary motor vehicle driver in the family.

Sequence and Timing

The patient required training on the sequence of each mode during the first session with the Dynavision. In subsequent sessions, he needed only cues as to which mode was going to run

and which actions were desired, such as “Use the left hand only this time.” Timing was the more important factor. The goal of the patient was to increase the speed of left visual field compensation and eye-hand coordination. In the later sessions, multi-tasking was added to complicate the task, and to more closly simulate the visual demands of driving a motor vehicle. While noting and touching the lights in the periphery, he had to read numbers flashing on a screen in front of him. For safety in driving, the timing has to be immediate. A score of 52 on Mode A of the Dynavision is the minimum recommended for safe driving.

Required Actions and Performance Skills

During the first sessions, the patient was assisted to transfer to a high chair with arms to sit while doing the Dynavision trials because the patient’s dynamic standing balance was insufficient for task performance while standing. During later sessions, he was able to stand for trials, given contact guard assist. At the final session, he was able to stand, with supervision, during performance of the task. The patient was able to understand and follow the instructions. He was able to see the lights and look for the ones that were in his left visual field cut. He was able to hear the tones to know that a light was lit and the trial had begun. He was able to bring his hand up to touch the buttons, although his left arm was slower and less accurate than the right. During the first sessions, he used his palm or back of the hand to touch the buttons because to do so required only gross motor coordination. In later sessions, he used his finger or thumb to touch the buttons, which requires fine motor coordination and increased visual accuracy. In earlier sessions, I set the computer to flash lights only in the inner rings. These were easier for the patient to find and reach. In later sessions, the lights were set to flash anywhere on the board which increased the activity demands.

Required Body Functions

The World Health Organization (WHO, 2001, p.10) describes body functions as "physiological functions of body systems (including psychological functions)" The patient had sufficient range of motion in his joints to move his arm up to touch the lights. He had sufficient vision to detect the lights. He had sufficient level of arousal and attention span to perform several trials during an hour treatment session. During the final sessions, he had the endurance to perform four minute trials.

Required Body Structures

Body structures are the "anatomical parts of the body such as organs, limbs, and their components [that support body function]" (WHO, 2001) that are required to perform the activity (AOTA, 2008). At least one functional eye is required to perform the Dynavision task. My husband, who is nearly blind, offerred to act as a patient when I was learning how to use the Dynavision. When asked to touch the light, he asked "What light?". The lighted buttons could be touched by a patient using a foot or head, but not nearly as easily as with a hand or elbow. A patient needs sufficient proximal stability, either anatomical or external (as in a back brace), to effectively move the extremities to perform the task.

Conclusion

Before purchasing the Dynavision 2000, I was asked to assist in determining if the machine's high cost could be recouped in patient benefits, therefore providing a competitive edge over surrounding hospitals. When asked if the activity had contributed significantly to his recovery, the patient referred to in this reflection paper said "definitely yes!" The patient was cooperative with other therapy activities, but he was enthusiastic about the Dynavision. It was fun and motivating for him. As an occupational therapist, I like the Dynavision because many

aspects of the activity demands, as defined in the *Practice Framework*, can be manipulated to fit the needs of the patient at each stage of his or her progress. Positive patient outcomes creates high patient satisfaction. High patient satisfaction creates the competitive edge desired by the facility and gives me the intrinsic reward of knowing I have been instrumental in enabling the patient to live life to its fullest.

References

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