

NDT Competence of Nurses Caring for Patients with Stroke

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Abstract: Neurodevelopmental treatment (NDT) is the most used rehabilitation approach in the treatment of patients with stroke in the Western world today, despite the lack of evidence for its efficacy. The aim of this study was to conduct an intervention check and measure the nurses' competence, in positioning stroke patients according to the NDT approach. The sample consisted of 144 nurses in six neurological wards who were observed while positioning stroke patients according to the NDT approach. The nurses' combined mean competence scores within the wards was 195 (70%) of 280 (100%) possible, and for each ward the mean score varied between 181 (65%) and 206 (74%). This study indicates that nurses working in hospitals where the NDT approach has been implemented have the knowledge and skills to provide NDT nursing.

Stroke is the third most common cause of death in the Western world. In the Netherlands, the annual stroke incidence has been reported to be 1.74/1,000 (Herman et al., 1982) and the prevalence 48/1,000 (Meyboom-de Jong & Buis, 1995; Schulte & van Gijn, 1989). The incidence and prevalence of stroke are even more striking when the personal disruption created by such a catastrophic event is closely studied. Therefore, it is important to seek ways of effectively managing stroke while ensuring high-quality patient care. Because stroke patients experience a wide range of physical, cognitive, and behavioral problems, the rehabilitation needs of these patients are diverse and complex, requiring specific rehabilitative interventions. Therefore, rehabilitation of patients with stroke is increasingly seen as a specialized form of rehabilitation, requiring specialized nursing knowledge (Barker, 2002; Hickey, 2002). Neuroscience and rehabilitation nurses have increased their knowledge about how to assist patients with stroke with mobility and activities of daily living (ADL) in the best possible way. Despite this, the nurses' contribution to the rehabilitation process of patients with stroke is still far from clear.

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Neurodevelopmental treatment (NDT), a rehabilitation approach widely used in the care of patients with stroke, aims to restore a maximal degree of bilateral function and to change abnormal patterns of movement so that normal patterns can be introduced (Bobath, 1990). NDT therapy, however, has been criticized for the lack of evidence provided for its efficacy in the treatment of patients with stroke. Several outcome studies (Brunham & Snow, 1992; Camp, Pierce, & Mion, 1991; Hesse et al., 1995; Leermakers, 1995; Lewis, 1986; Logigian, Samuels, Falconer, & Agar, 1983; Salter, Lord & Hall, 1986; Wagenaar et al., 1990) and randomized clinical trials (RCT; Basmajian et al., 1987; Dickstein et al., 1986; Gelber, Josefczyk, Herrman, Good, & Verhulst, 1995; Langhammer & Stanghelle, 2000; Mulder, Hulstijn, & van der Meer, 1986; Partridge, Edwards, Mee, & van Langenberghe, 1990) have been conducted. All but two small, limited nursing studies (Leermakers, 1995; Lewis, 1986) failed to show positive effects of NDT.

Other rehabilitation approaches, such as the Movement Science Approach (MSA), which aims directly to assist the patient to relearn motor control and develop strength and endurance during functional motor performance, have been shown to have better effects on the functional outcome of patients with stroke than NDT (Lord & Hall, 1986; Langhammer & Stanghelle, 2000). Also, patients treated with NDT stayed significantly longer in the hospital than patients treated with MSA or traditional functional training (Langhammer & Stanghelle, 2000; Lord & Hall). Other studies indicate that functional exercises, including variables of ADL (Czorny, Hamilton, & Gresham, 1990) such as functional gait training (Kwakkel, Wagenaar, Twisk, Lankhorst, & Koetsier, 1999; Malouin, Potvin, Prevost, Richards, & Wood-Dauphinee, 1992), resistive pedaling exercise (Brown, Kautz, & Dairaghi, 1997; Miller & Light, 1997), intense aerobic training (Potempa, Braun, Tinknell, & Popovich, 1996; Potempa et al., 1995), among others (Potempa et al., 1995; Hesse et al., 1995) may be more effective in facilitating functional recovery. Despite the lack of evidence for its efficacy, however, NDT is the most commonly used exercise therapy for patients with stroke today (Davidson & Waters, 2000; DeGangi & Royeen, 1994; Hafsteinsdóttir, 1996; Lennon, Baxter, & Ashburn, 2001).

Because of the shortcomings of previous studies, a study was conducted to measure the effects of the NDT approach applied by nurses and physiotherapists in the

treatment of patients with stroke by the means of a prospective, nonrandomized, parallel group design. In this study the patient's functional status, quality of life, depression, and shoulder pain are measured over 1 year following the stroke. None of the previous studies dealt with these important aspects of stroke.

A major limitation of the previous studies was the lack of data on an intervention check, evaluating whether indeed patients were treated according to NDT principles (DeGangi, Hurley, & Linscheid, 1983). An *intervention check* is defined as the empirical assessment of the degree to which study participants adhere to the treatment conditions. When the effects of a therapy given in an outcome study or a trial are measured, it is important to ensure that the actual intervention under study is being given and that sufficient contrast is provided between the experimental and the control groups (Kwakkel, Kollen, & Wagenaar, 1987 [AU: 1999 in ref list?]). This article describes an intervention check conducted with the nurses on the wards using NDT and forming the experimental group for a larger outcome study. In this intervention check, the nurses' competence in applying the NDT interventions and techniques was measured. We could in this way provide data on whether the intervention was actually provided to the experimental group of the main study.

Problem Statement

Prior studies measuring the efficacy of NDT nursing on the various patient outcomes were hampered by methodological limitations. One of the most important limitations was the lack of an intervention check, reporting on the extent to which the NDT therapy was given and whether the healthcare professionals or the nurses were competent in providing NDT interventions. Therefore, we do not know whether the professionals in these studies actually did provide NDT interventions. In this study, we observed the competence of nurses working on neurological wards who participated in an outcome study measuring the efficacy of NDT.

Methods

A prospective, descriptive design was used to measure nurses' competence in using the NDT approach in the care of patients with stroke. The study took place on six Dutch neurological wards that had implemented the NDT approach as a standard treatment for these patients. The nurses' competence in positioning the patients according to the NDT approach was measured as in another intervention check that measured physiotherapists' competence in using NDT (Hafsteinsdóttir, van Meeteren, & Grypdonck, 2003). The nurses' competence was measured at the level of the ward. A recently developed NDT instrument was used (Hurkmans-van der Tuuk & van Keeken, 1999), based on Dutch NDT

Table 1. Description of Hospitals and Wards

Ward	Hospital	Beds/Hospital	Beds/Unit	FTE
1	University	863	50	49
3	University	930	51	42
4	General	942	28	32
5	General	604	38	34
7	General	663	40	39
8	General	653	44	30

guidelines (van Keeken & Kaemingk, 1999). A competence score of 60% was used as a cutoff. The medical ethics committees of the participating hospitals approved the study.

Sample

The sample included 144 nurses working on six neurological wards that used NDT nursing, located in a large Dutch university ($N = 2$) and in general hospitals ($N = 4$). The mean average number of beds on the wards was 39 (28–50). The mean average full-time equivalent of nursing positions per ward was 44 (30–49); see Table 1.

Observer

The researcher was a registered nurse with a master's degree and considerable research experience. She had postgraduate basic and follow-up courses on how to apply NDT. She did not work as a nurse on any of the wards, however. The researcher conducted the observations and scored the performance of each nurse on an instrument.

The Simulated Patient

Because the instrument needed to be used in a standardized way and also because of the ethical problems of putting patients under the strain of unnecessary interventions, a simulated patient situation was used instead of a real patient situation. Three volunteers took part in the study as simulated patients. They did not have to act as a patient who had suffered a stroke but were asked to behave normally and to do what the nurses asked them to do.

The Instrument

The instrument, which was based on Dutch NDT guidelines, had recently been developed for the purpose of measuring nurses' competence in performing NDT positions (Hurkmans-van der Tuuk & van Keeken, 1999). The NDT guidelines contain detailed descriptions of how to perform each of the NDT techniques (van Keeken & Kaemingk, 1999). Table 2 lists 16 NDT positions or activities included in the instrument. Each of the 16 items contains sub-items, ranging in number from 9 to 36. For example, the item describing the position "Facilitating active sitting" contains 9 sub-items, while the item describing the activity "Washing and dressing" contains 36 sub-items. The total instrument contains 280 sub-

Table 2. NDT Competence Per Ward for Each Item and for the Total Instrument

Highest NDT Items Positions Performed	Possible Ward 1 Score	Mean					
		Ward 2 (N = 24)	Ward 3 (N = 24)	Ward 4 (N = 24)	Ward 5 (N = 16)	Ward 6 (N = 24)	(N = 32)
1 Rolling to the side	24	20.50	21.00	17.00	21.00	21.67	18.75
2 Shoulder inhibition/control (lying down)	13	10.00	10.67	8.00	10.00	7.00	9.50
3 Rolling from the back to the affected side and lying on that side	22	19.50	18.67	20.33	16.50	16.00	15.00
4 Supine position	9	7.00	6.67	5.67	8.00	8.33	6.75
5 Moving from lying down to sitting up on the side of the bed	20	17.00	12.33	14.33	14.50	13.33	14.25
6 Moving from sitting on the side of the bed to lying down	13	9.00	8.00	5.33	7.50	8.00	5.75
7 Moving forward with feet swinging loose	12	7.50	6.67	7.67	7.00	8.00	6.25
8 Moving from sit to sit	18	15.00	16.00	13.33	17.50	14.33	15.75
9 Moving from sit to standing	15	11.00	8.33	3.33	10.00	12.33	7.75
10 Facilitating active sitting	9	5.50	4.33	5.00	5.50	3.33	3.50
11 Walk with facilitation from the standing phase through the pelvis	11	10.50	7.33	4.67	4.65	10.33	8.25
12 Eating and drinking	18	15.50	10.00	9.00	9.00	14.33	12.50
13 Washing and dressing (instructions level 2)	22	17.50	15.33	15.00	17.50	13.67	15.50
14 Washing and dressing (instructions level 5)	25	20.50	15.33	17.00	18.00	15.67	12.00
15 Washing and dressing (instructions level 6)	36	23.00	21.00	26.00	27.00	21.33	17.75
16 Guiding	13	13.00	11.33	9.67	10.00	9.33	10.25
Total scores of NDT items per ward	280	206.00	193.00	181.33	205.50	193.67	187.75
Percentage of correctly positioned interventions	100%	74%	69%	65%	73%	69%	67%

items (Table 2). Each sub-item is scored as 1 for yes (*done*) and 0 for each no (*not done*). The rating for each item (position or activity) is reached by adding up the scores for each sub item. The total scores for each item could thus vary from 9 (*the position of lying in a supine position*) to 36 (*for assisting with washing and dressing*), with a total score for the instrument a possible 280. The instrument proved to have good internal consistency and interrater reliability (Hurkmans-van der Tuuk & van Keeken, 1999).

Interrater reliability

The interrater reliability was also measured between the researcher and two specialized NDT nurses, as they observed seven nurses conducting six of the NDT positions and actions (items 2, 4, 5, 6, 7, and 10; Table 2). The two specialized nurses were working on the neurological wards participating in the study and were also tutors experienced in teaching NDT according to the Dutch NDT guideline. The researcher had completed a post-graduate course on how to use the NDT and was not working as a nurse on any of the wards or as an NDT tutor. The seven nurses observed in this interrater reliability test, however, were not working as NDT tutors but were working on the neurological wards. The six items used in the interrater reliability test had been randomly selected from the instrument (Hurkmans-van der Tuuk & van Keeken, 1999). Each of the seven nurses performed the six positions and actions, which were rated

simultaneously and independently by the three observers on a scoring form. The inter-rater reliability was determined, with Cohen's kappa (k). A (k) value higher than 0.75 was taken to represent "excellent agreement beyond chance" (Fleiss, 1981). The kappa was calculated for each sub-item and then for all six items.

The (k) value showed a good to excellent agreement between the three observers. For five of the items, the (k) value varied from 0.69 to 0.78; for item 2, the (k) value was somewhat lower ($k = 0.49$). The (k) value was found to be excellent for the most of the sub-items within the items, varying from 0.75 to 1. For some items the (k) value was somewhat lower (0.23 to 0.63). The (k) value could not be calculated for the remaining sub-items because these were placed in one class by all observers.

Procedures

Approximately a week before the study, the nurse manager was contacted by telephone to determine an exact and convenient date for the data collection. A few days before the measurements, information, including the aims of the study and a description of the study procedure, was sent to each of the participating nurses. The observations took place in a quiet room where all materials to be used were available. Before the observations began, the "patient" was informed about the procedure. The participating nurse read the information letter and then selected two numbers, at random, referring to the two nursing items (positions, handling, or movements),

which he or she then performed while being observed by the researcher.

Because the activities of the items varied in length and complexity, containing 9 to 36 sub-items, the duration of the observation of each positioning varied, from 5 to 25 minutes. All the observations occurred during a day shift that was convenient to the nurses. The observations for each ward took place on 2 to 3 consecutive days. A total of 288 sets of observations was made.

Statistical Analysis

The data were analyzed using the SPSS-computer program (10.0). The mean total score was calculated for each ward. As the unit of analysis was the ward, data were aggregated at a ward level. The ward score is the average of the score of the nurses participating in that ward.

Results

One hundred forty-four nurses were observed while performing the NDT positioning, handling, and movements of the stroke patients. The mean score for the six neurological wards was 195 (70%) of the 280 (100%) possible. The ward scores for all the wards were well above the cutoff of 60%, indicating that the nurses had sufficient knowledge and skills in handling and positioning stroke patients according to the NDT approach. As shown in Table 2, the total scores for the wards ranged from 181 (65%) to 206 (74%). Because the techniques vary in complexity, the scores for individual techniques or items on the instrument differ from the possible highest score in varying degrees (Table 2).

Discussion

The importance of documenting the extent of the therapy given to the groups being compared in outcome studies is increasingly being emphasized (DeGangi et al., 1983; Kwakkel, 1998). Previous studies comparing outcomes of the NDT approach and other therapy approaches for stroke have been limited in their description of the approaches being studied (Dickstein et al., 1986; Langhammer & Stanghelle, 2000; Leermakers, 1995; Lewis, 1986; Logigian et al., 1983; Lord & Hall, 1986; Salter et al., 1991) and were hampered by the lack of an intervention check to document the content of the therapy given (Hafsteinsdóttir 1996; DeGangi et al., 1983). Outcome studies, which also provide information on an intervention check, would provide information not only on the effects of the treatment provided but also on the content of that therapy. At the same time, sufficient therapy contrast between the experimental and the control groups being compared may be ensured.

The findings of the study showed that the nurses' competence in providing the NDT therapy for each ward was well above the cutoff score of 60%. The nurse were considered to have sufficient knowledge and skills in

applying the NDT positions. The nurses who showed the highest NDT competence in positioning stroke patients were working on a neurological ward in one of the university hospitals, where all stroke patients were treated at the same location with a multidisciplinary team and a standardized treatment protocol. The ward scoring the lowest was a neurological ward, also in a large university hospital.

Although competence does not guarantee actual behavior, observing actual practice was not considered to solve the problem of a possible discrepancy between the competence and actual behavior. Observation of actual practice is obtrusive and can easily lead to an adaptation of behavior to the expectation of the researcher. Participant observation, in which the nurses would have been observed providing the patient with the NDT therapy, would also have been difficult for ethical reasons, because patients would have been exposed to unnecessary and demanding therapy. Concealing the real nature of the observation was not considered an option, because long-lasting relationships and collaboration with the nurses in the hospitals were necessary. The use of videotape to observe the manual guidance provided by the nurse was considered but rejected. Videotaping was found to be too obtrusive and not readily useful for observing the different amounts of manual guidance given by the nurse to the patient. In light of these points we consider the method we used to be a valuable way to assess the nurses' adherence to the NDT principles.

A limitation of the study may be the fact that we observed a limited number of interventions applied by each nurse. Observing each nurse performing more interventions might have been better. Because of the complexity and the length of most of the interventions, however, this alteration in the study would have been too time consuming.

The strength of the study may be the fact that the nurses taking part in the study were informed about the study only shortly before the actual observations took place and therefore did not have the opportunity to improve their knowledge beforehand. The nurses knew that the study concerned the outcome study of the NDT approach.

This study is, to our knowledge, the first to report the findings of an intervention check of the NDT approach in an outcome study measuring the effects of the NDT. Previous outcome studies did not provide data on an intervention check, which was considered an important limitation (Davidson & Waters, 2000; Hafsteinsdóttir, 1996). The method used in this study (i.e., observing nurses' competence in positioning patients according to the NDT approach in a simulated patient situation) proved to be useful for the purpose of this study. Because it provides information on the content of the therapy

provided, this method may be of help to other researchers who are measuring the differences in the outcome of various therapy approaches in outcome studies.

Future studies measuring the efficacy of the various rehabilitation regimens provided in the care and treatment of patients with stroke need to include an intervention check showing the extent to which the therapy is being provided. Only by doing so may one ascertain that the actual therapies are being provided. Also, this check may secure safe comparison between the treatment groups.

Summary

Neurodevelopmental treatment is the most used rehabilitation approach in the treatment of patients with stroke in the Western world today, despite the lack of evidence for its efficacy. In the current study, an intervention check was conducted in which the nurses' competence in positioning stroke patients according to the NDT approach was measured. A total of 144 nurses in six neurological wards were observed while they were positioning stroke patients according to the NDT approach. The findings showed that the nurses' combined mean of competence score within the wards was 195 (70%) of 280 (100%) possible, and for each ward the mean score varied between 181 (65%) and 206 (74%). The study showed that the nurses working on NDT wards have the knowledge and skills to use the NDT approach in the nursing care of patients with stroke.

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