Neurodevelopmental treatment and stroke rehabilitation: A critique and extension for neuroscience nursing practice

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Abstract
The aim of this article is to review neurodevelopmental treatment (NDT) literature and existing stroke NDT nursing research, as well as explore issues related to professional collaboration in stroke rehabilitation and implications for neuroscience nursing practice. NDT or the Bobath approach is used to encourage stroke patients to use the affected side of their body in order to promote and relearn normal movement and to reduce muscle spasticity. Neuroscience nurses have an important role in facilitating stroke patients to practise transferring out of bed and performing activities of daily living outside of physiotherapy and occupational therapy sessions. Neuroscience nurses also care for stroke patients over a 24-hour period. Therefore, it is important that nurses understand physiotherapy and occupational therapy strategies in stroke rehabilitation.

Approximately 50,000 strokes occur in Canada each year and 80% of stroke survivors are left with a permanent disability (Heart and Stroke Foundation of Canada, 2002; Canadian Stroke Network, 2003). Individual deficits can range from cognitive impairments such as aphasia or memory loss, to unilateral neglect and deficits altering motor function (Doolittle, 1988; Riddoch, Humphreys & Bateman, 1995; Taylor, Ashburn & Ward, 1994). Rehabilitation for stroke patients is designed to address individual deficits and tailor therapy toward achieving personal rehabilitation goals. The ideal is for all members of the health care team to collaborate in order to promote optimal rehabilitation and therapy, as negotiated with the stroke survivor. Physiotherapists and occupational therapists use stroke rehabilitation therapies such as neurodevelopmental treatment to establish a program that promotes recovery and facilitates new learning (Davis, 1996).

The Bobath concept or neurodevelopmental treatment (NDT), as it is termed in North America, was first developed in the 1940s in England by Dr. Karel Bobath and his wife Bertha Bobath, a physiotherapist and researcher. NDT is known and used by some physiotherapists and occupational therapists in North America, but it is used more commonly in Europe as a primary therapy for stroke rehabilitation by all health care professionals including nurses (Paci, 2003). The main principle of NDT is to reduce muscle spasticity and promote normal patterns of movement (Bobath, 1970). Neuroscience nurses have an “influential role in managing spasticity” as activities of daily living, positioning, and joint range of motion are practised and reinforced outside of one-hour therapy sessions (Habel, 1997, p. 122). Collaboration is the key to promoting optimal stroke recovery, and nurses need to understand and critique physiotherapy and occupational therapy strategies such as NDT in order to be an integral part of the stroke rehabilitation team. The purpose of this article is to review: i) neurodevelopmental treatment literature and

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Traitement neurodéveloppemental et réhabilitation post-acv: Une critique et une expansion pour la pratique infirmière en neurosciences

L’objectif de cet article est de revoir la littérature sur le traitement neurodéveloppemental ainsi que sur la recherche infirmière existante dans le domaine des accidents cérébraux vasculaires et le traitement neurodéveloppemental. Ainsi qu’à explorer différentes questions reliées à la collaboration professionnelle dans la réhabilitation post-acv et les implications pour la pratique infirmière en neurosciences. Le traitement neurodéveloppemental ou l’approche Bobath est utilisé pour encourager les patients ayant subi un acv à utiliser le côté affecté de leur corps dans le but de promouvoir et d’apprendre à nouveau des mouvements normaux et de réduire la spasticité.

Les infirmières en neurosciences ont un rôle important pour ces patients. Après les sessions en physiothérapie et ergothérapie, elles doivent aider ces patients à pratiquer le transfert du lit et à exécuter des activités journalières. Les infirmières en neurosciences administrent des soins à ces patients 24 heures par jour. Donc il est important qu’elles puissent connaître des stratégies en physiothérapie et en ergothérapie dans le processus de la réhabilitation de leurs patients.
existing stroke NDT nursing research; and ii) explore issues related to professional collaboration in stroke rehabilitation and implications for neuroscience nursing practice.

**Literature review**

Different descriptions of the Bobath concept and therapy exist (Ashburn, 1995; Bohtman, 1987; Davies, 1985; Goodgold-Edwards, 1993; Sodring, 1980). The scope of this article offers an ideal opportunity to introduce the Bobath concept to neuroscience nurses. Therefore, this discussion is based mainly on the writings of Bobath (1970, 1990).

**The Bobath concept**

The Bobath concept or NDT for the treatment of hemiplegia originated out of principles developed for the care of children with cerebral palsy (Bobath, 1963). The aim of NDT is to concentrate therapy on both the affected and unaffected side of the hemiplegic patient in order to promote symmetrical movement (Bobath, 1970). Instead of accepting that the affected side is untreatable and concentrating therapy on the physical strength of the unaffected side, therapists focus on normal patterns of movement in order to decrease spasticity. Bobath (1970) states, “by reducing the patients’ spasticity and by giving [the patient] more normal postural sets to initiate movements, reflex-inhibiting patterns, inhibit abnormal motor activity, and at the same time facilitate more normal activity” (p. 73). Movement where both sides move in symmetry promotes normal function. The ideal is to change or suppress abnormal movement in order to introduce normal patterns of motor function.

The control of postural tone and reduction of spasticity are the two main goals of NDT. Bobath (1970, 1990) describes the different phases of adult hemiplegia in three stages: initial flaccid stage, stage of spasticity, and stage of relative recovery. At the onset of hemiplegia, the stroke survivor initially experiences a state of flaccidity. During this state of complete hemiplegia, the therapist focuses therapy on normal posture. Techniques that support normal posture are practising neutral pelvic placement and weight transfer while sitting and standing. Bobath therapists stress the importance of correct normal movement of the patient at ‘key points’ such as the trunk, shoulder girdle, and pelvis (Lennon, 1996). Essentially, the stroke patient is an active participant and the therapist helps the patient to obtain normal posture and movement by guiding the patient through the treatment. However, in this stage of flaccidity, periods of spasticity can occur and, therefore, treatment is focused on preventing or decreasing periods of high tone during therapy or as the patient progresses to the next stage of spasticity (Lennon).

Spasticity usually develops slowly in the extensor muscles of the leg and flexor muscles of the arm (Bobath, 1970, 1990). However, in severe cases, strong spasticity can occur even early in the onset of stroke. Bobath (1970) stated that spasticity
conducted on such assumptions. An example of one of the Bobath techniques is mobilization of the affected shoulder girdle to prevent the scapula from contracting spastically backward. By placing a hand on the patient’s scapula and moving the shoulder forward away from the spine following normal range of motion, the nurse or therapist effectively reinforces normal movement, and thereby decreases spasticity. Other areas of focus are the neck, spine, pelvis, and legs. According to Bobath (1970), the patient can often stand in the second stage, with some if not all weight on the affected leg. The nurse or therapist works on decreasing spasticity while preparing for standing and walking by teaching the patient bridging. While in a supine position, the therapist or nurse supports the patient’s bent knee as the patient raises their pelvis to an equal height off the support or bed creating a bridge. Bobath (1970) insists it is essential that the patient begin to walk independently only when normal patterns of movement occur without signs of spasticity in order to decrease the risk of injury to the patient, nurse, and therapist.

In the recovery stage, spasticity is slight and the stroke patient can walk relatively independently (Bobath, 1970). Rehabilitation in this stage focuses on continuing to practise neutral posture and proper positioning prior to movement depending on the individualized needs of the patient. The work of the patient and the therapist or nurse is a process of practice and negotiation. Bobath (1970, 1990) stated that these recommendations are only meant as an outline for therapy. It is the therapist who will “develop his or her own technique”, and must adjust treatment according to the responses of the patient (p. 115).

Although the concept of hemiplegic treatment is presented by Bobath (1970) in stages, it is acknowledged that the three stages are intertwined. Treatment depends greatly on the level of recovery that the patient has reached. Bobath stresses that the earlier treatment is initiated, the better rehabilitation outcome for the stroke survivor. A positive impact of NDT is that practice will aid the patient to continue the use of normal posture outside of the therapy session.

NDT research

Lennon and Ashburn (2000) conducted research that aimed to investigate how the Bobath concept evolved since the last publication in 1990. Expert physiotherapists were organized into two focus groups by area of interest (neurology and elderly care) and given critical questions for group discussion. The outcome of this study was the finding that Bobath principles had changed since 1990 (Lennon & Ashburn). Both groups agreed that the basic tenants of the treatment had not changed, but differed on ways in which the treatment was conducted. The neurology group was mainly made up of Bobath purists who concentrated their key assumptions on control of tone and on preparation. Conversely, the elderly care group focused on ‘task specific practice’ and goal setting. The authors concluded that it is essential that further experimental research be conducted on such assumptions.

Since NDT has widespread use by physiotherapists and occupational therapists, NDT therapy needs to be justified with more than just clinical experience and practical skills, but with research-based practices and updated treatment regimens (Lennon, Baxter, & Ashburn, 2001; Partridge & Edwards, 1996; Riddoch, 1994). Walker, Drummond, Gatt, and Sackley (2000) stated that a current climate exists where a large number of occupational therapists are unable to describe the theoretical underpinnings of treatment, and are unfamiliar with standard assessments used with stroke patients. A blind acceptance of practice exists where therapists tend to rely on what they already know rather than on research evidence (Carr, Mungovan, Shepherd, Dean, & Nordholm, 1994; Dickson, 2002).

Shah (1998) suggested that controversy also exists regarding which stroke rehabilitation therapy clearly produces a significantly better stroke recovery outcome. A Canadian research group concluded that the NDT approach does provide a base from which the stroke patient may be evaluated (Corriveau, Arsenaault, Dutil, & LePage, 1992; Guarna, Corriveau, Chamberland, Arsenaault, Dutil, & Drouin, 1988). The general consensus of most researchers has been that NDT compared to other treatment strategies such as the motor relieaning program, or the Brunnstrom technique were similar in outcome rather than clinically superior (Dickstein, Hocherman, Pillar, & Shalam, 1986; Gelber, Josefczyk, Herman, Good, & Verhulst, 1995; Hiraoka, 2001). In a recent published research article related to NDT effectiveness, the author concluded that there was no evidence that NDT was superior to other methods, but cautioned that the merit could not be discarded without further study (Paci, 2003). Some researchers, specifically Brunham and Snow (1992) and Lennon (2001) used small sample sizes of one and two participants respectively and, therefore, methodological issues have limited their NDT studies in terms of generalizing research conclusions.

In addition to effectiveness studies, many authors compared NDT and the Motor Relearning Programme (MRP) developed by Carr and Shepherd (1987). The basic aim of MRP is to improve functioning of everyday life and is based on the assumption that the impaired, such as stroke patients, learn the same as the unimpaired. Biomechanics theory is used to analyze movements, provide feedback, and encourage relearning (Carr, Shepherd & Ada, 1995).

Comparisons of NDT and MRP led to mixed conclusions. Miles-Breslin (1996) welcomed MRP treatment strategies as an addition to current occupational therapy theory and practices. MRP compared to NDT was viewed as complementary rather than superior to NDT (Lettinga, Siemonsma, & van Veen, 1999). In addition, Langhammer and Strangehelle (2000) conducted a double-blind controlled study where 61 acute, first-ever stroke patients were randomized into two groups based on gender and site of hemiplegia. Thirty-three patients received MRP therapy and 28 patients received NDT as a therapy treatment post-acute stroke. These authors concluded that motor function in the group of stroke patients being treated with MRP was significantly improved.
(Langhammer & Stranghelle). However, Bobath supporters have recently challenged this study for two reasons. First, it is suggested that Langhammer and Stranghelle have misrepresented NDT because they did not acknowledge that the Bobath concept has evolved since the 1990 Bobath publication (Barrett, Evans, Chappell, Fraser & Clayton, 2001; Paturnin, 2001). Second, Gustavsen, Jansen, Kjendahl, and Lorentzen (2002) asserted that data comparing the two groups did not support MRP as a favourable therapy but, in fact, the results reveal that the NDT group caught up to the MRP group in treatment outcome. Another significant finding from the Langhammer and Stranghelle research which has not been identified in the literature debate is that the patients’ quality of life scores were equal in value for both the NDT and MRP groups. That is, neither the MRP nor NDT technique showed efficacy in increasing the patients’ quality of life. So an important critique of this research is why such low scores were achieved in relation to quality of life. It would be interesting to research whether individualized therapy, i.e., using the most appropriate method of therapy based on personal functional outcomes and increased quality of life indicators is more effective than utilizing a standardized therapy adopted by a unit, physiotherapy department, or hospital.

To add to this controversy, nursing researchers have also analyzed the effectiveness of NDT compared to traditional techniques. Salter, Camp, Pierce, and Mion (1991) audited 87 stroke patient charts. Forty-three were treated with NDT and 37 with the traditional approach where therapy and care is focused on the patients’ non-hemiplegic side or remaining abilities such as feeding. Even though the findings of this study were not statistically significant, 86% of the NDT group was discharged home as compared to 76% of the traditional group. The researchers concluded that the NDT approach was not superior to the traditional nursing approach. However, Lewis (1986) and Passarella and Lewis (1987) conducted similar research studies to Salter and colleagues (1991), but concluded that NDT appeared to be the treatment of choice, indicating that further research is needed before nurses commit to one rehabilitation approach. This controversy will continue until more therapists and nurses critically analyze their practice not only through anecdotal evidence based on experience, but also through larger controlled trials which can be generalized and utilized in neuroscience practice.

**NDT and rehabilitation nursing**

NDT is used by some practitioners in North America, but is used widely in European countries such as England, Holland, Germany, and Norway. For example, in the Netherlands, nurses have a well-established reputation for incorporating NDT principles into nursing strategies in order to promote 24-hour therapy (Hafsteinsdóttir, 1996). The following is an exploration of NDT nursing literature and related rehabilitation issues regarding collaboration between nursing, physiotherapy, and occupational therapy.

It is not uncommon to observe a physiotherapy treatment such as NDT incorporated in rehabilitation nursing practice (Passarella & Lewis, 1987). NDT principles of promoting neutral posture and normal patterns of movement are utilized by nurses while positioning, transferring, and helping stroke patients with activities of daily living (Camp, Davis, Salter, & Pierce, 1995). In traditional nursing care, nurses focus treatment on the unaffected side in order to promote unilateral function. Comparatively, NDT offers nursing techniques to help the patient to relearn normal and bilateral postural movement safely (Borgman & Passarella, 1991). NDT nursing techniques teach natural movement, beginning with positioning in bed, in order to promote calm safe movement with minimal anxiety. In other words, to avoid periods of high tone, the nurse guides movement of the patient to reduce excessive exertion, a leading cause of spasticity (Passarella & Lewis, 1987; Passarella & Gee, 1987).

**Positioning.** NDT nursing techniques begin with teaching the stroke patient natural positioning and movement in bed. Rolling or turning in bed is taught to the patient to promote independent bilateral movement. With the guidance of the nurse, rather than two nurses predominantly moving the patient, the patient begins the turn by clasping their hands in front of them then lifting their head and shoulders.

**Figure One (above): Use of traditional technique for turning. Figure Two (below): Use of NDT technique for turning.** Reprinted with permission from Camp, Y.G., Davis, T.M., Salter, J.P. & Pierce, L.L. (1995). Stop and look: Two approaches to manage stroke patients. *Journal of Neuroscience Nursing, 27*(1), 24-28. Copyright 1995 by the American Association of Neuroscience Nurses.
off the bed, and looking in the direction of the turn (Camp et al., 1995). Turning begins with the patient’s knees raised off the bed as the nurse guides the roll toward him or her while supporting the patient’s back and knees (see Figure One, Figure Two). After the turn is complete, the nurse strategically places supports in key areas to control spasticity (Hafsteinsdóttir, 1996). The side-lying shoulder is protracted forward and externally rotated with a support placed under the extended supine forearm and hand. A support is also placed behind the back and the pelvis is protracted and externally rotated, thereby encouraging natural placement of the top leg forward with knee and ankle flexed and supported with a pillow (Hafsteinsdóttir; Passarella & Lewis, 1987; Passarella & Gee, 1987).

**Transfers.** NDT transfers are also based on natural body movement with the focus being on neutral positioning of the pelvis. The pivot transfer begins with the patient’s hands clasped together leaning slightly forward with both feet flat on the floor sitting upright at the edge of the bed (Camp et al., 1995). To ensure the transfer is safe, the nurse places his or her knees at either side of the patient’s with the nurse’s hands placed below the patient’s waist (see Figure Three, Figure Four). “A backward movement of the nurse then assists the patient to raise [their] buttocks just high enough to clear the surface and the patient rotates on the balls of the feet 90 degrees toward the second surface and sits in an upright position” (p. 26). Camp and colleagues suggested that the pivot transfer encourages natural movement and concentration on the part of the patient.

**Adjusting position while seated.** After the patient transfers to a chair or wheelchair, they often slide down in the chair, rounding their lower back and creating abnormal posture. The traditional nursing technique is to stand behind the wheelchair wrapping your arms around and under the patient’s arms and then lifting the patient back in the chair. With this approach, there is an increased risk of causing shoulder subluxation creating permanent pain in the patient’s shoulder girdle (Hafsteinsdóttir, 1996). However, using the NDT technique, the risk of shoulder subluxation is eliminated and the amount of energy used for both the nurse and the stroke patient is decreased. With the patient’s feet on the floor and with the nurse standing on the patient’s affected side, the patient leans forward and the nurse moves the patient’s hips backward (Passarella & Lewis, 1987). “Bringing the patient’s weight over [their] feet enables [the nurse] to move [the patient’s] hips back in the chair without lifting” (p. 108). The key to this movement is transfer of the nurse’s weight from the front to the back foot, thereby creating movement using leverage.

**Dressing, grooming, and eating.** Using a traditional technique, nurses encourage patients to use their functional side to either wash their face or don their clothes using many steps creating a frustrating process. The NDT approach, however, encourages the use of both the hemiplegic and non-hemiplegic side, thereby treating neglect related to right middle cerebral artery stroke syndrome (Camp et al., 1995). The patient, with the assistance of the nurse if needed, can effectively feed himself or herself, for example, by incorporating both limbs (see Figure Five, Figure Six). The patient can lift their mug or cup to their mouth using both hands with deliberate aid by the nurse on the hemiplegic side. When washing, the patient can grasp the face cloth and their hemiplegic hand with their functional hand and move in a circular motion to wash their face. In essence, the patient is forced not to leave their hemiplegic arm behind and physically promotes movement of that limb (Camp, et al.).

The aforementioned NDT nursing techniques are not utilized in isolation. If it is determined that NDT is the treatment of choice for a stroke patient, it is critical that the entire health care team be consistent in the approach used. Since nurses work most directly with stroke patients from the onset of stroke through acute treatment, rehabilitation, to home, it is important that nurses are a primary element of the stroke rehabilitation team (Garrett & Bechtel, 1996; Gibbon 1993). It is the nurse who helps the patient change their position every two hours and helps the patient to and from the bathroom. Therefore, it is most important that nurses incorporate rehabilitative techniques such as NDT into their practice to continue and add to the patients designated weekday one-hour therapy sessions.

**Professional collaboration**

According to Gibbon (1993), rehabilitative goals set by the stroke patient must be carried out consistently by all disciplines for optimal rehabilitation to be achieved. In order for consistency to occur between all members of the health care team, collaboration through sharing of information is critical. According to Gibbon and Little (1995), nurses must increase their understanding and knowledge of techniques used by physiotherapists and occupational therapists thereby creating a collaborative atmosphere. For example, if NDT is used for a
particular patient’s therapy, it is essential that the nurse caring for that patient is knowledgeable of that therapy. In addition, Christensen (1995) offers that therapists have an obligation to be collaborative and “communicate changes in the use of concepts or principles to the nursing staff, in order to be reliable coworkers to nurses” (p. 270). Such communication can ensure that the patient’s therapy is continued over a 24-hour period. It is in a collaborative relationship which values communication that better outcomes for stroke patients can be achieved.

Nurses are an active and essential element in the rehabilitation of stroke patients. Nurses coordinate, encourage, facilitate, and care for stroke patients, but nurses also continue the role of physiotherapists, occupational therapists, and social workers after four p.m. and on the weekends. The nursing role in stroke rehabilitation is viewed as essential, but exactly what that contribution is remains undefined (Gibbon, 1993; Gibbon & Little, 1995; Waters & Luker, 1996). According to Waters and Luker, nurses are an under-valued and under-utilized resource in rehabilitation. The following are excerpts from research conducted to uncover the attitudes of professionals working in rehabilitation that highlight differing opinions of the nursing role. One consultan geriatrician to a rehabilitation unit regarding basic nursing care stated that he “expected [the] nursing service to make sure the patients are fed, watered, washed, and put in a clean bed” (Waters & Luker, p. 110). A physiotherapist commented that nurses “get the body able to function so that I can get at it” (Waters & Luker, 110). But, it is interesting and sad to note that the nurses’ comments about their rehabilitation role were similar. Nurses viewed themselves as good at basic care and had little time for rehabilitative care, thereby agreeing with the argument that nurses have a role that includes maintenance and coordination of care rather than part of rehabilitation (Waters & Luker; Gibbon & Little, 1995). However, Kirkevold (1997) offered that nursing has a unique function in rehabilitation of stroke patients. The nurse has an:

1. Interpretive function – referring to ways in which nurses help stroke patients and their families understand the process and outcome of stroke,
2. Consoling function – where the nurse provides emotional support when the patient is developing their own understanding of their stroke experience, in essence building a ‘trusting relationship’,
3. Conserving function – the focus is on maintaining normal function. For example, preventing complications and supporting the patients’ basic needs,
4. Integrative function – referring to ways the nurse can aid the patient to take activities of daily living (ADL) learned in the therapy sessions and utilizing them in practical situations. An example of this is practising getting out of bed, getting dressed, washing, and eating (p. 59-60).

Whether defining their rehabilitative nursing role as different functional components or as a single belief system, neuroscience nurses need to clearly define their rehabilitation practice to include a rehabilitative component.

Neuroscience nurses should be commended for the care they provide regarding rehabilitation of stroke patients. A key part of what nurses do is encourage and teach patients to maintain their basic needs, and this should not be discarded. However, nurses, whether in acute care, rehabilitation, or homecare, should take a greater interest in rehabilitation education and become active in the therapy provided to stroke patients by physiotherapists and occupational therapists. As stated earlier in this article, nurses are in an important position because they can provide therapy like NDT on a 24-hour basis, support treatments recommended in collaboration with physiotherapists for their patients, and ensure that the patient and their family have learned the therapy techniques so that rehabilitation continues at home (Bukowski, Bonavolonta, Keehn, & Morgan, 1986). It is consistent and collaborative care that is most important for optimal rehabilitation for stroke patients (Booth, Davidson, Winstanley, & Waters, 2001).

**Implications for neuroscience nursing**

Rehabilitation for stroke patients does not begin when the patient is transferred to a rehabilitation unit. The rehabilitation process begins as soon as the patient is diagnosed with either an ischemic or hemorrhagic stroke (Hickey, 2003). It is when the stroke patient is admitted to an acute care unit that neuroscience nurses have an opportunity to begin the rehabilitation process. Research conducted by Hamrin (1982) questioned whether or not introducing an activation nursing program early in the care of stroke patients would affect recovery post stroke. The rehabilitation program introduced included preventive care and rehabilitation principles over a three-month period starting in acute care. It was concluded that the program did stimulate early recovery (Hamrin). Furthermore, according to Hagell (1999), early multidisciplinary rehabilitation in conjunction with medical regimens is crucial for optimal recovery post stroke. Neuroscience nurses are a critical part of the rehabilitation process and should be involved in multidisciplinary research regarding stroke rehabilitation in acute care.

![Figure Five (above): Traditional use of cup. Figure Six (below): NDT use of cup.](image)

Many nursing researchers have concluded that more research is needed in nursing regarding stroke rehabilitation. Areas for research are rehabilitation therapies, stroke rehabilitation education, nurses’ role in stroke care and rehabilitation, professional collaboration, acute care nursing and stroke rehabilitation, and the stroke experience in acute care and rehabilitation (Camp et al., 1995; Doolittle, 1988; Gibbon, 1993; Hafsteinsdóttir, 1996; Waters & Luker, 1996). The following are examples of possible nursing research questions related to stroke rehabilitation:

1. Does the use of NDT as a rehabilitation therapy affect quality of life post stroke?
2. What is the role of nursing in stroke rehabilitation? What is the role of nursing in continuing stroke rehabilitation in home care?
3. What is the current status of stroke rehabilitation education in baccalaureate programs across Canada?
4. What are stroke rehabilitation patients’ perspectives regarding multidisciplinary collaboration?
5. What perceptions or beliefs do acute nurses hold regarding stroke rehabilitation?
6. What is the experience of a stroke patient during rehabilitation? What is the experience of stroke families during rehabilitation?

**Summary**

Although controversy exists whether NDT is the optimal treatment for stroke patients, it is important that nurses increase their knowledge of different treatments available to their patients. NDT is one stroke rehabilitation regimen that can be utilized with stroke patients. Bobath (1970, 1990) asserts the sooner that the hemiplegic patient begins treatment, the sooner the patient will begin to naturally assume neutral posturing, decrease spasticity, and increase normal movement. Neuroscience nursing care for stroke patients during the entire continuum of care, therefore, nurses are in an optimal position to reinforce and educate stroke patients and their families about their particular therapy. Furthermore, it is critical that all members of the health care team collaborate regarding stroke rehabilitation treatment in order to optimize stroke rehabilitation and recovery, as well as conduct multidisciplinary practice-based research. Neuroscience nursing includes rehabilitative care and, in order to propel nursing toward leadership in stroke care, further nursing research must be conducted in stroke rehabilitation.

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