



Unilateral Neglect: Assessment in Nursing Practice

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Abstract: The North American Nursing Diagnosis Association has recognized unilateral neglect (UN) as a nursing diagnosis for more than 2 decades. Such a designation implies that nurses primarily are responsible for assessing, treating, and researching the disorder. However, nurses have made few documented contributions toward this responsibility. Although UN is a complex problem that requires attention from several specialties, there is room for nurses to substantially increase their role. Nurses are uniquely positioned to assess and treat UN by virtue of their interaction with patients in a variety of times, settings, and activities. Nurses need to develop quantifiable measures of clinical observation that are reliable and valid in nursing practice. This article reviews the literature to examine the impact of UN, existing assessment methods, and nursing involvement in assessment and treatment. Potential nursing contributions in practice and research are featured as well.

Unilateral neglect (UN) is a disorder that causes people with brain damage to behave as though one half of their world—the half contralateral to the damage—has become unimportant or simply ceased to exist (Mesulam, 2000). It is a striking disorder; while those affected may not orient to or interact with their contralesional environment or the contralesional half of their own bodies, this is not primarily caused by a sensory or motor deficit (Heilman, Watson, & Valenstein, 2002). So while homonymous hemianopia, hemianesthesia, hemiparesis, or other sensory and motor impairments may occur with UN, they do not cause UN and can be doubly disassociated from it. As clarified by Mesulam (2000), UN is “not a disorder of seeing, hearing, or moving, but one of looking, detecting, listening, and exploring” (p. 195).

A typical clinical picture of UN is a patient with damage to the right parietal cortex who slouches to the left; fixates head and eye orientation to the right; only dresses, grooms, or protects the right side of the body; ignores people on the left; eats food from only the right side of the plate; and frequently collides with leftward obstacles (Parton, Malhotra, & Husain, 2004; Robertson & Halligan, 1999).

Although UN can occur after damage to either cerebral hemisphere, it appears to be more common, severe, and permanent after right-brain damage (Bowen, McKenna, & Tallis, 1999; Ringman, Saver, Woolson, Clarke, & Adams, 2004). There are several potential reasons for this. The right hemisphere appears to pay attention to both sides of space, while the left hemisphere focuses more exclusively on the contralateral half (Mesulam, 2002). The right hemisphere also appears specialized for global attention and the left hemisphere for focal attention (Kleinman et al., 2007). In addition, the right hemisphere may be more involved in sustained attention than the left (Robertson & Halligan).

UN's Functional Impact

UN may functionally affect as many as 200,000 stroke survivors in the United States (Barrett, Levy, & Gonzalez Rothi, 2007). UN frequently goes unacknowledged even though its consequences may be dramatic.

As measured by the Barthel index of activities of daily living (ADLs), UN has a more negative effect on functional ability after a stroke than age, sex, power, side of stroke, balance, proprioception, cognition, or premorbid ADL status (Kalra, Perez, Gupta, & Wittink, 1997). Its presence within the first 10 days of a stroke is a stronger predictor of poor functional recovery after 1 year than other variables including hemiparesis, hemianopia, age, visual memory, verbal memory, or visuocognitive ability (Jehkonen et al., 2000). UN most likely is one of the reasons patients with right-hemisphere brain damage are twice as likely to fall as those with left-brain damage (Ugur, Gücüyener, Uzuner, Ozkan, & Ozdemir, 2000). Patients with UN require a longer rehabilitation

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period and make less daily progress than other patients with similar functional status (Gillen, Tennen, & McKee, 2005). Patients with UN also are less likely to live independently than patients who have both aphasia and right hemiparesis (Heilman et al., 2002).

UN Varieties

UN is a heterogeneous syndrome with several subtypes, and it is possible that many distinct disorders have been inaccurately lumped together under a single label (Halligan & Marshall, 1994; Stone, Halligan, Marshall, & Greenwood, 1998). There is growing consensus that no single mechanism accounts for the full range of UN signs and symptoms (Buxbaum, 2005). It appears that impairments of several different pathways converge to produce UN; interestingly, each of these impairments can exist independently without causing UN (Parton et al., 2004). Despite considerable effort, it has proven difficult to assign any particular variations of UN to specific neuroanatomical loci (Buxbaum). Despite these taxonomical limitations, UN may be loosely described with four overlapping variables: type, space, axis, and orientation.

Type

UN is broadly divided into disorders of either input or output (Bailey, Riddoch, & Crome, 2000). The neglect of input, often called *inattention*, includes ignoring contralesional auditory, visual, tactile, and even olfactory stimuli. Surprisingly, this inattention can apply to imagined stimuli. In what is termed representational or imaginal neglect, patients ignore the left side of memories, dreams, or hallucinations (Robertson & Halligan, 1999).

The neglect of output includes motor and premotor neglect (Robertson & Halligan, 1999). A patient with motor neglect does not use a contralesional limb despite the neuromuscular ability to do so. A person with premotor neglect, frequently termed *directional hypokinesia*, can move unaffected limbs ably in ipsilateral space but has difficulty directing the limbs into contralesional space. Consequently, a patient with premotor neglect may struggle to grasp an object on his or her left side when using the unaffected right arm.

Space

UN can exist in discrete ranges of spatial distance. Patients may neglect their own personal space, the peripersonal space that is within their reach, or the far space beyond their reach (Robertson & Halligan, 1999). This differentiation is significant because the majority of assessment measures test only for neglect within the peripersonal space (Azouvi et

al., 2003). But a patient who passes a test in the personal space may neglect a left arm or not notice distant objects on the left side of the room.

In extreme cases of UN in the personal space, patients may deny ownership of contralesional limbs. Sacks (2006) described a patient who frequently fell out of bed because he mistook his own left leg for a severed cadaver limb and anxiously tried to push it away. In one of our own units, a patient exclaimed, "I don't know whose hand that is, but they'd better get my ring off!" Another confided, "This is a fake arm someone put on me. I sent my daughter to find my real one."

Axis

Most tests for UN look for rightward or leftward errors. But patients also may neglect stimuli on one side of a horizontal or diagonal axis (Heilman et al., 2002). For example, when asked to circle all of the stars on a printed page, patients may locate targets on both the left and right sides of the page while ignoring those across the top or bottom.

This neglect across an axis may have to do with a shift of perspective and not just inattention to unilateral stimuli. When Richard, Rousseaux, Saj, and Honoré (2004) asked patients with left neglect to project their midline with a neon bulb, they found they tended to position it parallel to their midsagittal plane, but in a position rightward of their true midline. This shift may account for the success of therapeutic prism glasses, which shift left visual spaces toward the right. By shifting visual input, they seem to correct the mind's sense of midline. The result often is not only the expected amelioration of visual neglect, but also of tactile, motor, and even representational neglect (Rossetti & Rode, 2002).

Orientation

An important question in studies of UN has been: "Left of what?" Patients may neglect with either an egocentric or allocentric orientation (Kleinman et al., 2007). Those with egocentric orientation neglect objects to the left of their own midline. Those with allocentric neglect may instead see all the objects in a room but neglect the left half of each individual object.

These two broad categories may be further subdivided. Patients with egocentric neglect may ignore the stimuli leftward of their trunks, heads, or retinæ (Kleinman et al., 2007). Those with allocentric neglect may neglect the true left of a presented object or, amazingly, may encounter a slanted or inverted object and first correct it in their mind's eye before neglecting the left side (Halligan & Marshall, 1994). If presented with an upside-down photograph of a face, for example, a patient may mentally rotate

the object right-side-up and then neglect the left side of the adjusted image. Likewise, a patient looking at a mirror image of a map of the United States may rotate California and Oregon despite their inverted placement onto the right side of the map.

Associated Deficits

There are several conditions that may coexist with UN, including deficits of arousal and sustained attention, motor and sensory impairments, emotional lability, and anosognosia (unawareness of deficit or illness; Barrett et al., 2006). Each of these may compound UN and several are difficult to disassociate from it. For example, anosognosia incorrectly has been referred to as a cardinal feature of UN (Azouvi et al., 1996) though it usually is not considered part of the neglect syndrome proper (Stone et al., 1998). Homonymous hemianopia, blindness affecting the same visual field of each eye, frequently is confused with UN in the literature, despite being a sensory deficit.

The disorders most commonly associated with UN likely are sensory and motor extinction. Individuals with sensory extinction do not neglect contralesional stimuli unless they are paired with an equal, simultaneous stimulus in the ipsilesional hemispace (Robertson & Halligan, 1999). A patient may feel tapping on either hand in isolation, for example, but when both hands are tapped simultaneously, the patient will only sense the tapping on the ipsilesional hand. The same could be true of simultaneous bilateral sounds or sights. Patients also may demonstrate motor extinction (slowed or halted activity) when they attempt to use both hands simultaneously (Mattingly, 2002).

There is no consensus on whether extinction should be considered separate from UN or as a type or degree of UN. Extinction is included in the National Institutes of Health Stroke Scale (NIHSS) as an indicator of UN (National Institute of Neurological Disorders and Stroke, n.d.) and often is referred to in the literature as a component of the neglect syndrome or as a mild form of UN. Yet many authors have differentiated extinction from UN proper because it is distracter-dependent, is less apparent in spontaneous behavior, and is believed to be associated equally with right- and left-brain injury (Halligan, Marshall, & Wade, 1989). However, Becker and Karnath (2007) recently demonstrated that extinction, like UN, predominantly is caused by right-hemisphere damage; therefore, it may be part of the neglect syndrome.

Nursing's Involvement with UN

The North American Nursing Diagnosis Association (NANDA) recognized UN as a nursing diagnosis in 1986 (McLane, 1987). It is conceptually appropriate

to classify UN as a nursing diagnosis because nursing diagnoses tend to describe human responses to lesions or diseases, rather than labeling those insults or processes themselves (Wesorick, 1999). In contrast, a medical diagnosis might identify the physical etiology of UN, such as a middle cerebral artery infarction. However, classifying UN as a nursing diagnosis also implies nurses should primarily be responsible for assessing, treating, and researching the disorder (Gordon, 1994). Historically, this has not been the case with UN.

In the past 2 decades, nursing contributions to understanding, identifying, and addressing UN have been paltry. Our team has only found one example of primary nursing research on UN (Ohshima, Murashima, & Takahashi, 2004). Other treatments in the nursing literature either have been grossly inaccurate or adequate but with noncontributory descriptions. More often, the topic is ignored, even in textbooks or in journals that are well-suited for its inclusion.

Meanwhile, other disciplines have made substantial contributions to address this disorder, and some medical dictionaries have begun to supplement the nursing diagnosis of UN with additional definitions classified under *neurology* (Venes, 2005) or *occupational therapy* (Stedman's Medical Dictionary, 2005). This creates a theory problem because the goal of identifying nursing diagnoses has never been to create duplicate labels for conditions that already are medically described. As Gebbie, Lavin, Carter, and Becker (1999) stated, "There is no need (and in fact it would be inappropriate) to call otitis media something else within a nursing diagnosis taxonomy" (p. 29).

UN's complexity is such that it must be addressed by several specialties, including neurology, psychiatry, nursing, psychology, occupational therapy, and physical therapy (Bowen et al., 1999). It may be expedient to relinquish a nursing-specific claim to the diagnosis and recognize UN as an interdependent issue. But regardless of the taxonomy that ultimately defines UN, nursing practice has several unique qualities and stands to make important contributions to the way UN is assessed, understood, and treated.

Assessment of UN

UN frequently is ignored in stroke assessment, both in acute and chronic phases. Several emergency stroke scales, such as the Cincinnati Prehospital Stroke Scale (Hurwitz, Brice, Overby, & Evenson, 2005) and the Emergency Triage Stroke Scale (Whelley-Wilson & Newman, 2004) do not include any measure of UN. And while the NIHSS does include UN in its score, it is heavily outweighed by language-dependent measures affected by aphasia (Woo et al., 1999).

Because of the failure to adequately assess UN, patients with right-hemisphere strokes receive inaccurately low NIHSS scores (Fink et al., 2002), are less likely to be admitted to a hospital (Foerch et al., 2005), and are less likely to receive tissue plasminogen activator (Di Legge, Fang, Saposnik, & Hachinski, 2005). Hillis, Wityk, Barker, Ulatowski, and Jacobs (2003) recommended correcting the underdiagnosis and undertreatment of right-hemisphere stroke by combining the NIHSS with additional UN tests. However, there is a general uncertainty about which tests should be used.

Critical Review of Assessment Tests

One of the earliest questions in our study of UN focused on how the disorder currently is assessed in the literature. To find which tests are most commonly used, we canvassed a 2-year period (January 2005–December 2006) of 25 journals. We searched for articles either manually or, when available, with electronic databases such as ScienceDirect and Academic Search Premier. We were looking for studies that divided participants into groups of subjects and controls according to who had UN and who did not. We could then examine the assessment methods used to make such determinations.

We found 32 qualifying studies from five journals: *Age & Ageing*, *Neuropsychological Rehabilitation*, *Cognitive Neuropsychology*, *Brain and Cognition*, and *Neuropsychologia*. The results are shown in Table 1.

Paper-and-Pencil Tests

Our review demonstrated that UN currently is assessed and primarily defined with tests performed with paper and pencil. Paper-and-pencil tests identify UN when patients make unilateral mistakes, such as only canceling out lines on the right side of the page (Fig 1), bisecting a line to the far right of its true center (Fig 2), or cramming all of the numbers of a clock face into the right side of the figure (Fig 3).

Of the 183 total tests in those 32 studies, 143 (78.1%) were paper-and-pencil tests. Cancellation tests alone comprised 73 (39.9%) of the tests used. In comparison, there were only 8 (4.4%) examples of clinical observations of neglect.

Paper-and-pencil tests are alluring because they can be numerically scored. For example, the conventional portion of the Behavioral Inattention Test (BIT; Wilson, Cockburn, & Halligan, 1987) has six paper-and-pencil tests that are scored for a cumulative total of 146 possible points. Patients who achieve fewer than 130 points are deemed to have UN. Similarly, the Myer's Scoring System (Myers, 1998) awards individual points for each

Table 1. Number of Times Each Test for Unilateral Neglect Was Used in the 32 Studies Reviewed

| Test Used | No. of Studies Using this Test ^a |
|---|---|
| Cancellation Test | |
| Line | 23 |
| Letter | 18 |
| Star | 17 |
| Bells | 10 |
| Other | 5 |
| Line Bisection | 22 |
| Figure or Scene Copying | 19 |
| Drawing from Memory | 13 |
| Writing or Reading | 13 |
| Extinction | |
| Visual | 3 |
| Auditory | 0 |
| Tactile | 2 |
| Motor | 1 |
| Contralesional Limb Finding or Matching | 3 |
| Interpretation of Visual Illusion | 3 |
| Baking Tray Test | 2 |
| Fluff Test | 2 |
| Other | 19 |
| Clinical Observations | |
| Gaze deviance | 3 |
| Neglect of objects or people | 2 |
| Underuse of contralesional limbs | 1 |
| Neglect while grooming | 1 |
| Neglect while dressing | 1 |

^aThis column does not total 32 because most studies used more than one test.

stroke of a complex drawing of a fenced house and surrounding trees. Patients who copy the scene can then be scored according to how many left or right strokes they omit.

Although numerical results give the impression of objective, hard data, these scoring systems are problematic. First, relative scores bear no relevance to actual severity of UN. It could not be said, for example, that one patient has UN “twice as badly” as another because their respective scores on the conventional BIT are 60 and 120. Likewise, two patients with identical scores might have very different manifestations of UN. In addition, many paper-and-pencil tests correlate highly and seem to load on a single underlying factor (Halligan et al., 1989). Consequently, an entire series of tests may repeatedly screen for a single variation of UN at the exclusion of all others (Azouvi et al., 2003).

More important, it is not clear how any such score correlates to actual performance in everyday activities. Many therapists are beginning to distrust paper-and-pencil tests because they lack the unpredictable, multitasking nature of real-life situations (Bowen et

Fig 1. The Line Cancellation Test of Unilateral Neglect

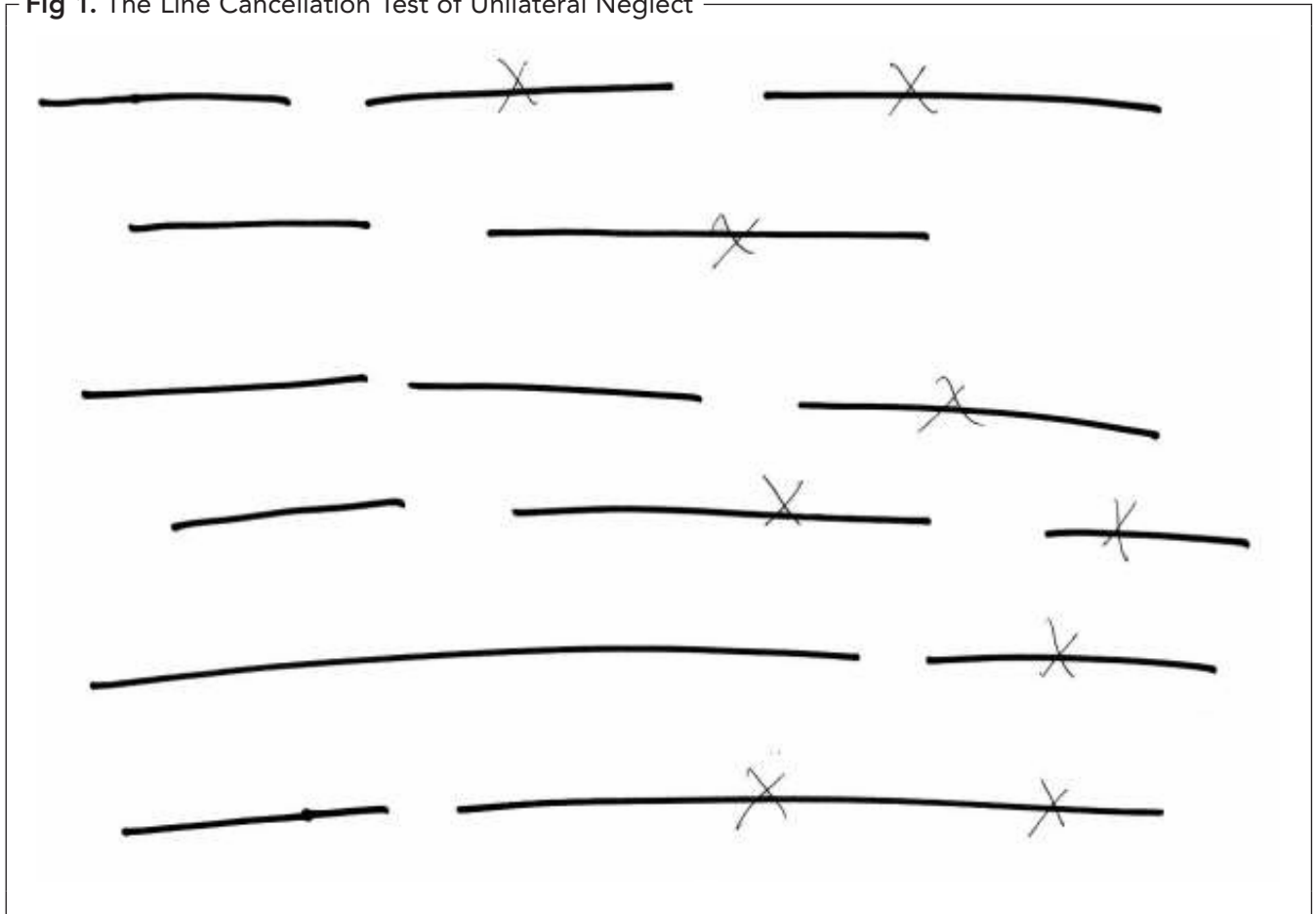
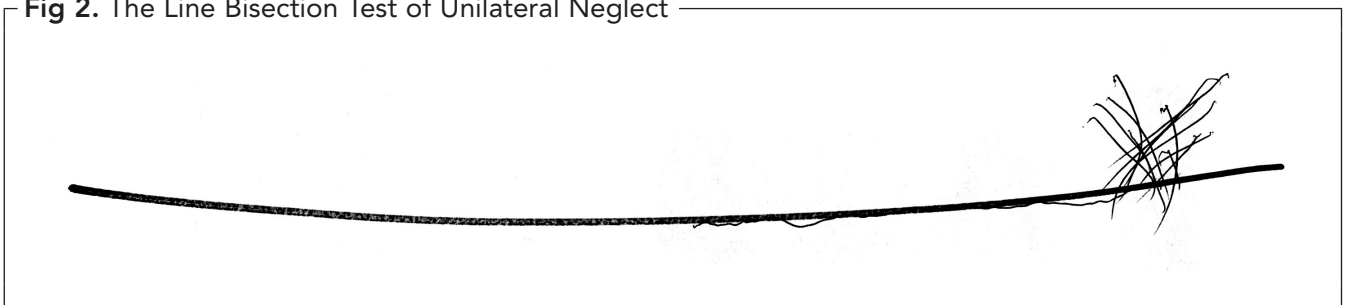


Fig 2. The Line Bisection Test of Unilateral Neglect



al., 1999). Patients also seem capable of suppressing UN during test situations (Appelros, Nydevik, Karlsson, Thorwalls, & Seiger, 2003) or memorizing specific tests without demonstrating any correlated improvement in actual function (Robertson, 2003). As Rossetti and Rode (2002) remarked, “patients may typically produce almost perfect performance on classical tests performed during a testing session and then walk into the door when leaving the room” (p. 376). There may be no simple solution to these problems other than observing UN patients perform complex activities in real-life situations and in a natural environment (Appelros et al.).

Clinical Observation

Clinical observations rarely were noted in the 32 studies that we reviewed, but it is likely they played a more important role than the reporting suggests. First, several of the paper-and-pencil tests commonly used today originally were deemed valid by comparing them with clinical observation of UN patients performing ADLs (Hartman-Maeir & Katz, 1995; Stone et al., 1991). In addition, it is likely that frank clinical manifestations of UN played a significant part in the earliest stages of subject selection for those studies.

Given the likelihood of their foundational role, together with the problems associated with

paper-and-pencil tests, it is surprising that clinical manifestations are not more commonly used or noted in assessing UN. This follows a common trend in health care, in which clinical phenomena often are omitted from reporting because they lack formalized taxonomies and are considered less scientific (Feinstein, 1987). Limited as they may be, paper-and-pencil tests do provide scores, thereby insinuating an objective measurability, even though it may be unclear what the scores represent. The only clear way to correct this is to create reliable, valid measures and scales that meaningfully quantify clinical observations (Feinstein, 1983).

The Catherine Bergego Scale

The Catherine Bergego Scale (CBS) represents an attempt to assess UN with greater accuracy (Azouvi et al., 1996). The scale was created for occupational therapists. It scores performance on 10 clinical observations of UN such as gaze deviance, grooming or dressing only the right side of the body, or ignoring food on the left side of the plate. The CBS authors have found it to be more sensitive than several common paper-and-pencil tests, and they suggest it paints a more accurate picture of a patient's condition (Azouvi et al., 2003).

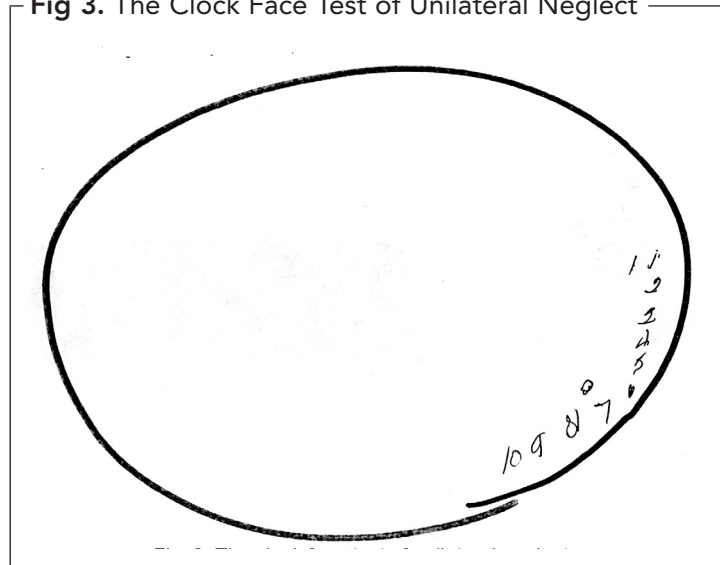
One shortcoming of the CBS is that it is designed to be used by occupational therapists during brief testing sessions rather than throughout the course of an entire day. UN fluctuates considerably according to a patient's wakefulness, mood, and motivation (Azouvi et al., 2006). Because of this variability, many subtle forms of UN are best observed by family members or caregivers who are with the patient in a variety of settings and throughout the course of the full day (Parton et al., 2004). Such all-day observation may be impractical for therapists, but it is perfectly suited for nurses.

Assessment in Nursing Practice

Nurses are likely to be the most important elements of a stroke rehabilitation team (Harwood, Huwez, & Good, 2005). Because nurses have more patient contact than other healthcare practitioners, they have a unique opportunity to interact with patients in a wide range of settings and through multiple complex activities. Ranhoff and Laake (1993) found that because nurses interact all day with patients, they provide more accurate patient scores on the Barthel index of ADLs than physicians, who provide more limited bedside evaluations. The same may prove true with UN assessment because it is a complex disorder with considerable variations throughout the day.

Clinical observation in the natural setting of everyday activity has its own set of limitations, the most

Fig 3. The Clock Face Test of Unilateral Neglect



significant being the inherent opacity that makes specific delineations nearly impossible (Goldenberg, Daumüller, & Hagmann, 2001). For example, it may be difficult for a nurse to differentiate between allocentric and egocentric UN or visual and premotor UN by clinical observation alone. However, the focus of nursing assessment need not substitute a full neurological exam. In most cases, all that is needed is to differentiate patients into basic groups according to who has UN and who does not (Lyden & Lau, 1991). Nurses can then plan practice-specific interventions and simultaneously collaborate with other specialists who are better equipped to precisely demarcate the various types, ranges, axes, and orientations of UN. In fact, joint assessments of UN that include both clinical observation and precise testing have proved superior to either method used alone (Sunderland, Walker, & Walker, 2006).

In addition to this crucial potential role, nurses have the opportunity to expand the understanding of UN and the part it plays in holistic health. The two disciplines that have contributed most to the current understanding of UN are occupational therapy and neuropsychology. Occupational therapists have focused primarily on how UN affects the performance of ADLs. Meanwhile, neuropsychologists often have focused more on what UN suggests about normal brain function than on how it affects patients. For example, Halligan and Marshall (1994) expressed their desire to know "what neglect is trying to tell us about the organization of the mind/brain" (p. 169).

Boynton De Sepulveda and Chang (1994) suggested ADL function is an insufficient criterion for measuring stroke severity or recovery because the patient who "returns to the community after a stroke encounters problems not addressed merely

by independence in daily living” (p. 202). To answer this need, they called on nurses to develop comprehensive approaches that account for all the facets of holistic patient care. This same challenge can now be issued to nurses as they research and treat UN. According to their defined role, nurses are poised to not only ask what UN is, but what it means to those who have it.

Summary

Clinical observation in natural patient settings may be the key to meaningful nursing assessment, treatment, and understanding of UN. Further testing of this hypothesis is necessary. Nurses must develop suitable measures to assess UN that are meaningfully quantifiable, demonstrably reliable, and valid when used in the course of evaluation.

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