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Interdisciplinary communication in inpatient rehabilitation facility: evidence of under-documentation of spatial neglect after stroke

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Abstract

Purpose—Spatial neglect commonly occurs after stroke and predicts poor rehabilitation outcomes. However, this disorder is under-recognized in clinical practices, which may result from the failure to document its presence. This study aimed to identify the predictors for documentation of spatial neglect in inpatient rehabilitation facilities.

Method—We performed a comprehensive chart review to investigate whether the presence of spatial neglect was documented in 74 neglect patients' clinical notes recorded by physicians, nurses, or occupational therapists (OTs), or in team conference notes. Independent variables included neglect severity, length of stay, Functional Independence Measure at admission and discharge.

Results—Of the 74 neglect patients, 75.7% were documented by OTs, 63.5% by physicians, and 17.6% by nurses. Although 93.2% of neglect patients were recognized by at least one clinician group, only 31.1% were discussed in multidisciplinary team conferences. Neglect patients who were documented by physicians were more likely to be documented in team conferences. While no factors predicted whether a neglect patient would be documented by nurses or OTs, we found significant predictors for neglect documentation in physician and team conference notes. The odds of being documented by physicians were increasingly greater with poorer efficiency of cognitive rehabilitation (odds ratio = 0.70). The odds of being discussed in team conferences were increasingly greater with more severe neglect (odds ratio = 0.98), and with longer stay in hospitalization (odds ratio = 1.06).

Conclusions—Multidisciplinary care may not involve as much interdisciplinary communication as needed to document important disease states. Stroke rehabilitation professionals should be able to recognize spatial neglect independently and document it consistently.

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Keywords

interdisciplinary teamwork; spatial neglect; stroke; team conference

Introduction

Spatial neglect is a debilitating neurocognitive disorder associated with longer hospitalization and poor rehabilitation outcomes in stroke survivors [1–4]. Spatial neglect is a failure or slowness to respond, orient, or initiate action towards contralesional stimuli [5] accompanied by functional disability [6]. Literature suggests that between 30–70% of right brain-damaged stroke survivors present with spatial neglect, while 20–60% of left brain-damaged stroke survivors have this disorder [7–11]. The discrepancy of prevalence estimation may result from various criteria and assessments for the diagnosis of spatial neglect [12], or from the fact that spatial neglect is clinically under-recognized and under-treated [13–15]. This missed diagnosis may impair efforts to optimize stroke management and rehabilitation assessment for patients with spatial neglect [16,17].

Accurate documentation of spatial neglect enhances the ability to track people with spatial neglect through the healthcare system and to identify its association with healthcare resource utilization, rehabilitation outcomes, and secondary health problems. However, clinical documentation of spatial neglect may not be reliable, especially when it is not being systematically assessed or detected by clinicians [13]. For instance, Edwards *et al.* found that 61% of stroke survivors with spatial neglect, prospectively identified by neuropsychological testing, were undetected clinically [13]. A multicenter retrospective study from ten acute-care hospitals revealed that only 13% of stroke patients received spatial neglect assessment with a standardized instrument [15]. Conventionally, it is the occupational therapist (OT) who assesses patients for spatial neglect [14,18].

Instead of depending on certain specialized clinicians, multidisciplinary teamwork may improve the identification rate of spatial neglect and thus rehabilitation outcomes. Many stroke survivors receive intensive rehabilitation services in inpatient rehabilitation facilities (IRFs) where a multidisciplinary healthcare team (including physicians, therapists, nurses, etc.) provides the services to meet complex nursing, medical management, and rehabilitative needs of patients [19]. Individual healthcare team members discuss symptoms of stroke patients and establish goals of rehabilitation during weekly multidisciplinary team conferences [19,20]. It has been questioned whether the team conference exists as a formality or as a forum for collaborative decision making [20–22]. Strasser *et al.* studied whether rehabilitation care provided by 46 Veterans Administration rehabilitation teams was associated with functional outcome in stroke patients [23]. The authors found that patients showed greater functional outcome when they were treated by teams that made better use of patient-oriented information. They also found that physician involvement and support did not predict functional outcome [23]. This result suggests that the physician may be the leader of the team treating stroke patients, but team members' utility of quality information, an indication of effective interdisciplinary communication, have significantly beneficial impact on stroke patients' recovery. Since spatial neglect is not being systematically assessed in both the acute-care and rehabilitation phases of stroke treatment [13,15], its presence is therefore under-recognized in medical records as well as in team conferences for information exchange among team members.

The aim of the present study was to identify the factors predicting failure to document spatial neglect by healthcare professionals individually or collaboratively. Among the healthcare professionals involved in stroke rehabilitation, physicians [24] and OTs [14,18]

are trained to detect spatial neglect through their formal training in neurologic physical examination. Nurses typically do not receive formal training in detection of spatial neglect unless they pursue specialized training in rehabilitation nursing, namely the Certified Rehabilitation Registered Nurse (CRRN) which is available in the United States. The CRRN program is administered by the Rehabilitation Nursing Certification Board, which is a component of the Association of Rehabilitation Nurses. Successful completion of CRRN certification indicates a specialized level of nursing focused on caring for the patient undergoing physical rehabilitation [25]. In the course of providing much personal care for daily living, nurses working in an IRF encounter symptoms of spatial neglect most frequently than other professionals [26].

We selected three groups of clinicians — physician, nurse, and OT — in the present study and examined the documentation rates of spatial neglect in their notes as well as meeting summaries from team conferences. In the institution studied, neuropsychologists are not routinely consulted on every patient. Therefore, they were not included in the analysis although they are a group of health professionals who do have the capability to identify neglect. Patient characteristics may also affect whether a patient would be assessed for spatial neglect [16]. We examined whether age, sex, years of education, neglect severity, functions at admission, or rehabilitation outcomes predict the likelihood of spatial neglect being documented by a physician, nurse, OT, or a team conference.

Methods

Participants

Patients were recruited from a healthcare system of three campuses of an acute IRF. As part of a larger institutional review board-approved study performed between December 2008 and December 2010, 101 stroke survivors with right hemisphere damage provided consent to participate in spatial neglect screening. Three medical records were unavailable or incomplete, four participants did not complete the screening test for spatial neglect, and 19 did not meet the criterion for being diagnosed with spatial neglect ($<129/146$ on the Behavioral Inattention Test; BIT) [27,28]. Figure 1 presents examples of typical performance of spatial neglect in four BIT subtests. One patient was excluded from the analysis because she was an outlier (>3 SD) in the number of days post-stroke at the screening session. Therefore, we included 74 stroke survivors with spatial neglect (i.e., neglect patients) in the present investigation.

Among the included neglect patients, there were 33 men and 41 women; 6 left-handed, 2 ambidextrous, and 66 right-handed. Participants included 16 African Americans, 5 Asians or Pacific Islanders, 52 Caucasians, and one reported other ethnicity; 2 were Hispanic. They ranged in age from 28 to 90 years ($M = 68.6$; $SD = 15.4$) and had 12.9 ± 3.2 years of education. On average 23.9 ± 12.2 days post-stroke, participants were screened for spatial neglect by our research team using the BIT. Participants were also evaluated for visual field lost by a physician in our research team; 11 participants presented hemianopia, and all of them were in the left visual field. The average length of stay (LOS) in the acute IRF was 30.3 ± 11.2 days.

Procedure

Blinded to neglect screening results, one author conducted a comprehensive chart review to identify the terms “spatial neglect”, “visual neglect”, “field neglect”, “hemispatial neglect”, “hemineglect”, “unilateral neglect”, “left-sided neglect”, “left neglect”, or “hemi-inattention” in medical notes. When an ambiguous term such as “lateral inattention”, “behavioral inattention”, or “facial neglect” appeared, the blinded chart reviewer discussed

with a clinician staff in order to understand the context. The blinded reviewer then reported to the other authors of this report in order to reach a conclusion whether the term referred to spatial neglect. The found keywords were then categorized by the type of documents: physician, nurse, OT, or team conference. The blinded reviewer also collected codes defined by the International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM) coding system that lists codes for diagnoses and procedures associated with healthcare service utilization in the United States [29]. The target ICD-9-CM code was 781.8, used for the neurological neglect syndrome.

In addition to medical records that may contain information about detection of spatial neglect, we acquired scores of the Functional Independence Measure (FIM) in both cognitive and motor domains at admission and discharge [30], i.e., cog FIM-adm, motor FIM-adm, cog FIM-dis, and motor FIM-dis. We then calculated indicators for efficiency of rehabilitation, and they were cog FIM change per day and motor FIM change per day (by subtracting FIM scores at admission from FIM scores at discharge and then dividing the value with LOS). All the information was stored and organized in Microsoft Office Excel 2007®. Statistical analyses were performed with PASW Statistics® 18.0.2 (SPSS, IBM, Armonk, New York).

Results and Discussion

Documentation rates

Of the 74 neglect patients included in the analysis, 69 (93.2%) were documented in at least one type of clinical notes, suggesting a high detection rate among clinicians. However, there was no documentation in any medical charts of standardized assessment utilized by physicians or nurses identifying spatial neglect. OTs recorded the use of standardized assessments in 49 neglect patients' charts (66.2%): 5 (6.7%) were assessed with the Catherine Bergego scale [31] only, 16 (21.6%) were assessed with star cancellation (a subtest of the BIT) only, and 28 (37.8%) were assessed with both instruments. No neglect patient was coded with the ICD-9-CM neglect code (781.8), suggesting that using such code for institutional or nation-wide prevalence research on spatial neglect is likely to be unfruitful.

As illustrated in Figure 2, the highest detection rate of spatial neglect occurred in OT notes (56 neglect cases identified; 75.7%), followed by physicians (47 neglect cases identified; 63.5%), and nurses (13 neglect cases identified; 17.6%). In the notes documenting team conferences, 23 neglect patients (31.1%) were mentioned having the disorder. Physicians explicitly stated that one neglect patient did not have neglect, but this patient was documented as having spatial neglect by an OT. On the other hand, one patient was documented as not having neglect by OTs, but spatial neglect was noted in the physician discharge summary. For the following analyses, we excluded these two neglect patients who were documented as having neglect by one clinician group but noted as "not having neglect" by another clinician group.

To examine whether there was a significant discrepancy in ratio of neglect documentation among different types of documents, we conducted six pair-wise comparisons using the χ^2 tests (significance level corrected for multiple comparisons: $p < 0.008$). One discrepancy was found significant between physician and team conference notes ($X^2 = 11.01$, $p = 0.001$, $\phi = 0.39$). This result reflects a physician-oriented bias in determining whether a neglect case would be discussed during the conference: 91.3% of neglect patients who were discussed in the team conference (21 out of 23 patients) were also documented in physician notes. However, consistent with the overall low discussion rate of spatial neglect in the team conference, we found 54.3% (25 out of 46) of physician-noted neglect patients, 76.9% (10

out of 13) nurse-noted neglect patients, and 69.1% (38 out of 55) OT-noted neglect patients were not discussed in the team conference. No significant difference among these three ratios was found with a 2×3 Fisher's exact test ($p = 0.181$).

Predictors for neglect recognition in clinical documents

Patient characteristics (age, sex, education), neglect severity (BIT), the presence of hemianopia, post-stroke function (cog FIM-adm, motor FIM-adm), or rehabilitation outcomes (LOS, cog FIM-dis, motor FIM-dis, cog FIM change per day, motor FIM change per day) may determine whether spatial neglect would be assessed and thus noted. In addition, documentation made by a clinician may be affected by other types of clinical notes, as the result showed in the previous section. Therefore, we performed a series of bivariate exploratory logistic regression analyses with the four independent variables — types of clinical documentation — and 11 patient-related predictors. Because cog and motor FIM changes per day were <1 in most of the cases, which might exaggerate odds ratios, these two factors were multiplied by 10 before entering into the logistic regression model. Table I summarizes the results in odds ratios. Several key results emerged from this analysis: (i) neglect patients were more likely to be documented by physicians if they had poor efficiency in cognitive outcome improvement (cog FIM change per day); (ii) physician-noted neglect patients were likely to be discussed in team conferences, and (iii) neglect documentation in team conference notes was associated with female sex, more severe neglect, longer stay in the facility, and poorer cognitive and motor outcome at discharge.

To determine the “best” predictor among the independent variables for neglect documentation, we performed a forward step-wise logistic regression analysis on each type of clinical notes. The result showed no significant predictor for neglect documentation in nurse or OT notes. For physician documentation, cog FIM change per day was the single significant predictor ($\chi^2 = 6.69$, Nagelkerke $R^2 = 0.122$, $p = 0.010$). The odds of being recognized as having neglect in physician documents were increasingly greater with poorer efficiency of cognitive rehabilitation (odds ratio = 0.70, $p = 0.015$). For team conference notes, two variables — BIT and LOS — emerged as significant predictors ($\chi^2 = 14.59$, Nagelkerke $R^2 = 0.257$, $p = 0.001$). The odds of a neglect patient being discussed in team conferences were increasingly greater with more severe neglect (poorer BIT scores) (odds ratio = 0.98, $p = 0.006$), and with longer stay in hospitalization (odds ratio = 1.06, $p = 0.044$).

General discussion

The literature on assessment of spatial neglect reports that it is not frequently assessed by specialized clinicians [14,15]. Our study confirms that this problem extends to healthcare documentation, administrative database, and thus validity of healthcare outcome data. Since ICD-9-CM coding may not presently identify stroke patients with disabling impairments like spatial neglect, this administrative database has very limited validity for conducting epidemiological, quality of care, or clinical research. Importantly, the findings related to team conference documentation are consistent with the concern about the gap between the intention and the practical function of the team conference [20–22]. Multidisciplinary care may not involve as much interdisciplinary communication as would be ideal for comprehensive, high-quality patient care.

Despite having a high detection rate overall, documentation of spatial neglect is diffuse throughout medical charts. OTs detected and documented more neglect cases than the other clinicians; however, our finding that neglect was not documented in team conferences suggests that perhaps OTs did not bring up the topic to the team conference, which may be

the reason why the overall documentation rate (a neglect patient identified in any notes) is not equal to the team conference documentation rate (93.2 vs. 31.1%; Figure 2). The difference between assessment and detection of neurologic deficits and the meaningful utilization of this information in team conference discussions is crucial for determining the extent to which the diagnosis of spatial neglect is incorporated into the individual patient's treatment plan.

Physicians, who lead and document team conferences, tend to dominate the discussion [21,22]. Although team conferences require all team members have input, this may be of a pre-scripted set of reporting data. Not all team members initiate topics for discussion in the conference [21,22], and thus the conference may not be an event for information exchange, goal setting, or problem solving, but become an event for task dissemination and reporting of specific endpoints [20]. This was reflected in our finding that most neglect patients who were mentioned in team conference notes were also recorded in physician notes. With more severe symptoms of spatial neglect and longer stay in the IRF, a patient's neglect symptoms were more likely to be discussed in the team conference. Although the other rehabilitation outcomes (cog FIM-dis, motor FIM-dis, and motor FIM change per day) were not predictors for neglect documentation in team conference notes, their significant associations (Table I) suggest that the topics discussed in a team conference were selective and biased toward neglect patients, who happened to be more females than males, with poorer rehabilitation outcome. This finding raises another question on the function of team conferences. Do team conferences improve use of care and treatment resources, and thus rehabilitation outcome, by effective information exchange? Or are neglect cases only worth discussing if they are severe?

If interdisciplinary collaboration did not yield the best practice, one would wish that individuals in the multidisciplinary team could meet the standard independently. In the context of stroke rehabilitation, proper identification of spatial neglect is crucial as this disorder is associated with longer admissions and reduced functional outcomes [1–4]. If stroke patients with spatial neglect return to the community without identification of their disability, there is a danger to both the patient and society if they resume driving or engage in adaptive activities without sufficient supervision [32,33]. In our study, the percentage of missed cases supported Edwards *et al.*'s contention [13] that many patients with this disorder are not identified during routine care, which may be due to the resistance of changing clinical practice in rehabilitation clinicians [34]. Neurocognitive deficits after left brain stroke, such as speech and language disorders, typically have more easily recognized signs and symptoms than more hidden disorders after right brain stroke, such as spatial neglect. Spatial neglect presents significant challenges to stroke recovery but may be less recognized by healthcare professionals and family caregivers when compared with speech and language deficits [16,17]. Spatial neglect is traditionally considered a disorder in the visual modality (thus “visual neglect” commonly used) [27,35] although the adverse consequences on motor function has been emphasized but not widely recognized such that spatial neglect may impair postural recovery [36], increasing fall risks [32,37]. In addition to motor planning and execution, its manifestation in other domains, e.g., auditory attention, pro-prioception, and memory [38–42] may be under-recognized by clinicians as well. If clinicians do not take advantage of developed tools and spatial neglect examination methods, this makes it more challenging to obtain reliable detection of spatial neglect.

Nurses' documentation rate of spatial neglect was much lower than the other clinicians. Stroke inpatients receive hands-on care from many staff members during their inpatient rehabilitation. Nurses who care for patients are in a unique position to observe patient movement within their rooms as well as patient behavior while receiving medication. Both these provide important clues about patients' ability to function in an ecological

environment. The North American Nursing Diagnosis Association has included assessment for spatial neglect for more than two decades [26]. Nursing documentation of neglect and collaboration with other disciplines in the inpatient setting can improve holistic care of the patient [26]. Continuation of stroke care into the outpatient setting often includes continued contact with nurses and improvement of nurses ability to detect cognitive and other “hidden disabilities” of stroke can improve community-based nursing strategies [43]. Our data suggest that more efforts are necessary to enable nurses to accurately assess patients for spatial neglect.

The present findings reveal the poor system of multidisciplinary documentation and interdisciplinary communication on spatial neglect. One limitation of this study is that participants were drawn consecutively from a selected sample receiving inpatient rehabilitation, which should be taken into account when generalizing the results. However, the population that this group may represent is inpatients with moderate levels of post-stroke disability, and is one for whom accurate healthcare coding, to track outcomes and proactively limit costs, is extremely important. Another limitation is that interdisciplinary communication may not be limited to team conference documentation but also include informal conversation between individual team members. However, formal and accurate documentation of a disabling disorder such as spatial neglect may enhance the ability to track people through the healthcare system and to identify its association with healthcare resource utilization, rehabilitation outcomes, and secondary health problems. Rehabilitation and post-acute care costs will come under close scrutiny in the era with the increasing population of the elderly, and it will be very difficult to demonstrate the benefit of rehabilitative interventions if major exacerbating factors, such as spatial neglect, that contribute to increased disability are not identified and accurately reported.

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Implications for Rehabilitation

- Occupational therapists detected and documented more neglect cases than physicians or nurses. Nurses' documentation rate of spatial neglect was much lower than physicians or occupational therapists.
- Spatial neglect was more likely to be documented by physicians if the patients had poor efficiency in cognitive outcome improvement.
- Stroke patients with more severe neglect or with longer stay were more likely to be documented in team conference notes.
- No neglect patient was coded with the ICD-9-CM code (781.8), suggesting that using such code for institutional or nation-wide prevalence research on spatial neglect is likely to be unfruitful.

Figure 1.

Examples of spatial neglect after a right brain stroke are shown in performance in (A) line cancellation, (B) line bisection, (C) free clock drawing, and (D) figure copying. In each of these, the patient's inattention to the left side of their drawing task is evidence of their inability to attend to the left side of space, a hallmark of spatial neglect.

Figure 2. Percentages of neglect patients documented in physician, nurse, OT (occupational therapist), team conference records. The “overall” bar represents the percentage of neglect patients being recognized for the disorder in any one of the four clinicians’ notes.

Table I

Matrix of odds ratios for documentation of spatial neglect in four types of clinical notes (documented cases coded 1; undocumented 0).

	Physician	Nurse	OT	Team
Independent variables				
Sex (M = 1; F = 0)	1.66	0.98	0.78	0.31 *
Age	1.01	0.99	1.00	1.00
Education	0.97	1.00	0.98	1.05
Hemianopia (presence = 1; absence = 0)	0.34	2.45	1.26	1.30
BIT	0.99	1.00	1.00	0.98 **
LOS	1.01	1.03	1.00	1.06 *
Cog FIM-adm	1.03	0.97	1.02	0.92
Motor FIM-adm	0.96	0.97	0.99	0.94
Cog FIM-dis	0.95	1.02	1.02	0.91 *
Motor FIM-dis	0.97	1.01	1.01	0.95 *
Cog FIM change per day	0.70 *	1.11	1.07	0.96
Motor FIM change per day	0.93	1.04	1.04	0.81 *
Types of clinical documentation				
Physician (doc = 1; und = 0)				
Nurse (doc = 1; und = 0)	1.67			
OT (doc = 1; und = 0)	1.05	0.53		
Team (doc = 1; und = 0)	1.10 **	1.71	1.22	

adm, at time of admission; BIT, behavioral inattention test; dis, at time of discharge; doc, neglect documented; FIM, Functional Independence Measure; LOS, length of stay; OT, occupational therapist; und, neglect undocumented; Team, team conference.

* $p < 0.05$;

** $p < 0.01$.