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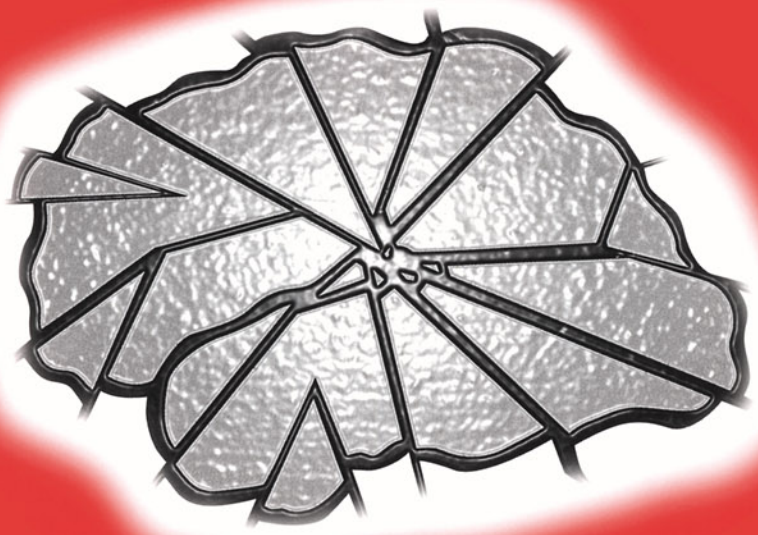

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Preface

The papers that appear in this special edition of *Aphasiology* were selected based upon their theoretical importance, clinical relevance, and scientific merit, from among the many platform and poster presentations comprising the 32nd Annual Clinical Aphasiology Conference held in Ridgedale, Missouri in June of 2002. Each paper was peer-reviewed by the Editorial Consultants and Associate Editors acknowledged herein consistent with the standards of *Aphasiology* and the rigours of merit review that represent this indexed, archival journal.

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Right hemisphere syndrome is in the eye of the beholder

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Background: Specific information about prevalence and patterns of deficits associated with right hemisphere brain damage (RHD) is incomplete. A recent large-scale study of inpatients in a United States rehabilitation centre (Lehman Blake, Duffy, Myers & Tompkins, 2002) provided initial estimates of deficit prevalence and co-occurrence. The data obtained were based on information from multiple medical disciplines, and may not adequately reflect the typical caseload seen by US speech-language pathologists (SLP). Differences in how professionals view RHD may influence whether patients are appropriately referred for services.

Aims: The first aim was to evaluate whether prevalence and patterns of deficits differ when diagnoses are made by SLPs versus other disciplines. The second aim was to examine whether the presence of certain deficits is associated with referrals to SLP.

Methods and Procedures: A retrospective chart review was conducted examining medical records for 122 adults with RHD in an inpatient rehabilitation unit. Diagnoses were obtained from speech-language pathology versus a group of other medical professionals, including neurology/physiatry, neuropsychology, and occupational therapy. Frequencies and cluster analyses were computed for both groups of diagnosticians to examine differences between groups. Relationships between performance on a screening measure of mental status and cognitive/communicative diagnoses were examined to determine if there were obvious connections between specific disorders and referrals to SLP.

Outcomes and Results: Diagnoses of pragmatic and communicative deficits were made more often by SLPs, while the other professionals more often diagnosed deficits in attention, visuoperception, and learning/memory. Moderate-strong correlations between diagnoses from the two groups were obtained only for deficits of attention, linguistics, and neglect. Referral to SLP was not related to performance on a general mental status screening test. Patients who presented with neglect, aprosodia, or deficits in interpersonal interactions were more likely to be referred to SLP than when these deficits were absent.

Conclusions: This study raises the question of how to ensure appropriate referrals to SLP when referring professionals may not always identify the communicative disorders exhibited by individuals with RHD. A descriptive definition of right hemisphere syndrome and a consistent set of terminology would facilitate communication about right hemisphere deficits within and across disciplines. A broader scope of referrals to SLP would increase the number of patients who receive appropriate care for their cognitive and communicative deficits.

Despite the well-known conventional descriptions of deficits associated with right hemisphere brain damage (RHD), limited data are available regarding specific deficits and patterns of deficits caused by RHD (e.g., Joanette & Goulet, 1994, Myers, 1999, Tompkins, 1995). A previous study (Lehman Blake et al., 2002) evaluated the prevalence and patterns of co-occurrence of cognitive/communicative deficits in a large retrospective sample. This was the first large-scale exploration of "right hemisphere syndrome" as seen in a US inpatient rehabilitation unit. Deficit categories were created to classify the large number of diagnostic labels used in the medical charts (see Appendix A). Results from that

Address correspondence to: Margaret Lehman Blake PhD, University of Houston, Communication Disorders, 100 Clinical Research Center, Houston, TX 77204–6018, USA. Email: mtblake@uh.edu Margaret Lehman Blake is now at the University of Houston, TX, USA. The data for this project were collected while the first author was a post-doctoral fellow in Speech Pathology at the Mayo Clinic in Rochester, Minnesota, under the direction of the second author. Thanks to Jacque Danielson for her assistance in retrieving the medical records.

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study indicated that the most commonly diagnosed deficits were in attention, neglect, visuoperception, and learning/memory. Additionally, the deficit categories of calculation, hyperaffectivity, and linguistics were not closely related to any of the other deficits evaluated.

The current study examined the same group of patients to explore some questions that remained unanswered after the initial study. Deficit categories analysed in the original study were based on diagnoses made by four disciplines combined: neurology/physiatry, neuropsychology, occupational therapy (OT), and speech-language pathology (SLP). Because diagnoses from all four professions were used, the picture of right hemisphere syndrome described in the previous study (Lehman Blake et al., 2002) may not be reflective of the typical caseload of RHD patients seen by a US speech-language pathologist, because SLPs and other professionals may not recognise or identify the same deficits. Thus, the first aim was to evaluate whether prevalence and deficit patterns differ when diagnoses are made by SLPs versus other disciplines. Differences between disciplines may provide insight into how cognitive/communicative deficits are perceived by various medical professionals. The previous study also indicated that while 94% of cases exhibited at least one cognitive/communicative deficit, only 44% were referred for an SLP evaluation. Thus, the second aim was to examine which deficits are likely to lead to a referral to SLP.

METHOD

Inpatient medical records were reviewed for patients with RHD consecutively admitted to a US inpatient rehabilitation unit over a 3–year period. Diagnoses of RHD were made by neurologists. For 88% of the cases, CT or MRI scans confirmed the diagnosis. The initial list contained 246 cases. Seven of these were excluded because the patients did not release their medical records for research purposes. Another 117 cases were excluded due to incomplete charts, lesions restricted to the cerebellum or brain stem, other neurological disease (e.g., dementia, Parkinson's disease), psychiatric disorder other than depression, and/or bilateral cerebral lesions (see Lehman Blake et al., 2002, for complete details of the chart review). This left a total of 122 cases available for group analyses.

Demographic and clinical data are provided in Table 1. Information about the presence or absence of selected disorders and deficits was obtained from inpatient neurology/ physiatry, neuropsychology, OT, and SLP reports. As detailed in Lehman Blake et al. (2002), the long list of diagnostic labels obtained from the medical charts was reduced to 14 deficit categories based on broad traditional classifications (e.g., linguistics, attention,

TABLE 1 Demographic and clinical information for cases with lesions restricted to the right hemisphere

Demographic and clinical variables	*All RHD cases* (*n*=122)	*Cases referred to SLP* (*n*=54)
Sex	71 male 51 female	26 male 28 female
Age (years) Mean (SD) Range	68.6 (12.4) 12–95	68.6 (12.6) 15–94
Education (years) Mean (SD) Range	12.0 (3.0) 7–20	12.0 (3.3) 7–20
Handedness	87% right 5% left 1% ambidextrous [7% missing]	87% right 9% left 2% ambidextrous [2% missing]
Reason for hospital admission	86% RH stroke 14% other medical condition*	87% RH Stroke 13% other medical condition*
Presence of previous stroke	81% no previous stroke 19% prior RH stroke	83% no previous stroke 17% prior RH stroke
Number of days between onset and admit to rehabilitation unit		
Mean (SD) Range	13.9 (26.6) 0–240	13.7 (21.5) 1–120

RHD = right hemisphere brain damaged; SLP = speech—language pathology; RH = right hemisphere.

* These represent patients who were admitted to the hospital for a medical condition other than CVA, who either had a CVA while hospitalised (e.g., as a complication), or who then received inpatient therapy for deficits resulting from a CVA that occurred prior to the current admission.

learning, and memory), and other behavioural characteristics (e.g., hyporesponsive, hyperresponsive). Two of the authors independently classified the labels. Initial agreement was 83%. Disagreements were resolved by discussion. Appendix A contains descriptions and examples of these categories. For each patient, a deficit category was considered present if one or more of the labels within the category was reported by any one discipline. Aprosodia and neglect were not merged into a deficit category, but were analysed as distinct disorders. (Essentially each one was a category of its own.) In this paper, deficit categories will be indicated by italics, while the separate deficits (aprosodia and neglect) will be printed in regular font.

ANALYSES AND RESULTS

The subset of individuals evaluated by SLP (*n*=54) was used to compare diagnoses made by SLP versus the other three disciplines. Results of frequency analyses, provided in Table 2, indicate that for both groups of diagnosticians the most commonly identified disorder was neglect. Following that, SLPs most commonly diagnosed deficits in *other cognitive deficits* and *hyporesponsivity*. In contrast, the other disciplines most often reported deficits in the categories *attention*, *visuoperception*, and *learning/memory*. Further examination of the results illustrates how the focus of a discipline affects diagnosis. Speech pathologists, focusing on communication, diagnosed deficits in *interpersonal interactions* in nearly 30% of patients, while other disciplines identified such

TABLE 2 Frequency of occurrence of deficits and deficit categories present in 54 patients, diagnosed by SLPs or other medical professionals

Deficits and deficit categories	*Prevalence diagnosed by neurology/physiatry, neurophyschology and OT*	*Prevalence diagnosed by SLP only*
neglect	66.4%	53.7%
attention	63.9%	35.2%
perception	58.2%	27.8%
learning/memory	58.2%	24.1%
reasoning & problem solving	56.6%	37.0%
other cognitive deficits	45.1%	42.6%
orientation	40.2%	27.8%
awareness	38.5%	27.8%
hyperresponsive	36.1%	18.5%
hyporesponsive	30.3%	38.9%
calculation	28.7%	5.6%
hypoaffective	24.6%	18.5%
linguistic	21.3%	24.1%
hyperaffective	15.6%	7.4%
aprosodia	12.3%	25.9%
interpersonal interactions	7.4%	29.6%

OT = occupational therapy; SLP = speech—language pathology.
Deficit categories are indicated by italics.

pragmatic deficits in only 13% of those same patients. Aprosodia also was diagnosed twice as often by SLPs (26%) as by the other professionals (12%).

In order to examine differences in patterns of co-occurrence related to disciplines, hierarchical cluster analyses (SPSS, 1999) were performed. A cluster analysis is an exploratory tool that identifies related groups or “clusters” within a

body of data (Aldenderfer & Blashfield, 1984). The two categories that co-occur most often are linked to form a cluster, and the linking continues until all categories fit into a specified number of clusters. For the current purposes, clusters were based on how often deficit categories co-occurred across the sample of cases. Six clusters were specified based on findings from the previous study (Lehman Blake et al., 2002). Analyses were conducted first on the data from SLP diagnoses, then on diagnoses from the other disciplines combined. As shown in Table 3, the affective deficits (*hypoaffective* and *hyperaffective*) separated into their own clusters when diagnosed by either SLP or other professionals. This result indicates that these deficit categories are relatively dissimilar to all others, regardless of who makes the diagnosis. No other obvious patterns were identified.

Phi correlation coefficients also were computed to evaluate similarities between the diagnoses by SLPs versus other disciplines. Based on Cohen's rule of thumb for evaluating correlation coefficients (Cohen, 1988), moderate to high correlations were obtained for diagnoses of *linguistics* (phi = .70), *attention* (phi = .46), and neglect (phi = .42). Small correlations were obtained for all other deficits and deficit categories (phi = .15 to .29), with the exception of *learning/ memory* (phi = .09).

To address the second aim, identifying which patients with RHD are referred to SLP, chi-square cross-tabulation analyses (SPSS, 1999) were performed to evaluate the association between referral to SLP and presence of deficits. First, the relationship

TABLE 3 Results of cluster analyses for diagnoses by speech-language pathologists (a) and other medical professionals (b)

Cluster 1	*Cluster 2*	*Cluster 3*	*Cluster 4*	*Cluster 5*	*Cluster 6*
(a) Clusters of deficit categories based on diagnoses by speech-language pathologists					
hyperaffective	*hypoaffective*	*attention* *awareness* *hyporespons ive* *other cognitive* *calculation*	*learning* *hyperrespo nsive* *reasoning*	*visuopercep tion* *interperson al* aprosodia neglect	*linguistic orientation*
(b) Clusters of deficit categories based on diagnoses by neurologists/physiatrists, neuropsychologists, and occupational therapists					
hyperaffective	*hypoaffective*	*attention* *awareness* *learning/ memory* *visuopercept ion* *hyporespons ive*	*hyperrespo nsive* *interperson al* aprosodia	*linguistic*	*calculation*

Cluster 1	*Cluster 2*	*Cluster 3*	*Cluster 4*	*Cluster 5*	*Cluster 6*
		orientation *reasoning* *other* *cognitive* neglect			

between presence of dysarthria and SLP referral was examined to see if a majority of cases was referred based on that diagnosis. If most cases were referred to SLP due to a motor speech disorder, then it would be difficult to determine what cognitive or other communicative deficits might influence the referral process. The entire group of 122 cases was included in these analyses, using diagnoses of dysarthria from neurology, neuropsychology, and OT. The data indicated that only 50% of the patients diagnosed with dysarthria were referred for a SLP evaluation (phi = .09, $p > .05$). Given that presence of dysarthria did not compel a SLP referral, cross tabulation procedures were conducted to examine the relationship between the presence/absence of cognitive/communicative deficits and referral to SLP. The results suggest that the presence of deficits in *visuoperception* (phi = .18, $p = .05$), *interpersonal interactions* (phi = .19, $p = .04$), neglect (phi = .29, $p = .001$), or aprosodia (phi = .22, $p = .02$) were associated with SLP referrals more often than when these deficits were absent. Although significant, all of these correlations are small.

A second analysis was conducted to further explore the second aim of the study. Data from The Short Test of Mental Status (Kokmen, Naessens, & Offord, 1987) were available for 63 of the RHD patients. This screening tool is similar to the Mini Mental State Examination (Folstein, Folstein, & McHugh, 1975), and provides information about cognitive abilities such as orientation, memory, language, attention, calculation, and visuoperception. A copy of the screening is provided in Appendix B. A series of onetailed independent *t*-tests was conducted to compare Kokmen mental state scores for patients who were and were not referred for SLP evaluation. There was no difference in mean total scores for these two groups ($t = 0.26$, $p > .05$). Examination of each subtest indicated that patients who scored low on orientation were more likely to be referred to SLP than those with higher scores ($t = 1.8$, $p < .05$). No group differences were found for any other subtest score. This suggests that neurologists did not base referrals to SLP solely on patients' performance on this screening. The small range of possible points per subtest (3–8 points) also may have contributed to the nonsignificant results.

Another explanation for the nonsignificant results is that this screening tool is not a valid measure of cognitive/communicative deficits. To address this possibility, a second series of one—tailed independent *t*-tests was conducted to evaluate the relationship between this assessment and the deficit categories. Means on the Kokmen subtests were compared in patients who did or did not present with deficits in a corresponding category, using diagnoses from all four

disciplines. As shown in Table 4, relationships were found between orientation (t = 2.98), recall (t = 2.39), and maths (t = 1.74) subtests and their corresponding deficit categories (all $p < .05$). However, there was no difference in Kokmen scores on the attention, construction, and abstraction subtests for patients who were and were not diagnosed with deficits in the comparable categories (all $p > .05$). These results suggest that for the more complex , multifaceted abilities, the Kokmen screening and the deficit categories do not clearly capture the same behavioural characteristics.

CONCLUSIONS AND CLINICAL IMPLICATIONS

This study examined a large group of adults with RHD and provides initial data regarding how RHD syndrome is perceived by different medical professionals. The results obtained must be interpreted with caution given the retrospective nature of the study and the imprecision of the deficit classification scheme. Additionally, the data were gathered

TABLE 4 *T*-test results of scores on the Short Test of Mental Status (Kokman et al., 1987) for patients diagnosed with deficit categories present or absent

Kokmen subtest—deficit category	*n*	*Means (SD)*	*t*	*P*
orientation—*orientation**				
absent	40	7.7 (.72)	2.98	.002
present	23	6.8 (1.7)		
attention—*attention*				
absent	22	6.0 (1.5)	–0.16	.88
present	41	6.1 (1.0)		
recall—*learning/memory**				
absent	22	2.6 (1.4)	2.39	.010
present	41	1.7 (1.4)		
abstraction—*reasoning/prob.solving*				
absent	23	2.5 (.90)	1.35	.09
present	40	2.l (2.1)		
construction—*visuoperception*				
absent	9	2.4 (1.4)	0.78	.22
present	20	2.1 (1.2)		
maths—*calculation**				
absent	42	2.5 (1.3)	1.74	.04
present	21	1.9 (1.6)		

Present = deficit diagnosed as present by at least one of four disciplines; Absent = deficit not present.

* Significantly different at $p < .05$.

from only one rehabilitation unit, and thus are influenced by sampling biases present in that facility. Despite these limitations, broad clinical implications can be drawn. One implication is that the characteristics of right hemisphere syndrome may vary depending on who makes the diagnosis, as prevalence of deficits may be a reflection of the biases of the professional conducting the evaluation. There appears to be substantial overlap across disciplines in the conceptualisation and recognition of attention, neglect, and linguistic deficits, but much diversity across disciplines for other cognitive/communicative disorders. The important question is not "who is right?" about the deficits that occur after RHD; the data suggest that different professionals focus on different deficits, which is appropriate given the training and expertise that characterise various professions. The relevant question that arises from this study is "how can we ensure that patients with RHD are appropriately referred to SLP when they exhibit deficits that are not consistently recognised by those professionals who make such referrals?".

There is no obvious explanation for which patients are referred to SLP. The presence of some deficits (e.g., *interpersonal interactions*, aprosodia, neglect) was associated with SLP referrals. This suggests that when other professionals do identify communicative disorders (pragmatic deficits and aprosodia), they refer those patients to SLP. However, the frequency analyses indicated that neurologists, neuropsychologists, and OTs do not consistently identify communicative deficits, or may not be as stringent in judging aspects of communication, and thus many appropriate referrals are missed. Performance on a general mental status screening test was not meaningfully related to referrals or to higher-level deficit categories, and thus does not add much information about how referral decisions are made. Several factors not taken into account here include experience of the referring neurologist/physiatrist, and individual referring preference. For example, some physicians are more likely to refer to SLPs due to their approach to referring in general, without regard for patients' specific deficits.

As discussed in the initial study (Lehman Blake et al., 2002), one important weakness with current practices of diagnosis and treatment of adults with RHD is the absence of a definition of right hemisphere syndrome. This study suggests that different disciplines have their own criteria or expectations regarding what deficits may occur after RHD, likely based on their professional expertise. While it is appropriate that different disciplines focus on different disorders, some patients may not receive proper referrals if deficits that can be treated by one discipline are not recognised by another. Related to this problem is the lack of consistent terminology, both within and across disciplines. A descriptive definition of the deficits associated with RHD would benefit our discipline and would be a step towards developing criteria for other disciplines to use when making decisions about referral for SLP evaluation and management. Of course, terminology or definitions alone cannot solve the problems associated with diagnosis and treatment of right hemisphere syndrome, and it may be impossible

to develop a standard set of terms that is used consistently across disciplines. Additionally, even with an "official" diagnostic label, referrals may not always be forthcoming. For example, in this study only 50% of individuals diagnosed with dysarthria were referred to SLP. Perhaps the best solution to the current referral problem is to urge that all patients admitted to a rehabilitation unit with a cerebral lesion should be referred to SLP. This practice would most definitely increase the rate of identifying cognitive and communicative deficits (not only those associated solely with RHD), although it also would presumably increase the number of evaluations in which such disorders are not identified. Open and active communication within the SLP community and between SLP clinicians and other medical professionals is needed to find an optimal solution that ensures that patients receive the best care possible without being submitted to undue examinations.

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APPENDIX A

Deficits and deficit categories defined by Lehman Blake et al. (2002)

Category	*Description*	*Illustrative labels encompassed under category*
Hyperaffective	heightened affective response	labile, pseudobulbar effect, hallucinations

Category	*Description*	*Illustrative labels encompassed under category*
Hypoaffective	dampened or restricted affective response	flat affect
Attention	ability to focus on stimuli; includes focused, sustained, and divided attention	Attention, concentration, distractible
Awareness	awareness of, or insight into deficits and consquences of the deficits	insight, awareness, refusal, denial
Learning/Memory	ability to learn and retain new information	learning, memory
Perception	visual and tactile perception and construction	visuoperception (includes perception & construction), agraphesthesia
Hyperresponsive	heightened responsivity to stimuli verbosity, talkative, tangential,	impulsive, disinhibition
Hyporesponsive	dampened or restricted responsivity to stimuli	paucity of speech, slow responses, poor initiation, unelaborated speech
Linguistic	basic expressive and receptive language functions	aphasia or other language deficits, auditory comprehension, anomia, paraphasias
Orientation	orientation to self, time, situation	orientation, confusion, confabulation, right/left orientation
Reasoning & Problem solving	cognitive skills associated with identifying problems, identifying relevant information and appropriate solutions, and goal achievement	problem solving, verbal reasoning, planning, executive function, mental flexibility, abstraction, inferencing, higher cognitive deficits, perseveration, detail oriented
Other Cognitive Deficits	cognitive skills associated with organising, sequencing, categorising, and integrating information	organisation, sorting, sequencing, integration, cognitive deficits, slow processing, vague speech, poor details
Calculation	mathematical skills	calculation, money handling