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THE RELATION OF MINIMUM DATA SET RATINGS AND PERFORMANCE ON MEASURES OF LINGUISTIC COMMUNICATION AND HEARING

by

Tammy Lynn Suzanne Hopper

A Dissertation Submitted to the Faculty of the

DEPARTMENT OF SPEECH AND HEARING SCIENCES

In Partial Fulfillment of the Requirements For the Degree

of

Doctor of Philosophy

In the Graduate College

THE UNIVERSITY OF ARIZONA

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As members of the Final Examination Committee, we certify that we have read the dissertation prepared by Tammy Lynn Suzanne Hopper

entitled The Relation of Minimum Data Set Ratings and Performance on Measures of Linguistic Communication and Hearing

and recommend that it be accepted as fulfilling the dissertation requirement for the Degree of Doctor of Philosophy

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Final approval and acceptance of this dissertation is contingent upon the candidate's submission of the final copy of the dissertation to the Graduate College.

I hereby certify that I have read this dissertation prepared under my direction and recommend that it be accepted as fulfilling the dissertation requirement.

Dissertation Director
Kathryn A. Bayles — 4-10-00 Date

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ABSTRACT

The purpose of this study was to evaluate the relation between ratings on items in the Communication/Hearing Patterns section of the *Minimum Data Set for Nursing Home Resident Assessment* (MDS; Morris et al., 1990) and performance on external criterion measures of linguistic communication and hearing.

Linguistic communication was evaluated with the *Story Retelling Subtest* of the *Arizona Battery for Communication Disorders of Dementia* (ABCD; Bayles & Tomoeda, 1993) and the *Functional Linguistic communication Inventory* (FLCI; Bayles & Tomoeda, 1994). Auditory evaluation included an otoscopic check, hearing aid check (when appropriate), pure-tone hearing screening, and monitored, live-voice speech recognition testing.

Fifty-seven individuals participated in the study. All lived in long-term care facilities in southeastern Arizona and had a diagnosis of dementia.

Residents with MDS classifications of 0 (normal) scored significantly higher on the FLCI and the *Story Retelling Subtest* than did those residents classified as 1 (impaired). However, all of the participants demonstrated some impairment in linguistic communication as indicated by scores on the FLCI and the *Story Retelling Subtest*.

Individuals categorized as having adequate hearing ability on the MDS scored significantly higher on speech recognition testing than did those categorized as impaired. However, no relation was found between MDS classification of hearing function and pure-tone hearing screening results. Surprisingly, none of the individuals with MDS-identified impairments had been referred to a communication specialist for further evaluation. The implications of the results for service delivery in nursing homes are discussed.

INTRODUCTION

According to the Diagnostic and Statistical Manual of the American Psychiatric Association (1994), dementia is defined as a clinical syndrome, characterized by an acquired impairment of memory and at least one other cognitive function, without delirium or underlying psychiatric disease. In the United States, 10% of individuals over the age of 65 have a diagnosis of dementia, and by the year 2020, the number of individuals with dementia is expected to rise to 14 million (National Alzheimer's Association, 2000).

Many diseases are associated with dementia, including Lewy Body disease, multi-infarct disease, Parkinson disease, and the most common cause of irreversible dementia, Alzheimer disease. As these diseases progress, dementia severity worsens and placement in a long-term care facility is common.

For individuals with dementia who reside in nursing homes, annual and quarterly assessments of communication and hearing abilities are conducted using the *Minimum Data Set for Nursing Home Resident Assessment and Care Screening* (MDS; Morris, et al., 1990). The MDS is a federally mandated assessment measure comprising 74 items (and more than 200 sub-categories of these items) designed to provide data on a broad range of abilities. Ratings on

MDS items are used to describe a resident's functioning, to determine need for further evaluation or treatment, and to form the basis of the resident's individualized care plan.

Although some psychometric characteristics of the MDS have been reported, no data are available on the validity of items in the Communication/Hearing (hereafter C/H) section. The purpose of this project was to evaluate the relation of ratings on items 1, 4, and 6 in the C/H section of the MDS to performance on external measures of linguistic communication and hearing. The following section includes a description of the Resident Assessment Instrument (of which the MDS is a part), a review of the literature related to the psychometric characteristics of the MDS, and a discussion of the communication and hearing abilities of individuals with dementia.

The Resident Assessment Instrument

In 1987, the United States Congress passed the Omnibus Budget Reconciliation Act (OBRA, 1987). The OBRA included a set of nursing home reforms, of which one was the development of a standardized measure for evaluating the functional status of all nursing home residents participating in Medicare or Medicaid programs. Researchers under contract with the Health Care Financing Administration (HCFA) developed the Resident Assessment Instrument (RAI) to meet this need.

The RAI is the basic assessment instrument used to help improve or maintain resident function in the nursing home environment. The RAI comprises three components: utilization guidelines, a core set of items called the Minimum Data Set (MDS) and Resident Assessment Protocols (RAPs). The use of these components yield "…information about a resident's strengths, weaknesses and preferences, and offer guidance on further assessment once problems have been identified" (p. 1-3, HCFA; 1995).

The Minimum Data Set is the foundation of the RAI and consists of 74 items related to functional status in 16 domains, as follows: Cognitive Patterns, Communication/Hearing Patterns, Vision Patterns, Mood and Behavior Patterns, Psychosocial Well-Being, Physical Functioning and Structural Problems, Continence, Disease Diagnoses, Health Conditions, Oral/Nutritional Status, Oral/Dental Status, Skin Condition, Activity Pursuit Patterns, Medications, Special Treatments and Procedures, and Discharge Potential. Each item is scored using either a dichotomous (impaired/normal) or ordinal rating (e.g., normal/mildly impaired/moderately impaired/severely impaired). A nurse, trained in the use of the MDS, coordinates the completion of the assessment in collaboration with staff and family caregivers.

The MDS is completed for each nursing home resident at admission, quarterly, annually, and whenever a significant change in condition occurs. An abbreviated form of the full MDS is used for quarterly evaluations. The MDS is used in conjunction with the Resident Assessment Protocols (RAPs) to provide a comprehensive assessment. The RAPs are completed if "triggers" are noted on specific MDS items.

Triggers are MDS scores in certain areas that indicate a resident is at risk "for developing specific functional problems…," that may "require further evaluation using the Resident Assessment Protocols…" (p. 2-3, HCFA, 1995). For example, for item 1, Hearing, in the C/H Patterns section, "0" is assigned for adequate or normal functioning, and scores of "1", "2" and "3" are used to signify increasing levels of impairment (see Table 1). If a score of 1, 2, or 3 is used to describe a resident's hearing function, then a "Communication RAP" is triggered. Other items in this section for which scores of 1, 2, or 3 trigger a RAP are items 4 (Making self understood) and 6 (Ability to understand others). Scores on other items in this section, such as item 5 (Speech Clarity), do not trigger a RAP.

Table 1. Items 1, 4 and 6 in the communication/hearing patterns section

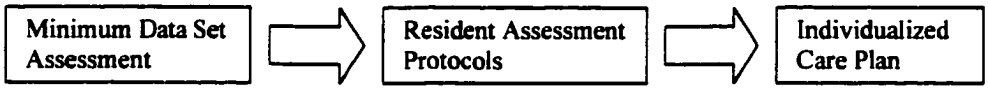
MDS Item	Possible Scores
1. Hearing	(With hearing appliance, if used) 0. Hears Adequately - normal talk, TV, phone 1. Minimal Difficulty - when not in quiet setting 2. Hears in Special Situations Only - speaker has to adjust tonal quality and speak distinctly 3. Highly Impaired - absence of useful hearing
4. Making Self Understood	(Expressing information content, however able) 0. Understood 1. Usually Understood - difficulty finding words or finishing thoughts 2. Sometimes Understood - ability is limited to making concrete requests 3. Rarely/Never Understood
6. Ability to Understand Others	(Understanding verbal information content, however able) 0. Understands 1. Usually Understands - may miss some part/intent of message 2. Sometimes Understands - responds adequately to simple direct communication 3. Rarely/Never Understands

RAPs are used to provide additional details about a resident's "strengths, problems, and needs" in a particular domain (p.2-28; HCFA, 1995). Based on MDS results and RAP summaries, the care plan team decides whether the "triggered condition…warrants a care plan intervention." (p. 4-5, HCFA, 1995).

The care plan is a structured intervention plan based on an individual's strengths, needs, and preferences (HCFA, 1995). The specific format of the care plan may vary across facilities, but it must include objectives or goals, interventions to achieve stated goals, and a specified time in which the goals should be met. The intent of "care planning" is to facilitate the highest practicable level of function for every resident in long-term care (OBRA, 1987).

In summary, the RAI consists of the MDS and the RAPs. The MDS is a basic assessment tool used to identify a resident's functional status. RAPs are used to address MDS-identified problems (triggers) with descriptions of causes, risks, and other pertinent information that may help to guide an intervention plan. Finally, a care plan containing goals and treatment approaches is developed. The relation between the components of the RAI and the care plan is shown in Figure 1.

Figure 1. The RAI and care plan process



Given the central role of the MDS in characterizing communication abilities, and because it forms the basis for referrals and care plans for all individuals living in nursing homes, more information is needed about the psychometric characteristics of the measure. The following section is a review of the literature related to reliability and validity of the MDS.

Reliability of the MDS

In the context of assessment, reliability refers to the consistency or dependability of test scores over time and across different testing conditions (Anastasi, 1988). Intra-rater reliability is assessed by one judge who completes the same assessment at two points in time. Two or more judges who complete the same set of assessment items concurrently obtain inter-rater reliability. The correspondence between the two testings is reported as a reliability coefficient. Most studies of MDS reliability have been based upon inter-rater evaluations.

Hawes et al., (1995) conducted a study in which nursing home residents in several states were randomly selected to receive assessments by two trained nurse

assessors. Spearman-Brown intraclass correlation coefficients were used to estimate reliability, with values of 0.4 and above considered to reflect "adequate" reliability, and values of 0.7 or above as indicative of "excellent" inter-rater reliability. Based on the results, the investigators concluded that "89% of the items in the final version of the MDS achieved a correlation of 0.4 or higher" and "63% achieved 0.6 or higher." (p. 174). Hearing and "understanding" (i.e., understanding others and making self understood) were rated as having reliability estimates of .84 and .66, respectively.

In 1997, Sgadari and colleagues conducted a study to investigate the inter-rater reliability of several items on the MDS. Facilities in seven countries served as sites for data collection. At each site, two nurses, trained by the investigators, concurrently completed the MDS assessments. Reliability was calculated using the weighted **k** (Kappa) coefficient. The k statistic was described by the investigators as assuming values between -1.0 and 1.0, with negative agreement being poorer than chance, positive agreement being better than chance, and 1 indicating perfect agreement. Adequate reliability for an item was defined as $\mathbf{k} \geq 0.4$, and excellent reliability as $\mathbf{k} \geq 0.75$. Sgadari et al. (1997) reported adequate reliability ($\mathbf{k}$ = .40 to .75) for 76 to 97% of the more than 300 items tested at

the seven international sites. In six countries, including the United States, hearing and communication/understanding items were rated as having adequate inter-rater reliability ($k > 0.4$).

Casten et al. (1998) extended the results of Hawes et al. (1995) and Sgadari and colleagues (1997) by providing reliability estimates for MDS items as used in "everyday practice," rather than as part of a highly structured research protocol. Two assessments were conducted by nurses trained in the use of the MDS according to HCFA guidelines. Neither had additional training on how to administer the items. For items related to Cognition, Activities of Daily Living (ADL), Time Use, Social Quality, Depression, and Problem Behavior, correlations ranged from $k = 0.61$ to 0.84 (adequate to excellent reliability).

In summary, several investigators have reported adequate inter-rater reliability for MDS items in general, and C/H items in particular. However, inter-rater reliability may be adversely affected if residents have cognitive impairments. In a study of 147 nursing home residents (84 with cognitive impairment and 63 categorized as cognitively intact), Phillips et al. (1993) found that assessments were significantly less reliable for residents with cognitive deficits. The authors explained that the reliability of those items requiring subjective assessment

decisions (e.g., communication and hearing) were more affected by cognitive status.

Validity of the MDS

Anastasi (1988) defines validity as a measure of "*what* [a] test measures and *how well* it does so." (p. 139). The term validity encompasses content, construct, and criterion-related validity. Content validity, as its name implies, is the degree to which the items of a test actually reflect the specific domain of content (Carmines & Zeller, 1979). Construct validity refers to "the extent to which a test may be said to measure a theoretical construct or trait" (Anastasi, 1988; p. 153). Criterion-related validation involves the comparison of test scores or performance against an external criterion, "a direct and independent measure of that which the test is designed to predict" (Anastasi, 1988; p. 145). The correspondence between the test and the external criterion is used to demonstrate the presence or absence of criterion-related validity (Carmines & Zeller, 1979). Criterion-related validity can be established as predictive or concurrent validity, depending on the time relation between the criterion and the test (Anastasi, 1988). Concurrent validity is the type most commonly reported in research related to the MDS.

Lawton et al. (1998) evaluated the concurrent validity of certain MDS sections against external criterion measures. Nursing home residents with dementia were evaluated with the MDS. Composite scores in the areas of Cognition, ADL, Time Use, Social Quality, Depression, and Problem Behaviors were compared to several criterion measures including two brief cognitive assessments, ADL and activity participation scales, depression, behavioral functioning, and social interaction measures. The validity coefficients obtained in the analyses were significant in every case, although the absolute size of many of the correlations was small.

Validity coefficients were higher in a study conducted by Frederiksen et al. (1996). Using a brief form of the MDS called the *Minimum Data Set Plus* (MDS+), the investigators evaluated the concurrent validity of the following sections: Cognition, Behavior Problems and Mood State, Communication, and ADL Functional/Rehabilitation Potential. MDS+ scores were composites of trigger items in each domain. Several external assessments were administered, including mental status, psychiatric, mood, and ADL measures.

Pearson correlations were high (r =.50 to .85) between Cognition, Communication, and ADL Functioning subscales and criterion measures, with smaller, yet still

significant correlations between performance on external measures and scores on both the Behavior Problems (.54 and .51), and Mood State (.20) sections. The investigators concluded that the items in all sections except Mood State had adequate concurrent validity.

In 1999, Snowden and colleagues used Spearman correlation coefficients to compare MDS scores in cognition, behavior, and ADL to related external criterion measures. "Modest" validity coefficients were obtained (.45 for cognition; .50 for behavior; .59 for ADL functioning), with the authors concluding adequate validity of the studied MDS areas.

Currently, no other published studies exist in which the validity of items in the C/H section of the MDS is evaluated. The aforementioned studies are insufficient to answer questions of criterion-related validity of the C/H section for several reasons. First, in the Lawton et al. (1998) and Snowden et al. (1999) studies, items in the C/H section were not included in the validity analyses. Second, in the Frederiksen et al. (1996) study, no comparison was made between scores in the C/H section and external measures of communication or hearing. Third, the specific MDS Communication items used in the analyses in the Frederiksen et al. (1996) study were not detailed.

Finally, none of the investigators examined the validity of the Hearing item in the C/H section of the MDS.

Currently, clinicians do not know if the MDS can be used to describe residents' communication and hearing status accurately. Criterion-related validity is an important issue because of the large number of nursing home residents with dementia and communication and hearing impairment.

Linguistic Communication and Dementia

Although different diseases can cause irreversible dementia, the diagnostic criteria for dementia remain the same across disease types. Specifically, a patient must have multiple cognitive deficits that include both 1) evidence of short and long-term memory impairment, and 2) at least one of the following conditions: aphasia, apraxia, agnosia, or impaired executive functioning. These deficits must result in significant problems with employment and social functioning and not occur exclusively with delirium (DSM-IV; American Psychiatric Association, 1994).

The characteristic memory impairments exhibited by individuals with dementia result in linguistic communication deficits. This relation is well documented in the literature on individuals with Alzheimer disease (AD) (Bayles, 1982; Hier et al., 1985; Murdoch et al., 1987; Schwartz et al., 1979).

In the mild stages of the disease, phonology and syntax are relatively preserved, with individuals able to understand and produce syntactically complex utterances (Bayles & Kaszniak, 1987). However, semantic aspects of linguistic communication are impaired. Conceptual errors are made in written and spoken discourse but are subtle and frequently overlooked (Bayles & Kaszniak, 1987). Even in the mild stage of AD, individuals demonstrate deficits in functional communication abilities (Fromm & Holland, 1989).

As the disease progresses through the moderate and severe stages, significant cognitive deterioration continues. Working and episodic memory systems become increasingly impaired, causing greater problems in communication. The disruption of semantic memory continues, leading to increased difficulty in verbal naming, reading comprehension, and linguistic reasoning (Bayles & Kaszniak, 1987). In the final stages of AD, patients typically demonstrate little meaningful communication. When dementia occurs with Parkinson disease (PD), the decline in cognition and communication is similar, yet more gradual (Bayles et al., 1996; Levin & Tomer, 1992).

Despite progressive deterioration in cognition, individuals with dementia may retain certain communication abilities at different stages of dementia severity.

Individuals with moderate AD, for example, often can repeat words, carry on short conversations, read aloud and write. Some individuals with severe dementia can provide an appropriate verbal response to a greeting, shake hands, state their own names when asked, and correct misinformation (Bayles & Tomoeda, 1994). A thorough evaluation of communication is necessary for caregivers to capitalize on these spared abilities and help patients maintain the highest level of functioning possible throughout the disease course.

Hearing and Dementia

Sensory deficits such as hearing loss also affect the functioning of dementia patients. Generally, the prevalence of hearing loss is high among elderly individuals. According to Gates and colleagues (1995), 30% of individuals aged 65 to 74 and 50% or more of individuals older than 75 years have hearing loss. The prevalence may be even higher among individuals residing in nursing homes.

Voeks et al. (1990) reported that 76% of the nursing home residents who were assessed had a hearing loss. This finding was consistent with results of an earlier study by Schow and Nerbonne (1980) in which 70 - 80% of nursing home residents tested had a hearing impairment. Among nursing home residents diagnosed with dementia, Weinstein and Amsel (1986) reported that 83% had a hearing impairment.

Although prevalence estimates vary as a result of the criteria used to determine hearing status, a large percentage of individuals who reside in nursing homes have some degree of hearing loss.

The negative impact of hearing loss on the health and well-being of nursing home residents is well documented (Weinstein, 1993). For older adults with intact cognitive functioning, hearing loss is reported to cause feelings of decreased self-confidence (Tanner, 1980) and a tendency to withdraw from social situations (Garstecki & Erler, 1996). Individuals with dementia and hearing loss may experience the same feelings, along with depression, isolation, and frustration.

Summary

The MDS is the primary assessment measure used to determine communication and hearing function of nursing home residents with dementia. Although the inter-rater reliability of data from the C/H section of the MDS has been reported, no information exists on the relation of ratings on C/H items to standardized measures of linguistic communication and hearing. Given the impact of communication and hearing deficits on the quality of life of nursing home residents, and the central role of the MDS in determining referrals to communication specialists,

validity of data obtained with these items must be evaluated.

The present study was designed to assess the relation between scores on items in the C/H section of the MDS and performance on external measures of linguistic communication and hearing. Scores on items 1 (Hearing), 4 (Making self understood), and 6 (Ability to understand others) in the C/H section of the MDS were compared with scores on external communication and hearing assessments. External measures included the *Functional Linguistic Communication Inventory* (FLCI; Bayles & Tomoeda, 1994), the Story Retelling Subtest of the *Arizona Battery for Communication Disorders of Dementia* (ABCD; Bayles & Tomoeda, 1993), a pure-tone hearing screening and a speech recognition test. These comparisons were used to determine the validity of the MDS for characterizing the functional communication and hearing abilities of nursing home residents with dementia.

Research Hypotheses

The following hypotheses were tested:

Hypothesis 1. The relation between MDS language expression and comprehension scores for individuals with dementia and scores on tests of linguistic function is such that:

a) **Ho**: Individuals classified by MDS score of 0 (normal) do not have significantly higher scores on the FLCI

(Bayles & Tomoeda, 1994) than those with scores of 1/2/3 (impaired).

Ha: Individuals classified by MDS score of 0 (normal) have significantly higher scores on the FLCI (Bayles & Tomoeda, 1994) than those with scores of 1/2/3 (impaired).

b) **Ho:** Individuals classified by MDS score of 0 (normal) do not have significantly higher scores on the *Story Retelling Subtest* of the *ABCD* (Bayles & Tomoeda, 1993) than those with scores of 1/2/3 (impaired).

Ha: Individuals classified by MDS score of 0 (normal) have significantly higher scores on the *Story Retelling Subtest* of the *ABCD* (Bayles & Tomoeda, 1993) than those with scores of 1/2/3 (impaired).

Hypothesis 2. The relation between MDS hearing scores for individuals with dementia and pure-tone hearing screening results is such that:

Ho: No significant relation exists between MDS rating (0=normal; 1=impaired) and hearing screening results (pass; fail).

Ha: A significant relation exists between MDS scores (0,1) and hearing screening results (pass, fail).

Hypothesis 3. The relation between communication/hearing status and referral outcome is such that:

Ho: Individuals with MDS-identified impairments are not referred to speech-language pathology or audiology.

Ha: Individuals with MDS-identified impairments are referred to speech-language pathology or audiology.

METHODS

Participants

Fifty-seven individuals with dementia participated in the study, 44 women and 13 men whose average age was 84.4 years. The presence of cognitive impairment was verified through administration of the *Mini-Mental State Examination* (MMSE; Folstein, et al., 1975). The mean MMSE score for the sample was 12.9/30, with a range of 1 to 24. Demographic characteristics of the subject sample are presented in Table 2.

Participants were recruited from five skilled-nursing facilities in southeastern Arizona that are all owned by the same company. All residents with a diagnosis of dementia were considered for participation (n=217). However, potential participants were excluded under the following conditions: a) if informed consent could not be obtained from the legal guardian (n=53), b) if the individual refused to participate (n=5), c) if the resident had a history of recent combative behavior according to nursing staff (n=23), or d) if they were unresponsive to the investigator's communicative attempts (n=76). Based on these exclusion criteria, sixty individuals were selected for participation. However, three were deselected; two because their mental status scores on the *Mini-Mental State Examination* (MMSE; Folstein, et al., 1975) were above the

cut-off for dementia (Tombaugh & McIntyre, 1992), and one because she was unable to complete the MMSE due to non-fluent aphasia.

Table 2. Demographic characteristics of study participants

Variables	Results
Gender	
Men	13
Women	44
Age (years)	
M	84.4
SD	7.7
MMSE	
M	12.9
SD	5.4
Dementia Type	
"Dementia"	24
Alzheimer disease	17
Organic brain syndrome	9
Parkinson disease	5
Alcoholic dementia	1
Multi-infarct dementia	1
Ethnicity	
Caucasian	54
Hispanic	1
Native American	2

M = Mean; SD = Standard Deviation

Procedures

The study involved testing each participant's hearing and communication abilities and comparing the results to

ratings on items 1, 4, and 6 in the C/H section of their MDS assessment. Prior to testing, the investigator reviewed each participant's chart for the following information: primary medical diagnoses, secondary diagnoses and medications. The investigator did not know the MDS scores at the time of testing; however, a nurse provided dates of the most recent and annual MDS evaluations.

To control for error introduced by lengthy time periods between MDS and research assessments, only subjects whose hearing testing was completed within 6 months of the annual MDS evaluation were selected. ASHA (1997) recommends screening for hearing impairment every 3 years for individuals over the age of 50, suggesting that, in the absence of a significant change in medical condition, little change is expected in hearing sensitivity in a period of 6 months.

Testing of linguistic communication always occurred within 8 weeks or less of the most recent MDS assessment. There is no reason to believe that a significant decline in linguistic communication would occur in this period of time. Although rate of deterioration of linguistic communication ability is variable among individuals with dementia, Bayles et al. (1999) reported no significant change in performance among moderate AD patients on 10/14 measures of linguistic communication over a two-year

period. Furthermore, under a rate of progression model for deterioration in linguistic communication, Bayles and colleagues (1993) reported that individuals with AD may take approximately 5-6 years to decline to nonfunctional performance on communication measures. (See Holland and Reinmuth, 1998 for an exception to this pattern of decline in an individual with AD). Cognitive decline also was reported as being gradual among individuals with PD and dementia (Bayles et al., 1996). In the present study, all participants had been diagnosed with dementia for at least 6 months, with no record of acute decline in function according to nursing staff or family caregivers.

Testing Protocol

The investigator followed a standard protocol for assessing auditory function, determining severity of dementia, and evaluating linguistic communication abilities. These procedures are detailed in the following section.

Assessment of Auditory Function

Testing was conducted in a quiet room. Noise level measurements were made in potential testing rooms to determine suitability for hearing screenings. In each testing room, noise levels were below maximum permissible ambient noise levels (MPANLs) for hearing screening at 25

dB HL (i.e., 51.5 dB SPL at 1000 Hz; 53.0 dB SPL at 2000 Hz; 59.5 dB SPL at 4000 Hz) (ASHA, 1997).

The first step in the protocol was an otoscopic check, to ensure that ear canals were not occluded. Bingea et al. (1982) and Mahoney (1993) found that between 25% and 39% of nursing home residents have impacted cerumen. If the tympanic membrane could be visualized in both ears, then testing proceeded. If the external canals were occluded, then the subject was referred to the nurse with recommendations for cleaning, and hearing testing was conducted at a later date. Six participants were referred for cleaning before testing was conducted.

If the participant had a hearing aid, an inspection and listening check were conducted using the procedures described in Appendix A. The condition of the hearing aid was noted, battery replaced as necessary, and testing continued. Five participants had hearing aids. Two individuals wore their hearing aids regularly, and these aids were in good working condition at the time of testing. Of the remaining three individuals, one had lost her hearing aids, one refused to wear her hearing aid, and one had a hearing aid that did not work.

The next step was a pure-tone hearing screening. A portable audiometer with TDH-50 earphones, calibrated

according to the American National Standard Specification for Audiometers (ANSI, 1996), was used for testing.

Before each screening, the investigator presented a tone at 50 to 60 dB at 1000 Hz to either ear to orient the subject to the task. Once the individual demonstrated an understanding of the task (by responding appropriately to the practice tones), the screening was initiated.

Pure-tone air conduction stimuli were presented at 25 dB HL at 1, 2, and 4 kHz in each ear. Each participant was instructed to respond verbally "whenever [you] hear a beeping sound." Most individuals responded by saying "there it is," "softer," "a little bit," "faint now," for a positive response, and "nothing," or "I don't hear a thing" for a negative response. Several of the more severely demented participants (n=5) needed reminders such as "listen for the sounds" to remain attentive to the task. One participant responded by looking towards the examiner whenever a sound was presented; she frequently mimicked the sound of the stimuli, saying "beep, beep, beep."

Using the American Speech-Language-Hearing Association (ASHA, 1997) guidelines for screening for hearing impairment in adults, individuals passed the screening if responses were obtained at all frequencies in both ears. Participants were considered to have failed the screening, if no response was observed to any frequency in either ear.

The final step in the hearing protocol was speech recognition testing. The two individuals with working hearing aids wore them during this portion of the test. They were instructed to set the volume control of their aids for conversational level speech. The other three participants with hearing aids that could not be used were not aided during this portion of the testing. The *AB Isophonemic Word Lists* (Boothroyd, 1968) were used to test speech recognition. The test consists of fifteen 10-word lists, each comprising the same 30 phonemes, 10 vowels, and 20 consonants (Markides, 1997).

For each participant, two lists were randomly chosen from among the 15. The investigator presented one list face-to-face and one list in an auditory-only modality (i.e., with the examiner's face out of the participant's view.) A sound level meter was used to monitor the live-voice presentation level of the stimuli, ensuring consistent presentation at 60 dB SPL, +/- 5 dB SPL. The investigator and participant sat 4 feet (1.2 meters) apart, with the sound level meter positioned approximately 6 inches (15 centimeters) from the investigator. The subjects were instructed to repeat the words that they heard the investigator say. Any incorrect repetition or word for which a subject requested repetition was counted as an incorrect response. Half of the subjects received

the face-to-face administration first, and half received the auditory-only administration first to control for order effects.

Following hearing testing, several tests were administered to quantify dementia severity and evaluate linguistic communication. Based on the results of the hearing evaluation, the investigator compensated for any observed hearing difficulty. This was accomplished by (a) having participants wear their hearing aids (n=2), (b) having participants wear an assistive listening device (n=33), or (c) having the investigator increase voice loudness level as necessary (n = 22). Individuals were provided an assistive listening device (Amplified Personal Stereo Listener Model 331093 by Optimus) if they had speech recognition (face-to-face) scores of less than 8/10 (80%).

Quantification of Dementia Severity

To verify the presence of dementia, the *Mini-Mental State Examination* (MMSE; Folstein, et al., 1975) was administered to all participants. The MMSE is a widely used mental status examination comprising 11 questions and 30 possible points. Scores below 24 are considered abnormal (Tombaugh and McIntyre, 1992); however, other investigators have argued that scores of 24 to 26 also indicate questionable mental status (Azuma et al., 1997). The MMSE has been reported to have good levels of

reliability and validity (Farber et al., 1988; Foreman, 1987).

To determine dementia severity, ratings on the *Global Deterioration Scale* (GDS; Reisberg, et al., 1982) were used. The GDS is an observation-based rating scale of dementia severity, with seven stages that include descriptions of deficits and abilities typical at different stages of disease progression. Each participant's dementia severity was staged following completion of the testing protocol, based on investigator observation and staff report. For example, staff members provided information on activities of daily living such as toileting, ambulation and dressing, and the investigator reviewed the medical chart and assessment results to determine cognitive and language abilities.

Evaluation of Linguistic Communication

The *Story Retelling Subtest* (Immediate) of the ABCD (Bayles & Tomoeda, 1993) was administered after the MMSE. In this test, subjects are asked to tell a short story immediately after hearing it. The Story Retelling Subtest takes approximately 5 minutes to administer and has high sensitivity (95%) and specificity (92%) (Bayles & Tomoeda, 1998). During standardization, the authors administered the subtest approximately one week after initial testing and

reported high test-retest reliability (r^2= .50; p(concordance)= .79).

To determine criterion-related validity, results from the *Story Retelling Subtest* (Immediate) were compared to scores on three accepted measures of dementia severity: the *Mini-Mental State Examination* (MMSE; Folstein et al., 1975), the *Global Deterioration Scale* (GDS; Reisberg, et al., 1982), and the *Block Design Subtest* of the *Wechsler Adult Intelligence Scale* (WAIS; Wechsler, 1981). Performance on the Story Retelling Subtest (Immediate) was highly correlated with scores on these three tests (p(of concordance)= .74, .75, and .71) (Bayles & Tomoeda, 1993).

The *Story Retelling Subtest* is a verbal episodic memory test, and was chosen as a measure of linguistic communication because normal performance requires the ability to comprehend and verbally express spoken material. Individuals with episodic memory impairment and poor performance on the *Story Retelling Subtest* likely have difficulty with comprehension and expression of spoken language in everyday contexts.

Additionally, the *Story Retelling Subtest* was used in this study because it has been used extensively in research with normal and demented individuals, yielding a large database of results. The scores of elderly individuals with no cognitive impairment and those with mild and

moderate AD from the standardization sample are shown in Table 3.

Table 3. Scores on the Story Retelling Subtest (Immediate) for normal elderly, mild and moderate AD patients from the standardization study of the ABCD

Story Retelling Subtest (Immediate) Scores	Normal Elderly Individuals	Mild AD Patients	Moderate AD Patients
M	14.0	7.3	2.6
SD	2.8	4.1	3.0

Following administration of the *Story Retelling Subtest*, the *Functional Linguistic Communication Inventory* (FLCI; Bayles & Tomoeda, 1994) was administered to determine linguistic communication abilities. The FLCI has ten components that allow quantification of communication; Greeting and Naming, Question Answering, Writing, Comprehension of Signs and Object-to-Picture Matching, Word Reading and Comprehension, Reminiscing, Following Commands, Pantomime, Gesture, and Conversation. The test is useful for characterizing the functional abilities of individuals in moderate to severe stages of dementia.

The FLCI was standardized on 40 individuals with probable AD diagnosed according to the NINCDS-ADRDA diagnostic criteria (McKhann et al., 1984). Within the

standardization sample, test-retest reliability was high for all subtests (ranging from P(concordance)= .69 to .92). Concurrent validity was established by comparing performance on the FLCI to performance on the *Arizona Battery for Communication Disorders of Dementia* (Bayles & Tomoeda, 1993). A strong, positive correlation was reported (r= .78) between the two measures (Bayles & Tomoeda, 1994).

At the completion of testing, the investigator recorded the MDS scores from each participant's medical chart. These MDS scores were then compared statistically to results from the communication and hearing evaluations.

MDS Scores

One nurse in each facility coordinated the MDS assessment. Known as "MDS Coordinators," these nurses completed the MDS according to HCFA guidelines and were certified to complete the MDS through a comprehensive training process that involved instruction, practice with clinical case examples, and completion of proficiency evaluations.

Reliability

To obtain an estimate of inter-rater reliability, 25% of the speech recognition, MMSE, Story Retelling, and the FLCI administrations were scored simultaneously by the investigator and another person. Point-to-point

reliability was calculated for individual test items and high levels of agreement were obtained (96 to 99%) (Table 4).

Table 4. Point-to-point reliability for dependent measures

Measure	Percent Agreement
Speech Recognition: Face-to-Face	98%
Speech Recognition: Auditory-Only	96%
MMSE	99%
Story Retelling Subtest	99%
FLCI	99%

RESULTS

Linguistic Communication

If MDS ratings on items related to linguistic communication are valid indicators of communication function, then a significant difference in communication abilities should exist between individuals rated on the MDS as normal and impaired. To determine the relation of ratings on MDS items 4 and 6 to scores on measures of linguistic communication, individuals were categorized into one of two groups based on their MDS ratings. Performances on the FLCI (Bayles & Tomoeda, 1994) and the *Story Retelling Subtest* of the ABCD (Bayles & Tomoeda, 1993) were then compared between the two groups.

The MDS ratings on items 4 and 6 were used as the grouping variable, with two levels: 0 or 1. The "0" group comprised residents who were rated by the MDS Coordinator as having normal communication abilities. The "1" group comprised residents who were judged as having some degree of impairment in linguistic communication (i.e., scores of 1, 2, and 3). This dichotomous classification was chosen for two reasons. First, scores of 1, 2 and 3 result in the same outcome in the resident assessment process, with any score triggering a RAP. Second, few subjects in the sample had scores of 2 or 3 on items related to linguistic

comprehension (n=16) and expression (n=9), making it difficult to group individuals based on these scores.

For purposes of analysis, scores on MDS items 4 and 6 were analyzed as one variable: linguistic communication. If participants had a score of 1, 2, or 3 on either or both items, they were assigned a "1". If participants had a score of 0 on both items 4 and 6, they were assigned a "0". Characteristics of the "0" and "1" groups are presented in Table 5.

Table 5. Characteristics of MDS groups

	MDS "0" Group (n=26)	MDS "1" Group (n=31)
Gender		
Male	9	4
Female	17	27
MMSE		
Mean	16.92	9.58
SD	3.77	4.05
Dementia Type		
"Dementia"	11	13
Alzheimer disease	7	10
Organic brain syndrome	4	5
Parkinson disease	3	2
Multi-infarct dementia	0	1
Alcoholic dementia	1	0

One-tailed *t* tests for independent means were conducted to determine the difference between the "normal" and "impaired" groups on the two dependent measures, the *Story Retelling Subtest* of the ABCD (Bayles & Tomoeda, 1993) and the FLCI (Bayles & Tomoeda, 1994). Prior to the analyses, data were reviewed to ensure that statistical assumptions for the use of *t* tests were not violated. If homogeneity of variances could not be assumed, then a *t* statistic based on the assumption of unequal variances was used.

For all of the statistical analyses, $p = 0.05$ was used as the level of significance. However, to control for increased Type I error associated with multiple tests, the Bonferroni technique was used. Specifically, *p* values associated with multiple *t* tests for language and hearing had to be less than or equal to 0.0125 (0.05/4) to be considered significant.

Results of the *t* tests are presented in Table 6. The group rated as having normal communication abilities (0) on the MDS had significantly higher scores on the FLCI than did the group rated as having impaired linguistic communication, [t (47.2) = 6.494, p = .000]. Additionally, the "normal" group scored significantly higher on the *Story Retelling Subtest* than did the "impaired" group, [t (55) = 4.069, p = .000]. Based on these results, the null

hypothesis of no significant difference in scores on language measures between MDS groups was rejected.

Table 6. *t*-test comparison of MDS groups on the FLCI and *Story Retelling Subtest*

	MDS "0" (n=26)	MDS "1" (n=31)		
	Mean SD	Mean SD	*t*	*p*
FLCI Total Score	70.69 9.01	47.87 16.91	6.49	.000
Story Retelling Subtest Total Score	7.73 3.96	3.68 3.56	4.07	.000

Hearing

The auditory testing protocol was followed for all 57 participants. However, only 44 participants had received their most recent annual MDS assessment within 6 months of the hearing assessments. Therefore, results related to hearing are based on a sample size of 44.

The second hypothesis tested was the relation between MDS hearing ratings (0 or 1) and pure-tone screening results (0=fail; 1=pass). For comparison of pure-tone hearing screening results and MDS classification, four additional individuals were excluded from the analysis

(n=40). These four individuals had been fitted with hearing aids, and their MDS classification was based on hearing ability while wearing hearing aids, whereas the hearing screening was conducted without hearing aids in place.

The planned analysis included construction of a 2x2 contingency table and application of the chi-square statistic to determine the relation between the variables. However, no participant passed the hearing screening. Clearly, no significant relation existed between hearing screening results and MDS classification and a chi-square analysis was not performed.

Further analyses were conducted using results of the speech recognition protocol. Individuals were tested in two conditions: seated face-to-face with the examiner, and seated with the examiner's face concealed. The four participants with hearing aids were included in the analyses (n=44). Of these 44 participants, 31 were classified as having normal hearing on the MDS ("0") and 13 were classified as having impaired hearing ("1").

The relation between MDS group status (0 or 1) and speech recognition performance in both modalities was analyzed using independent samples *t* tests. As mentioned previously, data were screened and the Bonferroni method

was used to correct for increased risk of Type I error associated with multiple statistical analyses ($p = 0.05/4 - 0.0125$). If MDS hearing ratings are accurate indicators of hearing function, then a significant difference in speech recognition performance is expected between the two groups.

Indeed, a significant difference in speech recognition ability was found (see Table 7.) Individuals classified as having adequate hearing scored significantly higher in the face-to-face condition [t (42) = 2.953, p = .005], and in the auditory-only condition [t (41) = 2.937, p = .005] as compared to those with MDS-identified impairments.

Table 7. t-test comparisons for MDS groups on speech recognition tests

	MDS "0" (n=31 Face-to-Face) (n=30 Auditory-Only)*	MDS "1" (n=13)		
	Mean SD	Mean SD	t	p
Face-to-Face Testing	6.16 2.61	3.69 2.32	2.95	.005
Auditory-Only Testing	4.23 2.71	1.77 2.01	2.94	.005

*One individual could not complete the auditory-only testing.

Referrals

Examination of referrals to speech-language pathology or audiology for residents with MDS-identified communication or hearing problems also was conducted. With regard to linguistic communication, 31/57 (54%) of the participants had scores indicating impairment in either linguistic expression (n=2), comprehension (n=9), or both (n=20). Of the 44 participants whose results were analyzed in the hearing section, 13/44 (29%) had a classification of "impaired" hearing on the MDS. Despite these identified deficits, none of the residents was referred to speech-language pathology or audiology.

DISCUSSION

Of primary interest in this study was the relation between MDS ratings of communication and hearing function and scores on external criterion measures. Of secondary interest was the outcome of the MDS assessment.

MDS Ratings and Performance on External Measures of Linguistic Communication

Fifty-seven participants with dementia were rated by nurses as having normal (n=26) or impaired (n=31) linguistic communication on items 4 and 6 in the Communication/Hearing Patterns section of the MDS. The group of 26 individuals with MDS scores of "normal" (0) scored significantly higher on the *Story Retelling Subtest* of the ABCD (Bayles & Tomoeda, 1993) and on the FLCI (Bayles & Tomoeda, 1994) than did the group of 31 individuals who were classified as "impaired" (1,2, or 3). However, the label of "normal" linguistic communication is problematic for individuals with dementia. In fact, evidence exists to support that the participants in this study did not have normal linguistic communication abilities.

First, performance of the group rated as "0" (normal) on the MDS was below normal on the FLCI (Bayles & Tomoeda, 1994). The FLCI was designed to characterize the functional communication abilities of individuals with

moderate to severe dementia, and is not intended for use with normal individuals who would perform at ceiling. Yet, none of the participants who were rated as "normal" on the MDS achieved 100% correct on the FLCI. In fact, the average FLCI score of these participants was 70.69/86, with a range of 46 to 83.

Second, performance by the MDS "normal" group on the *Story Retelling Subtest* of the ABCD (Bayles & Tomoeda, 1993) was not within the normal range. The average score achieved by the "normal" group was 7.73/17, whereas individuals without cognitive deficits achieve scores of $\geq$ 14/17 (Bayles & Tomoeda, 1993). Further, the mean MMSE score for the participants classified as normal by MDS rating was 16.92, with a range of 12 to 24. This range of scores is typical of individuals with moderate (0 - 15) and mild dementia (16 - 23) (Tombaugh & McIntyre, 1992).

These verbal episodic memory deficits and general cognitive impairment have adverse effects on linguistic comprehension and expression that are apparent in everyday contexts. Several researchers have demonstrated that individuals with mild to moderate dementia have difficulty reading and writing (Fromm & Holland, 1989), following commands (Kempler et al., 1998), expressing intentions (Bayles & Kaszniak, 1987), and carrying on a conversation (Orange et al., 1996).

Based on evidence from this study and the published literature, assigning an MDS rating that indicates normal communicative functioning may be inappropriate for people with dementia. However, what nursing home professionals think is "normal" linguistic communication may be related to their definition of communication.

The definition of "functional" communication in medical settings generally relates to a person's ability to meet basic needs, such as hunger, thirst, or pain. Other purposes of communication, such as social interaction, may not be considered when rating residents' linguistic communication abilities. Although meeting basic needs is crucial in any setting, most nursing home residents with dementia engage in a daily routine in which basic needs are anticipated and met. The social needs of the resident with dementia are less likely to be addressed, and may not be recognized by staff.

Researchers have shown that residents with moderate to severe dementia have few opportunities to interact with caregivers who understand how to facilitate meaningful communication (Armstrong-Esther & Browne, 1986; Hallberg, et al., 1990). These researchers describe social interaction between staff members and nursing home residents with dementia as minimal, unidirectional, and lacking personal relevance. With little attention given to

social interaction in the nursing home environment, staff members' judgments of communicative competence may be restricted to situations in which only basic needs are considered.

MDS Ratings and Performance on External Measures of Hearing

Participants with an MDS hearing rating of "0" scored significantly higher on speech recognition tests than did those who were classified as hearing impaired. However, when the pure-tone hearing screening was used as the external criterion measure, no relation was found between MDS classification and hearing screening results.

None of the participants who had pure tone hearing screenings could be characterized as having adequate hearing ability. Whereas all of the participants failed the screening, the majority (n=31) were classified as having normal hearing on the MDS. This result is in accordance with previous researchers' findings that nursing assessments of hearing loss are not as accurate as hearing loss measured by audiometry, and that the majority of individuals with hearing loss have no institutional documentation of the problem (Garahan, et al. 1992). The reasons for the discrepancy between actual hearing function and MDS rating that were apparent in this study are unclear. However, conversations with nursing staff revealed several possible explanations.

First, nursing staff may be accustomed to the high prevalence of hearing loss among nursing home residents. As a result, they may consider hearing to be "adequate" even when individuals miss some part of a message in normal conversation. Furthermore, nurses and other staff members may automatically increase the loudness level of their speech when interacting with residents. This compensation may mask the deficits that would be more apparent if nurses spoke at normal conversational levels of loudness. Finally, nursing staff may be unfamiliar with signs of mild to moderate hearing impairment, attributing behaviors such as requests for repetition, withdrawal from social situations, and frustration in group situations to cognitive-communicative impairments resulting from dementia rather than hearing loss.

Regardless of the reasons, a large number of participants in this study exhibited a hearing impairment. This pattern is consistent with previous investigations of prevalence of hearing impairment in nursing home residents (Schow & Nerbonne, 1980; Voeks, et al., 1990). Although individuals with mild hearing loss may be thought of as having functional hearing abilities, hearing impairments exceeding 25 dB HL can affect communication, health, and well-being (ASHA, 1997). Therefore, the under-identification of individuals with hearing loss, and the

lack of referrals for those who were identified, should cause concern.

Ratings on MDS item 1, Hearing, do appear to account for some of the variation in functional hearing ability between groups classified as "0" and "1," with a significant difference found in speech recognition ability between the two groups. However, even on the basis of speech recognition ability, the label of "adequate hearing" for the MDS "0" group is misleading. Among the group with "adequate" hearing according to the MDS, the mean number of words correctly repeated was only 6.2/10 (62%) with face-to-face cues, and 4.2/10 (42%) in the auditory only condition.

Outcomes of the MDS Assessment: Referrals

Certain MDS scores are intended to "trigger" further assessment using the Resident Assessment Protocols, or RAPs. None of the participants with an MDS trigger score in linguistic communication or hearing was referred to speech-language pathology or audiology for evaluation.

Twenty-nine percent of the participants (13/44) were classified as having a hearing impairment on the MDS, and 54% (31/57) had at least one MDS trigger score in the area of linguistic communication. All participants with trigger scores were further evaluated with a Resident Assessment Protocol (RAP). The purpose of the RAP is to describe the

deficits exhibited by the resident, explain the possible causes or mitigating factors influencing performance and guide the development of an individualized care plan. The RAP also includes referrals to other professionals as necessary.

The lack of referrals for participants in this study was surprising. Lubinski (1995) suggested that use of the RAI would result in "increases in referrals to and possibly intervention by audiologists and SLPs" (p. 13). However, in the present study, not one referral was made, despite documentation in the RAP regarding the risks associated with communication/hearing deficits. Examples of Communication/Hearing RAPs for two study participants with communication trigger scores are presented in Table 8. Although these RAPs are not identical in format, each contains information about the nature of the triggered condition, complications and risk factors, need for referrals/further evaluation by appropriate health professionals and a decision regarding whether or not to "proceed to care plan" to address the problem area.

Table 8. Examples of commmunication/hearing RAPs

Hearing	Communication
Problem: Decreased ability to understand others **Contributing Factor**: dementia, decreased hearing **Risk Factors**: Not having needs met, not receiving total message **Referrals**: None **Proceed to Care Plan**: Yes	**Trigger**: Communication **Cause**: Dementia **Contributing Factor**: Long and short-term memory loss **Effect**: Unable to finish thoughts or voice needs adequately **Risk Factors**: Increased confusion, anxiety **Strengths**: Can voice some needs, able to answer simple, yes/no questions **Strategies**: Anticipate and meet needs daily **Referrals**: None **Proceed to Care Plan**: Yes

Clearly, the MDS Coordinators who made these statements recognized the communication problems, yet they did not refer to audiology or speech-language pathology for further assessment.

The absence of referrals for hearing evaluations may be due to the limited role of audiologists in nursing homes. Nurses do not refer to audiology because audiological services are not routinely provided in skilled

nursing facilities. Although diagnostic audiological tests are covered services in nursing homes under the Medicare payment system, aural rehabilitation services by audiologists are reimbursed only in hospital inpatient settings. Speechreading services, provided by speech-language pathologists, are the only aspect of aural rehabilitation covered by Medicare in skilled nursing facilities (ASHA, 2000).

The absence of referrals for linguistic communication deficits may reflect a lack of knowledge about communication interventions for individuals with dementia. Nurses may be unaware of speech-language pathology services for individuals with dementia. Additionally, nurses may believe that the communication problems of residents with dementia are chronic and that little or nothing can be done in the way of skilled rehabilitation. As a result, communication deficits in dementia are not seen as a "significant change in condition," a prerequisite for skilled rehabilitation referral.

Interestingly, trigger scores, though indicative of deficits, may also represent areas in which the resident has potential to improve. In fact, HCFA (1995) guidelines include several statements regarding the potential of individuals with communication deficits. "The

communication trigger suggests residents for whom a corrective communication program may be beneficial." (RAP 4, Communication Page 1 of 3). Further, HCFA advises that "…a special effort [is required] by staff to overcome any preconceived notions or fixed perceptions they may have about the residents' probable responsiveness to treatment." (RAP 4, Communication Page 1 of 3). Of course, not all individuals with deficits have the potential to benefit from a skilled therapeutic intervention. However, the speech-language pathologist or audiologist must be involved to determine who can benefit.

Without referrals, the treatment program usually takes the form of nursing "approaches" outlined in the care plan. The care plan consists of statements related to the problem being addressed, a short-term goal for resolution of the problem, and "individualized" treatment approaches. Table 9 contains two actual care plan items, one for hearing and one for communication, written by nurses for two participants in the study.

Table 9. Example care plans for hearing and communication deficits

Hearing

Problem	Short Term Goal	Approach
Communication deficit. L.E. is hard of hearing. Onset 1/5/00 Target 4/4/00 Resolved / /	Will communicate ADL needs x 90 days. Begin 1/5/00 Target 4/4/00 Resolved / /	1) Face L.E. and speak loudly 2) Involve in activities that do not depend on hearing: parties, games, crafts, small groups 3) Always stand in front of resident so face and mouth can be watched during verbal communication. Use gestures to reinforce meaning.

Linguistic Communication

Problem	Short Term Goal	Approach
Resident has communication deficit related to cognitive deficit and diagnosis of senile dementia. Onset 02/09/00 Target 05/09/00 Resolved / /	Resident should be able to make basic needs known to staff on a daily basis during the next 90 days. Onset 02/09/00 Target 05/09/00 Resolved / /	1) Encourage non-verbal communication, i.e., facial expressions, body language, gesturing, etc. 2) Ask resident to repeat requests as necessary 3) Use simple, direct communication 4) Anticipate daily needs

These care plans typify those of the participants in this study. Upon examination of these care plans, some problems are apparent. First, the nature of the hearing or linguistic communication deficit is unknown. The type and severity of the problem, and effective treatment techniques are not detailed. As a result, the care plan is a standard, generic list of approaches that may not be appropriate for the resident's individual needs or abilities. For example, "anticipating needs" may be necessary for the resident with severe cognitive decline who cannot participate in self-care activities. However, this approach may not be beneficial for higher-functioning residents. For these residents, anticipating needs may result in promoting dependent behaviors, rather than supporting independent ones.

Second, some care plan approaches may be incorrect. For example, compensating for hearing loss by involving an individual "in activities that do not involve hearing" is a difficult approach to implement, as most of the activities listed in the care plan actually involve hearing. Moreover, proposing an activity limitation to compensate for a sensory deficit is counter to OBRA (1987) guidelines to facilitate each resident's highest possible level of function.

In addition to these problems, implementation of the care plan may be difficult. Although efforts are made to ensure that the plan of care is implemented, daily staff caregivers frequently are unaware of the specific goals and approaches. If they are aware of the approaches, they may not know how to carry out recommended strategies without direct training.

The care plan is the culmination of the resident assessment process, and should be a reflection of the strengths and deficits identified using the MDS and RAPs. In general, if the identified communication problem is significant enough to warrant a care plan, residents should have a full evaluation to determine how to improve or help maintain their current level of communicative functioning.

Possible Solutions

Based on the results of this study, outcomes of the resident assessment process appear to be inconsistent with the OBRA (1987) mandate to ensure provision of appropriate services that help maintain or improve the abilities of nursing home residents. The RAI may be compromised by misclassification of individuals with communication/hearing problems, and a lack of referrals to communication specialists when deficits are identified. However, some solutions to improve the current state of affairs are possible.

First, speech-language pathologists must be involved in the evaluation of nursing home residents with dementia. The MDS Coordinators are responsible for resident care across several domains of functioning and cannot be expected to specialize in communication/hearing functioning. Rather, speech-language pathologists need to screen individuals at admission, and at regular intervals thereafter, to ensure that residents with communication/hearing deficits receive necessary services. Some individuals with communication deficits will not be appropriate candidates for speech-language or hearing services. However, those individuals with the potential to improve or maintain communication/hearing function must be identified by the speech-language pathologist.

A second possible solution to improve identification of and referral for communication problems is to conduct inservice training for nursing staff. Training should be focused on increasing knowledge about the link between episodic memory impairment and communication ability, as the relation between cognition and language frequently is misunderstood. Nursing staff and others should recognize that individuals with impairment ratings on MDS Cognitive Patterns items likely have concomitant linguistic communication deficits.

Training also should be focused on increasing awareness of speech-language and hearing services for individuals with dementia. Expanding nurses' knowledge of options for communication/hearing interventions may help to improve the rate of referrals for individuals with identified impairments.

Limitations of the Current Study

The MDS appears useful for distinguishing between individuals with mild-moderate and moderate-severe communication deficits associated with dementia. However, because the outcome associated with an MDS rating of 1, 2 or 3 is the same (i.e., a RAP is triggered), these scores were collapsed into one group ("impaired") for the purposes of the study. As a result, little is known about the validity of the MDS as a tool used to describe different levels of impairment.

Data also should be collected on communicative performance and MDS ratings for nursing home residents who do not have a diagnosis of dementia. A comparison between individuals with and without cognitive impairment, who are all rated as having normal communication abilities on the MDS, would allow determination of the validity of the "normal" rating for individuals with cognitive-communication impairments associated with dementia.

More information also is needed on the reliability of the MDS communication items for individuals with cognitive impairment. Phillips et al. (1993) reported that items requiring subjective judgments, such as hearing and communication items, have lower levels of inter-rater agreement among nurses. Reliability was not addressed in this study, but it is a necessary condition for validity. Further research on the reliability of the MDS, as used with residents with cognitive impairments, is necessary. Investigators should examine the use of short, objective screening measures (such as the *Story Retelling Subtest* and speech recognition tests) that may be effective in improving the consistency of judgments related to communication.

Finally, external validation of the results of this study may be limited. Sample selection procedures resulted in a carefully delineated sample of participants who may not be representative of the population of nursing home residents with dementia. All residents with dementia were referred, but the sample was selected based on each person's ability to participate in the testing protocol. Thus, the study sample was small (n=57) and comprised individuals who were cooperative with no behavior problems. The results obtained with this sample of participants may be generalized *to* the target population of individuals with

dementia who fit this description, but not *across* different populations or subpopulations of nursing home residents (Cook & Campbell, 1979).

The exclusive use of nursing facilities all belonging to the same company also may restrict generalization of findings across settings. Although participants were recruited from five facilities in urban and rural southeastern Arizona, the same company owned all of the buildings. The decision to use these nursing homes was made to reduce rater error related to differences in MDS training and completion. The MDS Coordinators in this study took part in the same RAI training program, and this consistency helped to ensure that MDS scores were determined in a similar way across data collection sites.

These sampling procedures may limit generalization of the results across populations and settings. However, results from this study form the basis for further research on MDS Communication/Hearing items as used with different resident populations in a variety of skilled nursing facilities.

SUMMARY

The relation of ratings on the C/H items of the MDS to external assessments of communication and hearing was assessed in a sample of 57 nursing home residents with dementia. A significant difference in linguistic communication ability (as measured by the FLCI (Bayles & Tomoeda, 1994) and the *Story Retelling Subtest* of the ABCD (Bayles and Tomoeda, 1993) was found between groups classified by MDS scores. A significant difference in speech recognition ability (as evaluated with the *AB Isophonemic Short Word Lists* (Boothroyd (1968) also was found between groups classified by MDS rating. However, MDS classification data were unrelated to pure-tone hearing screening results, and many nursing home residents with communication/hearing deficits were classified as having normal communication abilities on the MDS.

For those residents with dementia who were identified as having communication impairments, no referrals were made to speech-language pathology or audiology. The resulting care plans, designed to address these deficits, were not individualized.

The documented high prevalence of communication and hearing problems among nursing home residents with dementia necessitates the involvement of communication specialists

in the screening and evaluation of these individuals. Speech-language pathologists must not leave the job of identifying individuals in need of services to the nurse (Glickstein and Neustadt, 1995). The Omnibus Budget Reconciliation Act (OBRA, 1987) was designed to improve quality of life for all nursing home residents. Based on the results of this study, the use of the RAI without input from speech-language pathologists or audiologists may result in diminished, rather than improved quality of care for nursing home residents with dementia.

APPENDIX A. HEARING AID CHECKLIST

(Adapted from the Speech and Hearing Clinic at The University of Arizona)

Step 1. Visual Inspection of Aid

	Yes/Clean/ Intact	No/Obstructed/ Broken
Clean?		
Casing Intact?		
Controls functioning?		
Battery door intact?		
Microphone opening clear?		
Receiver tube clean?		

Step 2. Visual Inspection of Ear Mold and Tubing

	Yes/Clean/ Intact	No/Obstructed/ Broken
Earmold clean?		
Tubing clean?		

Step 3. Listening Check

	Yes	No
Battery working?		
External feedback? (Turn aid all the way up, cup in hand, should have feedback)		
Internal feedback? (Turn aid all the way up, block receiver tubing and microphone hole, should have NO feedback)		

Insert Aid into Listening Stethoscope, Volume to Lowest Setting, Switch to "M"

Evaluate Sound Quality (use voice signal such as running speech)

	Yes	No
Unwanted sound?		
Noisy?		
Scratch/intermittent?		

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