Objective: To determine the association between neuropsychiatric symptoms and the presence of medical illness among outpatients with mild dementia.

Method: The Neuropsychiatric Inventory (NPI) was used to assess neuropsychiatric symptoms, and the Cumulative Illness Rating Scale (CIRS) was used to evaluate physical impairment, in 44 outpatients diagnosed as having dementia (Alzheimer disease, n=22; vascular dementia, n=13; mixed dementia, n=9). The tests used were standard parts of a memory assessment program at a college of osteopathic medicine. Pearson product moment correlations were used to assess any associations between NPI and CIRS scores.

Results: Significant associations were identified between several NPI-assessed symptoms and degree of medical illness as measured by the CIRS. Neurobehavioral problems were significantly correlated (P<.05) with illness in the following body organ systems: gastrointestinal (lower), genitourinary, neurologic, ophthalmologic/otolaryngologic, psychiatric, and respiratory.

Conclusion: The authors’ preliminary data underscore the importance of primary care physicians assessing patients with dementia for comorbidity of psychiatric illnesses when conducting medical examinations.

Dementia is primarily a disease of older adults and is characterized by progressive decline in memory and other cognitive abilities. Neuropsychiatric disturbances are common, and most patients with dementia, because of their age, suffer from concurrent medical conditions in various body systems. Dementia, therefore, can have a substantial impact on morbidity and quality of life.

Although physical and psychiatric comorbidities are known to exist in younger patients, the association between these two variables in older patients with dementia is not well understood or documented. Greater clarity regarding this association would have bearing on both diagnosis and intervention.

The Neuropsychiatric Inventory (NPI) assesses the presence of neuropsychiatric symptoms among patients with dementia. The Cumulative Illness Rating Scale (CIRS) evaluates the degree of physical impairment in each of 13 body organ systems. To better understand the association between neuropsychiatric symptoms and medical illness, the NPI and the CIRS were administered to a sample of outpatients who had been diagnosed as having mild to moderate dementia.

Methods

The present study was approved, prior to data review, by the institutional review board at the University of Medicine and Dentistry of New Jersey–School of Osteopathic Medicine (UMDNJ–SOM) in Stratford.

Participants

A review of an existing Memory Assessment Program database was used to identify 44 outpatients who had complete records of CIRS and NPI information. These individuals were patients at the UMDNJ–SOM Center for Aging (now the New Jersey Institute for Successful Aging). All participants lived in the local community and had been diagnosed as having mild to moderate dementia, as defined by a score on the Mini-Mental State Examination (MMSE) between 15 and 25. Out of a total possible score of 30, people with dementia typically have scores of 26 or less on the MMSE. The patients’ dementia diagnoses included Alzheimer disease (n=22), vascular dementia (n=13), and mixed dementia (n=9).

Measurements

The NPI assesses the frequency and severity of 12 neuropsychiatric symptoms: aberrant motor behavior, agitation, anxiety, apathy, delusions, depression, disinhibition, eating disturbances, euphoria, hallucinations, irritability, and sleep disturbances. The score for each symptom is the product of the frequency (0, not at all; 1, occasionally; 2, often; 3, frequently; 4, very frequently) and severity (1, mild; 2, moderate; 3, severe).
Results

Demographics
Participants had a mean ± SD age of 79.4±6.1 years, a mean education of 12.2±2.7 years, and a mean MMSE score of 22.7±3.5. Thirty (68%) participants were women, and 14 (32%) were men.

Pearson Product Moment Correlations
Table shows significant Pearson product moment correlational analyses between various body organ systems as sites of illness (as indicated by CIRS scores) and various neuropsychiatric symptoms (as indicated by NPI scores). The data reveal significant correlations between disorders indicated by the CIRS psychiatric examination and NPI-assessed symptoms of aberrant motor disturbance, anxiety, depression, and irritability (all P<.05 except anxiety [P<.01]). Significant correlations were also found between illness indicated by the CIRS neurologic examination and the NPI-assessed symptoms of apathy, eating disturbance, and irritability (apathy and irritability, P<.05; eating disturbance, P<.01). Respiratory disorders were significantly associated with euphoria, while ophthalmologic disorders were negatively correlated with anxiety (P<.05). Lower gastrointestinal dis-

<table>
<thead>
<tr>
<th>Body Organ System</th>
<th>Neuropsychiatric Symptom(s)</th>
<th>Pearson r†</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gastrointestinal, lower</td>
<td>Euphoria</td>
<td>0.329</td>
</tr>
<tr>
<td>Genitourinary</td>
<td>Agitation</td>
<td>0.297</td>
</tr>
<tr>
<td>Neurologic</td>
<td>Apathy</td>
<td>0.313</td>
</tr>
<tr>
<td></td>
<td>Eating disturbance</td>
<td>0.386‡</td>
</tr>
<tr>
<td></td>
<td>Irritability</td>
<td>0.356</td>
</tr>
<tr>
<td>Ophthalmologic/otolaryngologic</td>
<td>Anxiety</td>
<td>−0.344</td>
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<tr>
<td>Psychiatric</td>
<td>Aberrant motor skills</td>
<td>0.341</td>
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<tr>
<td></td>
<td>Anxiety</td>
<td>0.498‡</td>
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<tr>
<td></td>
<td>Depression</td>
<td>0.375</td>
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<tr>
<td></td>
<td>Irritability</td>
<td>0.336</td>
</tr>
<tr>
<td>Respiratory</td>
<td>Euphoria</td>
<td>0.351</td>
</tr>
</tbody>
</table>

* Disorders of body organ systems were assessed using the Cumulative Illness Rating Scale (CIRS); neuropsychiatric symptoms, using the Neuropsychiatric Inventory. The total CIRS score, the sum of CIRS scores from each of 13 body organ systems, had a Pearson r (Pearson product moment correlation coefficient) of 0.310 with the neuropsychiatric symptom, irritability.
† P<.05 unless otherwise indicated.
‡ P<.01

Statistical Analysis
Descriptive statistics, including mean scores and SDs, were calculated for all demographic variables and the NPI and CIRS evaluations. Pearson product moment correlations were used to assess the associations between individual and total scores from the NPI and CIRS evaluations.
orders were significantly associated with euphoria, and genitourinary disorders were correlated with agitation ($P<.05$). Finally, the total CIRS score was significantly correlated with irritability ($P<.05$).

**Comment**

We identified significant associations between neuropsychiatric symptoms and degree of medical illness in an outpatient sample diagnosed as having dementia. In addition to neurologic and psychiatric illness, neurobehavioral problems were associated with the following body organ systems: gastrointestinal (lower), genitourinary, ophthalmologic/otolaryngologic, and respiratory.

These findings may underscore the important role that primary care physicians can play in screening patients for neuropsychiatric illness when medical illnesses are present in the above-mentioned body organ systems. Primary care physicians are the patient’s first line of care and are in the unique position of assessing and providing treatment for physical and neurobehavioral symptoms prior to referral for specialty care.

Furthermore, the recognition of comorbid neuropsychiatric and medical conditions in patients with dementia will likely assist the physician in diagnosis and treatment, which, in turn, can improve the quality of life for patients and their caregivers. For example, an elderly patient with dementia and a urinary tract infection may lack the ability to meaningfully express his or her physical discomfort and instead become agitated or irritable. Neuropsychiatric symptoms or an altered mental status may be the only symptoms indicative of an infection in an elderly patient. Thus, recognizing the association between agitation and potential genitourinary disease would alert the physician to a possible urinary tract infection, thereby facilitating medical treatment and reducing patient discomfort.

We acknowledge that the present study is preliminary in nature and not without limitations. First, our results are based on correlational analysis of data and, thus, do not imply a causal association between medical illness and neurobehavioral distress. Second, the study included a relatively small sample size of outpatients with dementia.

We look forward to our findings being replicated in other medical settings, such as an urgent care medical center or an inpatient hospital unit. It may be that a more acute setting will identify stronger correlations between medical illness and psychiatric symptoms.

**References**