LETTER TO THE EDITOR

The impact of dementia prevalence on the utility of the AD8

Kathy J. Christensen¹,²

¹ Geriatric Research, Education and Clinical Centre, Minneapolis VA Health Care System, Minneapolis, MN 55417, USA
² Department of Psychology, University of Minnesota, Minneapolis, MN 55455, USA

Correspondence to: Kathy J. Christensen, PhD, GRECC (11G), Minneapolis VA Health Care System, One Veterans Drive, Minneapolis, MN 55417, USA.
E-mail: chris006@umn.edu

Sir, Galvin et al. (2010) suggest that the AD8, a brief informant-based test, may improve detection of dementia in community settings. Research on the AD8 has been conducted in settings where the prevalence of dementia is unusually high. The prevalence of dementia is likely to be much lower in community settings, and it is likely that the utility of the AD8 will be reduced accordingly.

The World Alzheimer Report (Alzheimer’s Disease International, 2010) estimates the global prevalence of dementia at 4.7% in individuals aged 60 and older. In contrast, the prevalence of dementia or Alzheimer’s disease in published studies of the AD8 has ranged from 37% to 89% (Galvin et al., 2005, 2006, 2007, 2010).

Positive and negative predictive values are a common way to evaluate the utility of an instrument in a specific setting (Altman and Bland, 1994). The positive predictive value estimates the likelihood that a patient with a positive test score has the targeted disease. The negative predictive value estimates the likelihood that a patient with a negative test score is free of the disease. Both values depend on the prevalence of the disease in the particular setting as well as the sensitivity and specificity of the screening instrument. The positive predictive values reported for the AD8 have ranged from 0.76 to 0.93, and the negative predictive values from 0.43 to 0.96 (Galvin et al., 2005, 2006, 2007, 2010).

To examine the impact of prevalence on the utility of the AD8, positive and negative predictive values were calculated from the sensitivity and specificity of the AD8 and estimates of global dementia prevalence. Table 1 provides the predictive values of the AD8 for three age groups based on a calculation of the median estimated prevalence across the regions in Asia, Europe and the Americas for which meta-analytic estimates are available (Alzheimer’s Disease International, 2009). These prevalence estimates range from 2.4% to 19.5%. Sensitivity and specificity estimates of 0.84 and 0.80, respectively, were obtained from the AD8 web site as referenced in Galvin et al. (2010).

In contrast to the reported positive predictive values of 0.76–0.93 for the AD8, positive predictive values range from only 0.09 to 0.50 in this example. Using population-based estimates for the prevalence of dementia, it is apparent that the

<table>
<thead>
<tr>
<th>Age</th>
<th>65–69</th>
<th>75–79</th>
<th>85–89</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prevalence of dementia</td>
<td>0.024</td>
<td>0.066</td>
<td>0.195</td>
</tr>
<tr>
<td>Positive predictive value (probability that AD8 ≥ 2 is a true positive)</td>
<td>0.09</td>
<td>0.23</td>
<td>0.50</td>
</tr>
<tr>
<td>Probability that AD8 ≥ 2 is a false positive</td>
<td>0.91</td>
<td>0.77</td>
<td>0.50</td>
</tr>
<tr>
<td>Negative predictive value (probability that AD8 &lt; 2 is a true negative)</td>
<td>0.995</td>
<td>0.99</td>
<td>0.95</td>
</tr>
<tr>
<td>Probability that AD8 &lt; 2 is a false negative</td>
<td>0.005</td>
<td>0.01</td>
<td>0.05</td>
</tr>
</tbody>
</table>

Table 1 Predictive values for the AD8 using cut-off score ≥ 2 to identify dementia based on global prevalence estimates (2009) and AD8 sensitivity of 0.84 and specificity of 0.80²

² Local US studies of the AD8 by the authors of the instrument report sensitivity estimates ranging from 0.84 to 0.97 and specificity estimates ranging from 0.46 to 0.83 for detection of dementia or Alzheimer’s disease. Cross-cultural studies of the AD8 have shown sensitivities ranging from 0.79 to 0.97 and specificities ranging from 0.50 to 0.90 for detection of dementia (Galvin, 2010). Median results calculated across these studies are 0.87 for sensitivity and 0.74 for specificity, which suggests that the sensitivity and specificity provided on the web site for the AD8 are reasonable estimates for purposes of the examples in Table 1.
positive predictive values for the AD8 do not begin to approach a range that most would consider useful until one reaches the 85- to 89-year-old age group. The negative predictive values are uniformly high, as would be expected with relatively low disease prevalence.

This example illustrates the marked decline in utility of the AD8 that may be expected in settings with dementia prevalence rates more in line with community-based estimates. It underscores the importance of understanding the context of reported predictive values and choosing instruments with optimal characteristics for the setting in question. Toward this end, Holsinger et al. (2007) may be consulted for a comparative review of dementia screening instruments.

References


