Deriving Modified Rankin Scores From Medical Case-Records

Terence J. Quinn, MRCP; Gautamananda Ray, MRCP; Sari Atula, MD; Matthew R. Walters, MD; Jesse Dawson, MRCP; Kennedy R. Lees, MD

Background and Purpose—Modified Rankin score (mRS) is traditionally graded using a face-to-face or telephone interview. Certain stroke assessment scales can be derived from a review of a patient’s case-record alone. We hypothesized that mRS could be successfully derived from the narrative within patient case-records.

Methods—Sequential patients attending our cerebrovascular outpatient clinic were included. Two independent, blinded clinicians, trained in mRS, assessed case-records to derive mRS. They scored “certainty” of their grading on a 5-point Likert scale. Agreement between derived and traditional face-to-face mRS was calculated using attribute agreement analysis.

Results—Fifty patients with a range of disabilities were included. Case-record appraisers were poor at deriving mRS (κ=0.34 against standard). Derived mRS grades showed poor agreement between observers (κ=0.33). There was no relationship between certainty of derived mRS and proportion of correct grades (P=0.727).

Conclusion—Accurate mRS cannot be derived from standard hospital records. Direct mRS interview is still required for clinical trials. (Stroke. 2008;39:3421-3423.)

Key Words: clinical trials • drug trials • methodology • outcomes • randomized, controlled trials • scales • therapy • treatment
performed all statistical analysis using Minitab software (version 13.1; Minitab Inc).

Results

Fifty patients were selected with a median age of 78 years (range, 30 to 92 years); median mRS was 2. The group comprised a variety of stroke subtypes (7 total anterior circulation syndrome; 16 partial anterior cerebral syndrome; 4 posterior circulation syndrome; 17 lacunar syndrome; 6 unclassified). Patients were reviewed at a median of 16 weeks (range, 2 to 56 weeks) from index stroke event. One patient withdrew consent after interview and was not included in the final analysis. To ensure there was no recall bias, we excluded 4 patients in which one or both of the case-record reviewers had been involved in their care.

Both reviewers were confident in their grading (mean confidence 3.2 out of 5; reviewer 1 = 2.6 out of 5; reviewer 2 = 3.8 out of 5). There was no relationship between certainty of derived mRS and proportion of correct grades ($P = 0.727$). Derived mRS showed poor agreement with correct grade (overall $k = 0.34$; appraiser 1 $k = 0.35$; appraiser 2 $k = 0.31$) and between observers ($k = 0.33$; Table 1). Agreement was greatest at extremes of mRS. Case-record reviewers tended to underscore disability (Table 2).

Discussion

We have shown that mRS derived from patient case-records has unacceptable accuracy and reliability for use in clinical research. This contrasts with other commonly used stroke scales, in which quantitative outcome data have been reliably described using qualitative case-record information.

Scales that have been successfully derived from case-records measure physical impairment only. Transforming bedside neurological examination into a quantitative scale is straightforward if comprehensive physical examination is recorded. As a global disability scale, mRS review requires measures of physical, cognitive, emotional, and functional status. Such data may not always be recorded during a busy outpatient assessment.

Although case-record reviewers were poor at deriving mRS, it is interesting that they felt able to derive a score for every patient and were confident in their grading for the majority. This may explain why previous trialists have been happy to use abstracted mRS without first testing validity or reliability.

Our results should be generalizable to other centers involved in stroke trials. Patients were reviewed at approximately 3 months after the event, the period when mRS is traditionally assessed. Review was performed by practicing stroke physicians trained in the use of the mRS. Specific pro formas are not used for data capture and consulting doctors can document as much information as they wish. Our clinic staff comprises internal medicine physicians with a stroke interest. It is possible that in the context of a specific rehabilitation, or privately funded service, consultations may be longer with more emphasis on disability.

The poor reliability inherent in standard mRS assessment is well recognized. To ensure that our “correct” mRS grading was suitably robust, we used multiple independent raters with final mRS chosen by the majority. This may explain why previous trialists have been happy to use abstracted mRS without first testing validity or reliability.

Table 2. Accuracy (Mean and 95% CI) for Derived mRS Versus ‘Correct’ mRS

<table>
<thead>
<tr>
<th>mRS</th>
<th>Combined mRS</th>
<th>Reviewer 1 mRS</th>
<th>Reviewer 2 mRS</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0.31 (−0.11−0.73)</td>
<td>0.5 (−0.39−1.39)</td>
<td>0.13 (−0.17−0.42)</td>
</tr>
<tr>
<td>1</td>
<td>1.00 (0.55−1.45)</td>
<td>1.29 (0.41−2.17)</td>
<td>0.71 (0.26−1.17)</td>
</tr>
<tr>
<td>2</td>
<td>1.29 (0.99−1.60)</td>
<td>1.59 (1.11−2.07)</td>
<td>1.00 (0.64−1.36)</td>
</tr>
<tr>
<td>3</td>
<td>2.00 (1.20−2.80)</td>
<td>2.43 (1.14−3.72)</td>
<td>1.67 (0.45−2.88)</td>
</tr>
<tr>
<td>4</td>
<td>3.22 (2.71−3.73)</td>
<td>3.25 (2.45−4.04)</td>
<td>3.20 (2.16−4.24)</td>
</tr>
<tr>
<td>5</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>

N/A indicates not applicable (no patients with mRS 5 level of disability were included).

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Disclosures
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References
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