The Barthel index in clinical practice: use on a rehabilitation ward for elderly people

ABSTRACT—Primary activities of daily living (ADL) were monitored weekly in 102 patients admitted to a rehabilitation ward for elderly people using the Barthel index. The three commonest diagnoses were ‘stroke’, ‘fractured neck of femur’ and ‘dementia recovering from acute illness’. Multiple disabling diagnoses were common: 60% of patients had dementia and 23% had a live-in carer; mean (median) length of stay in the rehabilitation ward was 98 (62 days). Over 18 months, the weekly assessment of patients in the ward was omitted once. No extra resources were needed. There was a significant rise in Barthel scores between admission to the rehabilitation ward (median Barthel 6) and discharge (median 13) for the group as a whole (median change 6, 95% CI 5–7; p < 0.001) and for each of the three main diagnostic groups. Barthel scores on discharge were significantly lower than in patients discharged from an acute ward for elderly people. Barthel scores and mental test scores (MTS) at discharge were significantly related to destination on discharge, with a characteristic pattern for patients unable to return home and having to be placed in nursing homes (Barthel < 10, MTS < 7). Our experience confirms that routine clinical use of the Barthel in this setting is feasible and responds to clinically important change, at least in group evaluation. It suggests that the Barthel may be useful in outcome measurement, case-mix adjustment and audit of discharge practices.

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had enjoyed widespread use in the research world, especially for stroke patients, its routine clinical use was probably low. Further studies of its use were suggested to evaluate its ‘feasibility, interpretability and usefulness’ in the everyday clinical situation. The report questioned its sensitivity to interventions such as multidisciplinary management, and pointed out that its potential as a case-mix adjuster and outcome measure was unproven and that any link between index scores and resource use was unknown.

We have already published the first report on the routine clinical use of the Barthel in a rapid turnover acute medical ward for elderly people [5]. The current study concerns its use with patients likely to need at least three to four weeks of intensive rehabilitation after their acute illness has been fully treated and who were then transferred from the acute ward to a specialist rehabilitation ward for elderly people.

We incorporated weekly use of the Barthel into the routine clinical practice of the rehabilitation ward. This paper reports on the feasibility of doing this and on the resources needed. On the basis of the information thus routinely recorded, we comment on the potential usefulness of Barthel scores in this clinical setting as an outcome measure or case-mix adjuster for groups of patients, and on the relationship between Barthel score and use of residential home, nursing home or hospital continuing care resources for individual patients.

Methodology

Geriatric service

The department of health services for elderly people at the Royal Free Hospital NHS Trust operates a comprehensive geriatric service for patients resident in Hampstead. Most patients are over the age of 75 years and are admitted to the acute wards from casualty. Most (80%) are discharged back home or to their pre-admission residence after a mean length of stay of 12.8 days. Approximately one in 20 patients is transferred to the rehabilitation wards if they seem likely to need intensive rehabilitation for at least three to four weeks after the acute illness has been treated. Concentrating such patients on a specialised ward means that their special needs are less likely to be overlooked in favour of more acutely ill patients [6]. Patients are not transferred if their only need is for institutional placement. The rehabilitation ward also accepts patients over 65 from general medical, surgical, orthopaedic and psychogeriatric wards who meet these criteria.
Ward

The rehabilitation ward in this study has 22 beds, two of which are designated for respite and two for patients under the management of a psychiatrist for the elderly. The ward is staffed by six nurses on an early shift and four on a late shift, with medical staffing for four sessions per week by a clinical assistant. There is one whole-time equivalent (WTE) physiotherapist, one occupational therapist, 0.2 WTE of a speech therapist and 0.5 WTE of a social worker. One consultant ward round takes place each week and includes a multidisciplinary meeting; a second consultant visit occurs later in the week.

Assessment of disability

Once a week, the nurses directly managing the patient assessed and scored each individual’s independence in self care on a standard form, using Wade and colleagues’ modification of the Barthel index, adhering strictly to the guidelines [2,3]. The assessment was reviewed on the weekly ward round. The final Barthel score was recorded on the discharge summary. The patient’s final performance on transfers, walking, continence, feeding, washing and dressing was also itemised on the summary for the information of GPs, district nurses and heads of homes. As in our previous study [5], space was left on the assessment form to record the level of help required in each ADL: whether it was verbal or physical, from one person or two; whether, in washing and dressing, the patient was able to do the top half; and whether a frame or stick was needed for mobility. This extra information was transmitted via the discharge summary to health care workers in the community. Hodkinson’s mental test score (MTS) [7] was administered by the clinical assistant on admission for the routine assessment of cognitive function, as recommended in the RCPL/BGS report [1]. The clinical assistant recorded the MTS on discharge in the discharge summary.

Statistical analysis

The RCPL/BGS report suggested that categorisation of raw Barthel scores might hold the key to their interpretation. Therefore, the Barthel scores of the 80 surviving patients were expressed, on admission to the ward and on discharge, both as raw and as categorised scores using Wade and colleagues’ arbitrary categorisation of the total Barthel score as ‘independent’ (Barthel 20), ‘mildly dependent’ (Barthel 15–19), ‘moderately dependent’ (Barthel 10–14), ‘severely dependent’ (Barthel 5–9) and ‘very severely dependent’ (Barthel 0–4) [8]. Wilcoxon non-parametric analyses were used to compare the change between admission and discharge for the entire group, separately for each of the categories of severity, and separately for each of the three main diagnostic groups, and to compare Barthel and MTS scores in patients discharged to different destinations.

Results

Patients

Over the period of this study (1 October 1991 to 30 April 1995) there were 104 consecutive discharges and deaths from the ward, excluding respite patients and those under the psychiatrist for the elderly. Barthel assessments on admission and discharge are available on 102 patients, 26 of whom were men; the mean (SD) age of the group was 82.6 (5.3) years.

Fifty (48%) patients had been transferred from the acute geriatric wards, 22 (21%) from the acute general medical wards, 13 (13%) from the orthopaedic wards (most orthogeriatric patients were admitted to another ward run by the consultant responsible for the orthogeriatric service), 5 (5%) from psychogeriatric wards, 4 (4%) from surgical wards and 4 (4%) from other hospitals. Four patients (4%), well known to the department, were admitted directly from day hospital. The mean length of stay (median) prior to transfer was 27 (23) days (acute geriatrics), 24 (22) days (general medicine), 22 (30) days (orthopaedics).

Twenty two patients died (21%), the majority of whom, having been severely disabled by a stroke, succumbed to the complications of immobility (eg pulmonary embolus, hypostatic pneumonia), second strokes or cardiovascular disease. Eighty patients were discharged from the ward; 43 (52%) went to their own homes, 16 (20%) to nursing homes (of whom 2 had previously been resident there), 13 (16%) to residential care homes (of whom 7 had previously been resident), 4 (5%) to NHS continuing care wards (2 to geriatric and 2 to psychiatry for the elderly wards). Two patients (2.5%) were transferred to the psychiatrist for the elderly for further management prior to placement and 2 (2.5%) to other hospitals nearer relatives. Overall, the mean length of stay on the rehabilitation ward was 98 days with a median of 62 days; for survivors, the mean was 108 days with a median of 84 days. Eighteen of the 82 patients discharged from the ward (22%) had a live-in carer.

Diagnoses

There were three main primary diagnostic groups (Table 1): stroke, fractured neck of femur, and patients with dementia who required further rehabilitation to reach their previous level of independence following an acute medical illness (such as chest or urinary tract infections). The MTS was less than 7/10 on discharge in 42 (63%) of 67 patients who could be assessed. No assessment could be made in 13 patients before discharge because of dysphasia, deafness, depression or anxiety. Single diagnoses were
Table 1. Primary diagnosis in 102 patients.

| Diagnosis                                         | Discharges | Deaths |
|--------------------------------------------------|------------|--------|
| Stroke                                           | 37         | 16     |
| Fractured neck of femur                          | 12         | 1      |
| Dementia/acute illness                           | 13         | 2      |
| Osteo or rheumatoid arthritis                    | 7          | 0      |
| Other fractures                                  | 3          | 0      |
| Parkinson’s disease                              | 2          | 0      |
| Depressed/hypomanic patients with acute illness  | 2          | 1      |
| Head injuries                                    | 2          | 1      |
| Cortical vein thrombosis                         | 1          | 0      |
| C4–5 laminectomy (myelopathy)                    | 1          | 0      |
| Subdural haematoma                               | 0          | 1      |
| **Total**                                        | **80**     | **22** |

relatively rare. For example, 19 (51%) of the 37 stroke patients discharged had problems affecting their rehabilitation which were quite distinct from any medical complications of their stroke, such as dementia, arthritis, psychiatric disease etc. Similarly, of the 12 patients discharged with a primary diagnosis of fractured neck of femur, 9 had pre-existing dementia (two of them were also alcoholic), one had Parkinson’s disease, and another a stroke.

Feasibility

Over the 18 months of the study, the weekly assessment of patients in the ward was omitted only once. No extra resources were needed except the paper for the proforma and access to a photocopier.

Total Barthel score on admission and discharge

Table 2 shows that severe and very severe dependence was much less common by the time of discharge and that mild and moderate dependence was more common.

Table 2. Number of patients at different dependency levels according to Barthel scores on admission and discharge (n = 80).

| Dependency level | On admission | On discharge |
|------------------|--------------|--------------|
| Independent      | 0 (0%)       | 2 (2.5%)     |
| (Barthel 20)     |              |              |
| Mild dependence  | 3 (4%)       | 28 (35%)     |
| (Barthel 15–19)  |              |              |
| Moderate dependence | 13 (16%) | 24 (30%)     |
| (Barthel 10–14)  |              |              |
| Severe dependence | 35 (44%)   | 20 (25%)     |
| (Barthel 5–9)    |              |              |
| Very severe dependence | 29 (36%) | 6 (7.5%)     |

The median Barthel score for the 80 live discharges was 6 on admission and 13 at discharge. Table 3 shows that this change was highly significant for the group as a whole and for each of the three main diagnostic groups. Even the most dependent patients showed significant improvement as a group (median change in Barthel 7; p < 0.001), as did the severely (median change 6; p < 0.001) and moderately (median change 3; p < 0.025) dependent groups. Analysis of the changes in category for all the above groups yielded no extra or different information.

There were no significant differences in either the admission Barthel or the change in Barthel between patients admitted from acute geriatric, general medical or orthopaedic wards.

Barthel score and destination on discharge

Figure 1 shows that nearly all patients discharged to nursing homes had a Barthel < 10 (median 7) and MTS < 7 (median 1.5). One had a live-in carer. None discharged to residential homes had this profile (Barthel median 14.5, MTS median 6.5). One had a live-in carer; all had psychiatric or behavioural problems. The indices were significantly different between the two groups (Wilcoxon; p < 0.01 and p < 0.025). Amongst those discharged home (Barthel median 15,
MTS median 7.5), such problems were absent; live-in carers were common and could support those with a 'nursing home' Barthel/MTS profile. Such patients were rarely discharged home alone unless unlikely to refuse services and initiate unsafe behaviour. Care packages supported those with low Barthel but higher MTS, even if alone.

Although three of the four patients discharged to hospital continuing care wards (median Barthel 3.5, median MTS1) had a 'nursing home profile' of MTS and Barthel scores, they also had behavioural problems too severe for nursing homes to cope with. The other (Barthel 3) had an MTS of 10, but her extreme skin fragility necessitated hospital continuing care.

Discussion

The RCPL/BGS report called for evaluation of the feasibility and resources needed to use standard assessments of elderly people in a variety of clinical settings [1]. The Wessex region reported that compliance of individual consultants with a standard of Barthel assessment at discharge and at admission varied from nil to 100% [9]. We found, however, that it was feasible to incorporate regular assessment of disability by the Barthel index along with regular assessment of cognitive function by the MTS into the medical and nursing routine of a ward that provides intensive prolonged rehabilitation of elderly people, without extra resources and with little training. As in our study on acute ward patients, we suggest that the act of recording the individual items may have focused the attention of doctors and nurses on patients' functional progress better than the usual nursing and medical assessments [5].

The report suggested that Barthel scores, at certain time intervals, have the potential to be used as a case-mix adjuster for comparing groups of patients [1]. Our data provide some support for this; patients transferred to the rehabilitation ward were more disabled (Table 2) than those discharged home from our rapid turnover acute ward [5], amongst whom the median Barthel was 18, and of whom 39% were independent, 36% mildly dependent, 15% moderately, 4% severely and 6% very severely dependent. This difference can probably be attributed to the nature and severity of the primary diagnoses, the higher prevalence of dementia (31% vs 63%), and the frequent presence of multiple disabling disorders amongst those transferred to the rehabilitation ward. These observations are consistent with the concept of the Barthel as a case-mix adjuster reflecting the impact of disease in elderly people.

The RCPL/BGS report suggested that the Barthel score could act as an outcome measure but feared that in older people it might prove insensitive to health care interventions such as multidisciplinary management. Our experience during routine clinical use demonstrates that for groups of patients the Barthel is sensitive to clinically important changes during such intervention (Table 3). No previous study has demonstrated this in a diagnostically mixed rehabilitation ward for elderly people. In theory this improvement could be purely spontaneous. However, it may indicate that the overall package of consultant-led, nurse and remedial therapy based rehabilitation is effective in
increasing patients' independence in self care across several diagnostic groups. On acute elderly wards much of the improvement in self care can be attributed to treatment of the acute illness. However, since the patients transferred to the rehabilitation ward in this study were medically stable, it is less likely that medical treatment of the underlying pathology had much influence on the reduction of disability. The true value of such rehabilitation wards can ultimately be shown only by a randomised controlled trial of, for example, a suitable domiciliary-based alternative [10,11] in which the Barthel might be one of a number of chosen outcome measures.

The RCPL/BGS report speculated that, although links between use of resources and scores on assessments such as the Barthel and MTS were as yet unknown, these assessments might have the potential to model resource utilisation [1]. We found a strong relationship of Barthel and MTS scores on discharge with use of residential care, nursing home or hospital continuing care beds. Previous studies with stroke patients have shown that the Barthel score is strongly related to destination on discharge [12]. Community studies with a more heterogeneous population have also shown that those in different categories of accommodation have characteristic patterns of Barthel scores and of cognitive impairment [13]. The data from our routine use of Barthel and MTS scores suggest that these might be useful guides to discharge destination and could be used by individual geriatric units as standards for the process of audit of discharge practices. However, they should not be used in isolation. Other factors, such as live-in carers, behavioural or psychiatric problems are also important (Fig 1).

The RCPL/BGS report suggested that categorisation of the raw Barthel scores might hold the key to their interpretation. The categories used by Wade and colleagues were not specifically mentioned but we found them neither too broad nor too narrow for there to be a clear relationship between category of dependency and destination on discharge, with patients placed in nursing homes coming from the two most dependent categories (Fig 1). Categorisation might come more clearly into its own if further studies could establish relationships between categorisation and outcome, or as a device for stratification of patients with different severities of initial disability. However, for registering change in groups of patients we found that categorisation had no advantage over using raw scores.

The RCPL/BGS report, in its conclusions, urged adoption of the Barthel for standard use in hospital so that wider experience could be gained. Our observations in a rehabilitation ward for older people suggest that weekly use of the Barthel is feasible. They also provide some support for the report's suggestions that the Barthel has potential to be used in case-mix analysis and outcome measurement, given its responsiveness to clinically important differences between and changes in groups of patients.

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