

**Title of measure:**  
**Barthel Index of Activities of Daily Living (ADLs)**

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**Brief overview:**

The Barthel Index of Activities of Daily Living (ADLs), first developed in 1965 (1) and later modified by Granger et al.(2), measures functional disability by quantifying patient performance in 10 activities of daily life. These activities can be grouped according to self-care (feeding, grooming, bathing, dressing, bowel and bladder care, and toilet use) and mobility (ambulation, transfers, and stair climbing). 5-point increments are used in scoring, with a maximal score of 100 indicating that a patient is fully independent in physical functioning, and a lowest score of 0 representing a totally dependent bed-ridden state. A five-item short form of the Barthel Index is also available (3). The test takes approximately 5 minutes to complete and should be used as a record of what a patient does, not of what a patient can do. Direct testing of the patient is not needed, as information can be derived from friends/relatives and nurses; although, the best available evidence should be used in evaluating the patient's performance.

**Validated:**

Originally designed by Mahoney and Barthel for use in scoring improvement during rehabilitation of patients with chronic neuromuscular or musculoskeletal disorders, the Barthel index has also been validated in the setting of primary brain tumors and brain metastases (4-7) and is considered easy to use, reliable and sensitive to change.

**Psychometric properties:**

The Barthel Index has been reported to have excellent reliability and validity and adequate responsiveness to change, in measuring neurologic physical disability. Hobart et al. compared psychometric properties of the Barthel Index with newer and lengthier scales, the Functional Independence Measure (FIM) and the Functional Independence Measure + Functional Assessment Measure (FIM+FAM), in patients undergoing rehabilitation. All three rating scales demonstrated equivalent reliability and validity in measuring physical disability, and were similarly responsive to change. This study suggested that the newer and more extensive rating scales of FIM and FIM+FAM offered few advantages over the more practical and economical Barthel Index (8). Similar results were observed in studies of patients with multiple sclerosis and stroke (9, 10).

However, the Barthel Index is limited by inherent ceiling and floor effects, potentially limiting its responsiveness to change in the chronic setting. Schepers et al. compared the Barthel Index with the FIM and other functional health status measures in stroke patients admitted for inpatient rehabilitation. They compared floor/ceiling effects and responsiveness, quantified by effect sizes, between three time points: rehabilitation admission, six months post-stroke (subacute phase) and between six and 12 months post-stroke (chronic phase). Though the Barthel Index demonstrated a large effect

size in the subacute phase, a smaller effect size was observed in the chronic phase. This was attributed to the interference of the ceiling effect with the assessment of responsiveness in the chronic phase (11). In addition, the Barthel Index is based on an ordinal rather than interval scale. With ordinal scales, the overall score is obtained by adding up arbitrary numerical values assigned to a subject's ratings on a series of items. This limits the scale's ability to quantify the exact amount of change between measurements. Van Hartingsveld et al. examined Barthel Index scores on 559 stroke patients using a Rasch probability model that weighted scores based upon "patient ability" and "item difficulty." In doing so, they observed an improvement in the psychometric properties and clinical interpretation of the Barthel Index (12).

The psychometric properties of the five-item short form of the Barthel Index have also been studied prospectively in patients admitted with a stroke by Hsueh et al. In comparison to the Barthel Index and the FIM, they observed limitations in the 5-item short form in patients with severe disability due to a notable floor effect. Otherwise, psychometric properties were similar (9).

The psychometric properties of the Barthel Index have also been tested in brain tumor patients. In patients with high-grade gliomas, Brazil et al. demonstrated that a verbally administered Barthel Index was sensitive to change, correlated with other measures of functional impairment including the Karnofsky performance score (KPS), and prognosticated for survival (5). In the setting of brain metastases, Herman et al. demonstrated the feasibility of administering the Barthel Index, along with other neurocognitive tests, in patients with brain metastases.

**Normative data:**

Normative data do not exist for the Barthel Index.

**Clinically significant changes:**

Clinically significant changes can be determined by calculating effect sizes between baseline and subsequent total scores. Though many effect size calculations exist, a commonly used calculation divides the mean absolute change score by the standard deviation of the baseline scores (13). The interpretation of the magnitude of the effect size is then based on Cohen's rule-of-thumb, in which an effect size of 0.2-0.5 represents a small effect, 0.5-0.8 represents a moderate effect, and 0.8 or greater represents a large effect (14).

**Website or how to register to use:**

Go to [www.copyright.com](http://www.copyright.com) to get permission to use the Barthel Index, copyrighted to the Maryland State Medical Society. Search under "Maryland State Medical Journal," the journal in which the index was initially published (1). Through this website, a request for academic license can be made. A representative from the Maryland State Medical Society should respond to you within a few days. If no response is received, consider contacting the Society directly at [www.medchi.org](http://www.medchi.org). The permission information should be given to RTOG headquarters for each RTOG QOL study.

**List any fees for usage:**

Currently, there are no fees for use of the academic not-for-profit use of the Barthel Index. A fee may be charged if a pharmaceutical company is sponsoring the trial.

**Languages available:**

The Barthel Index has been translated into Spanish(15) and Persian (16).

**Instructions for CRAs and or credentialing for administration:**

There is no credentialing needed for administration of the Barthel Index. The Barthel Index can be completed by the patient without assistance. Direct testing of the patient is not needed, as information can be derived from friends/relatives and nurses (17); although, the best available evidence should be used in evaluating the patient's performance. Self-report by telephone has also been found reliable (18).

**Time required to complete the instrument:**

The majority of patients complete the questionnaire within 5-10 minutes without assistance and 2-5 minutes with assistance.

**Quality assurance for administration (if needed):**

Each protocol has instructions for the CRA's.

**Scoring of instrument:**

The Barthel Index consists of 10 items assessing the ability to achieve certain activities without assistance. It evaluates the ability of feeding, moving from wheelchair to bed and returning, doing personal toilet, getting on and off toilet, bathing self, walking on level surface, ascending and descending stairs, dressing, controlling bowels and controlling bladder. Scoring ranges from 0 (completely dependent) to 100 (completely independent) with intervals of 5 points.

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