

Assessment and outcome measurement tools

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Assessment and outcome measurement tools

Introduction

Recent efforts by the Joint Stroke Strategy Working Group; the Joint Policy and Planning Committee (JPPC) of the Ministry of Health and Long-Term Care and the Ontario Hospital Association; the Rehabilitation Working Group; the Canadian Institute for Health Information (CIHI); and the Ontario Stroke Registry Pilot Project have all focused attention on the need for coordinated care and coordinated outcome measurement. A coordinated provincial monitoring system for evaluating stroke care, patient outcomes, and resource utilization in stroke is being developed. These initiatives highlight the importance of using standardized outcome measures to monitor stroke patients across the continuum. Standardized outcome measures that are chosen should:

- be applicable to a broad range of stroke survivors
- have adequate sensitivity to capture all levels of independence
- facilitate the evaluation of the impact of the stroke on the individual
- complement other assessments, while avoiding duplication
- become part of the patient's medical record
- be valid, reliable, responsive, and sensitive to change.

Selecting appropriate outcome measurement tools can be a complex task, as each measure has limitations, a single measure is usually insufficient, and outcome measurement tools should complement each other. Also, some tools are restricted to specific disciplines or are designed to be used by individuals trained to administer them and evaluate and interpret the results. For example, the evaluation of cognition is a complex area and is usually performed by a specially trained psychologist or an occupational therapist, who is experienced in screening patients for cognitive and perceptual deficits.

The use of integrated interdisciplinary assessment tools allows integration of the assessment process, which has several benefits. Integrated assessment provides an interdisciplinary assessment that:

- avoids duplication, reducing effort and resource use
- increases time available for therapy
- prevents client and caregiver frustration associated with repeated assessments
- supports seamless transitions and improves information sharing by using compatible outcome measures
- allows the development of a clinical consensus for decision making.

Important integrated assessment tools that are being used more frequently now include the National Institutes of Health Stroke Scale (NIHSS) in acute care and the Canadian Institutes of Health Research National Rehabilitation Reporting System (CIHI NRS) in rehabilitation.

This module provides a brief overview of commonly-used assessment tools. The measurement of client satisfaction is an important component of care, but tools to measure client satisfaction are not included in this manual, because institution-specific measures are usually used.

Assessment and outcome measurement tools



Acute diagnosis and assessment

ASPECTS

To score baseline CT scans of individuals who present with an acute stroke and meet the inclusion criteria for thrombolytic therapy, ASPECTS is used.^{1,2} ASPECTS quantitatively keeps tally of the amount of early ischemic change in the middle cerebral artery territory (MCA). The CT scan should also be assessed for the presence or absence of hemorrhage, edema or swelling, effacement, a

hyperdense MCA sign, vertebrobasilar (VB) artery territory hypodensity, posterior cerebral artery (P) hypodensity, and anterior cerebral artery (A) hypodensity. ASPECTS assesses the MCA territory on the basis of two standardized axial cuts, one at the level of the thalamus and basal ganglia, and one superior to this level but such that ganglionic structures are not involved.

The baseline ASPECTS value predicts functional outcome and intracerebral hemorrhage. This CT scoring system is simple, reliable, and identifies individuals unlikely to make an independent recovery despite thrombolytic treatment.

References

1. Barber PA, Demchuk AM, Zhang J, Buchan AM. Validity and reliability of a quantitative computed tomography score in predicting outcome of hyperacute stroke before thrombolytic therapy. ASPECTS Study Group. *Alberta Stroke Programme Early CT Score. Lancet* 2000;**355**:1670-1674.
2. The Canadian Stroke Consortium, Hoffmann-La Roche Limited, Heart and Stroke Foundation of Canada. *CASES-CT Scan Form* [online]. Retrieved September 6, 2000: <<http://www.strokeconsortium.ca/CASES/FR.A4biv.html>> The Canadian Stroke Consortium; 2000 [accessed October 8, 2002].

GCS

The GCS is used to assess decreased levels of consciousness, and it is therefore not useful in alert stroke patients. It evaluates physiological deficits associated with stroke and assesses basic neurological function at the cortical, midbrain and brainstem levels. This well-validated tool is suitable for rapidly evaluating improvement or deterioration in neurological status in the acute phase of stroke. Scores are

highly correlated to those seen on CT scan, and the GCS is predictive of short- and long-term mortality and major morbidity from stroke. It is endorsed by the *Clinical Practice Guidelines for Stroke* published in the US by the Agency for Health Care Policy and Research (AHCPR, 1995). The GCS only evaluates impairment at a basic level, not activity, ADL limitations or limitations to participation. It is not suitable for rehabilitation or community settings.

References

1. Hall K, Cope N, Rappaport M. Glasgow Outcome Scale and Disability Rating Scale: comparative usefulness in following recovery in traumatic head injury. *Arch Phys Med Rehabil* 1985;**66**:35-37.
2. Teasdale G, Jennett B. Assessment of coma and impaired consciousness. A practical scale. *Lancet* 1974;**2**:81-84.

CNS

Impairment or physiological deficit is measured by the CNS. Measuring cognition and motor response in stroke, it is suitable for use in an acute care setting. The CNS is sensitive to change and predictive of death, re-infarction, and functional independence at 6 months. It is endorsed by the *Clinical Practice Guidelines for Stroke* published in the US by the Agency for Health Care Policy and Research (AHCPR, 1995).

References

1. Cote R, Battista RN, Wolfson C, Boucher J, Adam J, Hachinski V. The Canadian Neurological Scale: validation and reliability assessment. *Neurology* 1989;**39**:638-643.
2. Bushnell CD, Johnston DCC, Goldstein LB. Retrospective

assessment of initial stroke severity: comparison of the NIH Stroke Scale and the Canadian Neurological Scale. *Stroke* 2001;**32**:656-660.

NIHSS

The NIHSS is a 15-item scale that measures various physiological deficits associated with stroke. It is primarily suited to the acute care setting. The NIHSS measures LOC, vision, extraocular movements, facial palsy, limb motor responses, ataxia, sensation, neglect, dysarthria, and aphasia. Results correlate well with anatomic changes and physiological deficits. It does not measure activity, ADL, or participation limitations. The NIHSS is well validated in the literature and is predictive of resource utilization. It is recommended by the *Clinical Practice Guidelines for Stroke* published in the US by the Agency for Health Care Policy and Research (AHCPR, 1995). The NIHSS is not well suited to rehabilitation or community settings.

References

1. Brott T, Adams HP, Olinger CP, et al. Measurements of acute cerebral infarction: a clinical examination scale. *Stroke* 1989;**20**:864-870.
2. Bushnell CD, Johnston DCC, Goldstein LB. Retrospective assessment of initial stroke severity: comparison of the NIH Stroke Scale and the Canadian Neurological Scale. *Stroke* 2001;**32**:656-660.
3. Adams HP Jr, Davis PH, Leira EC, et al. Baseline NIH Stroke Scale score strongly predicts outcome after stroke: a report of the Trial of Org 10172 in Acute Stroke Treatment (TOAST). *Neurology* 1999;**53**:126-131.



Global functional ability

FIM

The FIM is a generic calculation of disability applicable to many different patient populations and is the most widely adopted functional status measure today. The FIM assesses self-care, transfers, locomotion, sphincter control, communication, and cognition, assessing physical and cognitive function in the context of relative burden of care.

The FIM gauges the amount of assistance and resources a disabled person will use in their living environment, and the FIM score is a basic indicator of disability, not impairment. Severity of disability changes during rehabilitation, therefore the data generated by the FIM can be used to track such changes and analyze the outcomes of rehabilitation. It is most useful in rehabilitation, but it is also used in acute care and in community settings. The FIM is exceptionally well validated in international trials. It is reliable, valid and responsive in all of these settings.

Significant training and certification are required to standardize assessment. The FIM should not be used in isolation, but as an indicator of activity limitations.

References

1. Uniform Data System for Medical Rehabilitation [online], 2002: <<http://www.udsmr.org>> [accessed October 8, 2002].
2. Granger CV, Hamilton BB, Sherwin FS. Guide for use of the uniform data set for medical rehabilitation. Buffalo: Project Office, Department of Rehabilitation, State University of New York, 1987.
3. Stineman MG, Hamilton BB, Goin JE, Granger CV, Fiedler RC. Functional gain and length of stay for major rehabilitation impairment

categories. Patterns revealed by function related groups. *Am J Phys Med Rehabil* 1996;75:68-78.

Alpha FIM

The Alpha FIM is a brief version of the FIM. It measures a subset of FIM items — 4 motor items (eating, grooming, bowel control, and toilet transfer) and 2 cognition items (expression, memory) — and the results are highly correlated with the FIM score as a whole. The Alpha FIM is useful in acute care, because it takes less time to administer than the full FIM.

Reference

1. Uniform Data System for Medical Rehabilitation [online], 2002 [cited October 8, 2002]: <<http://www.udsmr.org>>.

CIHI NRS

The CIHI NRS is an instrument that includes the FIM, measures of pain, and instrumental ADL. It also includes system indicators, such as length of stay and resource utilization. The Ministry of Health and Long-Term Care has mandated the use of CIHI NRS for institutions with designated inpatient rehabilitation beds.

Reference

1. Canadian Institute for Health Information [online]. Revised July 8, 2002: <<http://www.secure.cihi.ca/cihiweb/disPage/>> [accessed October 9, 2002].

CIHI MDS-HC

The CIHI MDS-HC is being implemented throughout CCACs in Ontario to determine the resource level required for rehabilitation of various populations, including stroke survivors.

Reference

1. Hirdes JP, Fries BE, Morris JN, et al. Integrated health information

systems based on the RAI/MDS series of instruments. *Healthc Manage Forum* 1999;12:30-40.

Barthel Index (modified)

In North America, the Barthel Index has largely been replaced by FIM. The modified Barthel Index assesses functional independence in personal care and mobility. This index measures mobility, stair climbing, self-care, and incontinence, using a 5-point rating scale ranging from *fully independent* to *unable to perform task*.

The Barthel Index is a valid and reliable measure that is useful in both acute care and in rehabilitation settings, and it has been widely used throughout the stroke literature. It is sensitive to change and is well documented throughout literature as able to demonstrate both change and progress over time. However, it should not be used alone for predicting outcomes, as it is possible to over- or under-estimate independence. The Barthel Index does not test cognitive function.

References

1. Mahoney FI, Barthel DW. Functional evaluation: The Barthel Index. *Maryland State Med J* 1965;14:56-61.
2. Korner-Bitensky N, Wood-Dauphinée S. Barthel Index information elicited over the telephone: Is it reliable? *Am J Phys Med Rehabil* 1995;74:9-18.
3. Wolfe CDA, Taub NA, Woodrow BA, Burney PGI. Assessment of scales of disability and handicap for stroke patients. *Stroke* 1991; 22:1242-1244.

Rankin Handicap Scale (modified)

The modified Rankin Handicap Scale assesses and grades the level of disability of stroke patients.

Independence is measured using a 6-grade scoring scale, ranging from *no symptoms* to *severe disability*. This scale is often used in emergency and acute care as a gross measure of disability. However, it is not sensitive or comprehensive enough to be used in rehabilitation or community care.

References

1. Rankin J. Cerebral vascular accidents in patients over the age of 60. *Scott Med J* 1957;**2**:200-215.
2. Bonita R, Beaglehole R. Recovery of motor function after stroke. *Stroke* 1988;**19**:1497-1500.
3. Van Swieten JC, Koudstaal PJ, Visser MC, Schouten HJ, van Gijn J. Interobserver agreement for the assessment of handicap in stroke patients. *Stroke* 1988;**19**:604-607.

Oxford Handicap Scale

The Oxford Handicap Scale, which is a modification of the Rankin scale, is a simple way of assessing disability.

References

1. Bamford JM, Sandercock PAG, Warlow CP, Slattery J. Interobserver agreement for the assessment of handicap in stroke patients. *Stroke* 1989;**20**:828.
2. Bamford J, Sandercock P, Dennis M, Burn J, Warlow C. Classification and natural history of clinically identifiable subtypes of cerebral infarction. *Lancet* 1991;**337**:1521-1526.

RNL Index

The RNL Index assesses global functional status and measures both the stroke survivors' perceptions of their own capabilities and objective indicators of physical, social, and psychological performance. The index is responsive to changes in the clinical status of patients, especially for the subscales Daily Living and Perceptions of Self. In terms of

criterion validity, the index is somewhat related to work status and disease status. The RNL Index is primarily useful in rehabilitation and in the community setting.

Reference

1. Wood-Dauphinée SL, Opzoomer MA, Williams JI, Marchand B, Spitzer WO. Assessment of global function: the Reintegration to Normal Living Index. *Arch Phys Med Rehabil* 1988;**69**:583-590.



Mobility, balance, and motor function

Chedoke McMaster

Stroke Assessment Scale

Specifically designed for use in stroke, the Chedoke McMaster Stroke Assessment Scale measures motor function in the upper and lower extremity.

Reference

1. Gowland C, Stratford P, Ward M, et al. Measuring physical impairment and disability with the Chedoke-McMaster Stroke Assessment. *Stroke* 1993;**24**:58-63.

COVS

The COVS is a functional mobility assessment, scoring 13 items, such as bed mobility, transfers, ambulation, and upper extremity function. COVS is applicable to a variety of rehabilitation populations, including stroke survivors.

References

1. Institute for Rehabilitation Research and Development [online]: <<http://www.rehab.on.ca/irrd/covs>> [accessed October 8, 2002].
2. Seaby L, Torrance G. Reliability of a physiotherapy functional assessment used in a rehabilitation setting. *Physiother Can* 1989;**41**:264-270.

MAS

Designed specifically for use in stroke, the MAS is a brief assessment of movement and physical mobility. Its reliability has been assessed only in stable individuals.

References

1. Carr JH, Shepherd RB, Nordholm L, Lynne D. Investigation of a new motor assessment scale for stroke patients. *Phys Ther* 1985;**65**:175-180.
2. Loewen SC, Anderson BA. Reliability of the Modified Motor Assessment Scale and the Barthel Index. *Phys Ther* 1988;**68**:1077-1081.
3. Poole JL, Whitney SL. Motor Assessment scale for stroke patients: concurrent validity and interrater reliability. *Arch Phys Med Rehab* 1988;**69**:195-197.

STREAM

Designed specifically for use in stroke, STREAM measures motor function in the upper and lower extremity and ability to change position. STREAM tends to measure the impairment level rather than the activity level.

Reference

1. Daley K, Mayo N, Wood-Dauphinée S. Reliability of scores on the Stroke Rehabilitation Assessment of Movement (STREAM) measure. *Phys Ther* 1999;**78**:8-23.

Berg Balance Scale

The Berg Balance Scale measures the ability of an individual to maintain balance while performing movements, such as transfers from bed to chair, standing from a sitting position, picking up objects, turning, and other common actions. It helps determine changes in functional standing balance over time and is a useful tool for assessing a patient's risk for falls and the need for an assistive device.

The Berg Balance Scale is most useful as a predictor of falls in the elderly and in stroke survivors, and it can also be used as an objective, qualitative measure of improvement through clinical intervention.

References

1. Wood-Dauphinée S, Berg K, Bravo G, Williams JI: The Balance Scale: Responding to clinically meaningful changes. *Canadian Journal of Rehabilitation* 1997;10:35-50.
2. Berg K, Wood-Dauphinée S, Williams JI: The Balance Scale: reliability assessment for elderly residents and patients with an acute stroke. *Scand J Rehabil Med* 1995;27:27-36.
3. Shumway-Cook A, Baldwin M, Polissar NL, Gruber W: Predicting the probability for falls in community-dwelling older adults. *Phys Ther* 1997;77:812-819.

TUG Test

TUG is a validated balance test that measures the ability of patients to perform sequential locomotor tasks incorporating walking, turning, and moving from sitting to standing.

Reference

1. Podsiadlo D, Richardson S: The timed "Up & Go": a test of basic functional mobility for frail elderly persons. *J Am Geriatr Soc* 1991; 39:142-148.



Cognitive and perceptual ability

MMSE

The MMSE is used for the screening, diagnosis, and assessment of cognition in psychogeriatric patients. It evaluates orientation, attention, immediate and short-term recall, language, and the ability to follow simple verbal and

written commands. The total score, combined with years of education, can detect impairment in cognition. The MMSE cannot be used alone for diagnostic purposes. It is useful for detecting significant cognitive impairment, but it is not sensitive enough to detect more subtle cognitive and perceptual deficits that may be seen in stroke survivors.

References

1. Dick JP, Guiloff RJ, Stewart A, et al. Mini-mental state examination in neurological patients. *J Neurol Neurosurg Psychiatry* 1984; 47:496-499.
2. Folstein MF, Folstein SE, McHugh PR. "Mini-mental state": a practical method for grading the cognitive state of patients for the clinician. *J Psychiatr Res* 1975;12:189-198.

MVPT

The MVPT is designed to assess visual perception in individuals with possible learning, cognitive, motor, or physical limitations. It evaluates 5 types of visual perception: spatial relationships, visual discrimination, figure-ground discrimination, visual closure, and visual memory. The MVPT requires special training and is usually administered by an occupational therapist.

Reference

1. Colarusso RP, Hammill DD, eds. *Motor Free Visual Perception Test (MVPT)*. Novato, CA: Academic Therapy Publications, 1972.

RBMT

The RBMT is a clinical memory test that provides an objective measure for various everyday recall problems reported and observed in patients with memory difficulties. This test provides two scores, a screening score and a more detailed profile score. The screening score estimates whether

an individual is likely to have everyday memory problems, and the profile score offers a more sensitive measure of change. The RBMT can be used for repeated assessment to monitor stability, improvement, or deterioration over time.

Reference

1. Thames Valley Test Company [online]: <<http://www.tvtc.com:8080/tvtc/tvtcpage/rbmt.html>> [accessed October 8, 2002].

WAIS®-III

The WAIS®-III is a general test of intelligence. The WAIS®-III consists of 11 subtests divided into two parts, verbal and performance. The verbal tests are information, comprehension, arithmetic, digit span, similarities, and vocabulary. The performance tests are picture arrangement, picture completion, block design, object assembly, and digit symbol. The WAIS®-III must be administered by a trained psychologist.

Reference

1. The Psychological Corporation [online]: <<http://www.psychcorp.com/catalogs/paipc/psy028-029apri.htm>> [accessed October 8, 2002].

PAS (cognition)

The PAS assesses cognition and depression in the elderly on a continuum and compares the results to the normal range of the elderly in the community. The PAS consists of an interview with the stroke survivor and an interview with a relative, caregiver, or other individual who knows the subject well. The interviews provide different perspectives on the subject's functioning. The PAS assesses cognition on a continuum that ranges from normal cognitive aging at one end to severe dementia at the other.

Reference

1. Psychogeriatric Assessment Scales [online]. Mental Health Research Institute, 1998 [cited October 8, 2002]: <<http://www.mhri.edu.au/pas>>.



Mood

BDI

The BDI is a widely used and easily administered scale for measuring depression in stroke patients. It is less useful in elderly individuals and in patients with aphasia or neglect. A high rate of false positives is seen, and somatic scores may be unrelated to depression.

References

1. Beck AT, Ward CH, Mendelson M, Mock J, Erbaugh J. An inventory for measuring depression. *Arch Gen Psychiatry* 1961;4:561-571.
2. Beck AT, Steer RA. *Beck Depression Inventory — Manual* (revised edition). San Antonio: Psychological Corporation;1987.

BASDEC

BASDEC is a useful tool for assessing depression in individuals who have suffered a stroke, as the ability to verbalize is not required because cards are used. BASDEC should be administered according to the standardized instructions. A patient scoring 7 or more points may be suffering from a depressive disorder.

Reference

1. Adshead F, Cody DD, Pitt B. BASDEC: a novel screening instrument for depression in elderly medical in-patients. *BMJ* 1992;305:397.

HADS

The HADS is a self-report questionnaire developed to detect anxiety and depressive states in hospitalized individuals. Therefore, it has limitations in aphasic populations. Because it was developed for use in non-psychiatric departments, it does not rely upon symptoms that may be present in people with physical illness alone, such as pain and weight loss. HADS is equally effective in hospital, outpatient or community settings. HADS is relatively unaffected by concurrent physical illness and designed for repeat administration, so that progress or outcomes can be compared.

Reference

1. Zigmond AS, Snaith RP. The hospital anxiety and depression scale. *Acta Psychiatr Scand* 1983;67:361-370.

PAS (depression)

The PAS assesses cognition and depression in the elderly on a continuum, and it compares the results to the normal range in the elderly in the community. The PAS consists of an interview with the stroke survivor and an interview with a relative, caregiver, or other individual who knows the subject well. The interviews provide different perspectives on the subject's functioning. The PAS assesses mood on a continuum ranging from positive well-being in old age to severe depression.

Reference

1. Psychogeriatric Assessment Scales [online]. Mental Health Research Institute, 1998: <<http://www.mhri.edu.au/pas>> [accessed October 8, 2002].



Quality of life

Caregiver Strain Index

The Caregiver Strain Index is a questionnaire that can help identify the need for intervention and is used with individuals who are caring for someone at home. This index correlates with caregivers' perceptions of the caretaking relationship and with the physical and emotional health of the caregiver and of the person receiving care.

Reference

1. Robinson BC. Validation of a Caregiver Strain Index. *J Gerontol* 1983;38:344-348.

SF-36

The SF-36 is a generic and subjective measure of health-related quality of life. The physical composite score includes measures of physical function, physical role, bodily pain, and general health. The mental composite score includes social function, emotional role, mental health, and vitality. It is usually self-administered, but has been validated in interview and mail formats as well. Because it has been well validated in the international literature for a wide variety of patient populations and for normal individuals, the SF-36 is useful for comparing populations. The SF-36 has been studied in acute, rehabilitation, and community settings.

Results are correlated with return to work, symptomatology, and resource utilization, and they are responsive to change. The SF-36 is particularly suited to the community setting when clients reintegrate into the community and attempt to resume normal roles. However, communication deficits may create difficulties in administering the SF-36 to some stroke survivors.

References

1. Ware JE. *SF-36 Physical and Mental Health Summary Scales: A User's Manual*. The Health Institute, New England Medical Center: Boston, MA, 1994.
2. Ware, JE. SF-36 [online]. Web site hosted by Quality-Metric Incorporated: <<http://www.sf-36.com>> [accessed October 8, 2002].

SF-12

The SF-12 is a 12-item, 2-minute questionnaire developed from the SF-36 to monitor health-related quality of life. The summary physical and mental health outcome scores are interchangeable with those from the SF-36. The SF-12 is used extensively as a screening tool and is frequently embedded into longer, condition-specific surveys.

References

1. Ware JE. *SF-36 Physical and Mental Health Summary Scales: A User's Manual*. The Health Institute, New England Medical Center: Boston, MA, 1994.
2. Ware, JE. SF-36 [online]. Web site hosted by Quality-Metric Incorporated: <<http://www.sf-36.com>> [accessed October 8, 2002].

SIS

The SIS assesses several aspects of health-related quality of life that are important to stroke survivors, caregivers, and healthcare professionals. These aspects include physical factors (strength, hand function, mobility, and activities of daily living), emotion, communication, memory and thinking, and social participation.

Reference

1. Online: <http://www2/kumc/edu/coa/SIS_Database/stroke-impact.htm> [accessed October 30, 2002].



Pain

VAS

The VAS is a simple and accurate way of subjectively assessing pain along a continuous visual spectrum. VAS consists of a straight line on which the individual being assessed marks the level of pain. The ends of the straight line are the extreme limits of pain with 0 representing *no pain* and 10 representing *the worst pain ever experienced*. Research is needed to determine the ability of the VAS to consistently measure pain in stroke patients.

Reference

1. Carlsson AM. Assessment of chronic pain I. Aspects of the reliability and validity of the visual analogue scale. *Pain* 1983;16:87-101.



Client-centred assessment

COPM

The COPM is an individualized, client-centred outcome measure designed to detect changes in an individual's perception of progress against self-set goals over time. It can be used for clients with a variety of disabilities and across all developmental stages. Changes in scores between assessment and re-assessment provide the most meaningful information using this instrument.

In a study with community-living adults, significant correlation between COPM scores and scores on the RNLI, the Life Satisfaction Scale, and the Satisfaction with Performance Scaled Questionnaire was seen. Changes in the COPM scores for Performance and Satisfaction are correlated with changes in overall function. The COPM is usually administered by an occupational therapist.

Reference

1. Baptiste S, Law M, Pollock N, Polatajko H, McColl MA, Carswell A. The Canadian Occupational Performance Measure. *World Federation of Occupational Therapy Bulletin* 1993;28:47-51.



Skin breakdown

Braden Scale for Predicting Pressure Sore Risk

The Braden Scale for Predicting Pressure Sore Risk is a widely used tool for foretelling the development of pressure ulcers in bedridden individuals. It assesses 6 risk areas for developing pressure ulcers:

- sensory perception
- skin moisture
- activity
- mobility
- nutrition
- friction or shear.

Each risk area is assigned a score ranging from 1 (highly impaired) to 4 (no impairment). Low scores indicate high risk. The Braden Scale for Predicting Pressure Sore Risk tool can be used at any stage of stroke care.

Reference

1. Braden BJ, Bergstrom N. Clinical utility of the Braden Scale for Predicting Pressure Sore Risk. *Decubitus* 1989;2:44-51.

General references

1. Kirk R. *Managing Outcomes, Process, and Cost in a Managed Care Environment*. Gaithersburg, MD: Aspen Publishers, Inc., 1997.
2. Kitchell Landrum P, Schmidt N, McLean A. *Outcome Oriented Rehabilitation: Principles, Strategies, and Tools for Effective Program Management*. Gaithersburg, MD: Aspen Publishers Inc., 1995.
3. Agency for Health Care Policy and Research of the US Department of Health and Human Services. *Clinical practice guidelines for post-stroke rehabilitation. Clinical guideline Number 16*. Rockville, MD, May 1995.
4. Cole B, Finch E, Gowland C, Mayo N, Basmajian J. *Physical Rehabilitation Outcome Measures*. Toronto, ON: Canadian Physiotherapy Association, 1994.
5. Finch E, Brooks D, Stratford O, Mayo N. *Physical Rehabilitation Outcome Measures: A Guide to Enhanced Clinical Decision Making*. 2nd ed. Toronto, ON: Canadian Physiotherapy Association, 2002.
6. McDowell I, Newell C. *Measuring Health: A Guide to Rating Scales and Questionnaires*. 2nd ed. New York: Oxford University Press, 1996.