



STROKE OF Fortune

By Corinne Hodgson

Until recently, stroke survivors and their families didn't know how much recovery they could hope for or what to expect in the future. New assessment measures and treatments are replacing uncertainty and sometimes despair with information and hope.

Stroke is one of the most devastating of neurological diseases. It not only kills (up to 20 per cent of stroke victims do not survive) but can rob survivors of their capacity to communicate, their mobility or a variety of sensory or cognitive abilities. Although stroke (also known as a “cerebrovascular accident” or “brain attack”) can be caused by a number of factors (see *A Stroke Primer*), one of the most powerful risk factors is age. After age 55, a person’s risk of stroke doubles with each decade. As the baby boom generation ages, experts warn that the number of strokes across North America will probably increase. In turn, the cost of the disease (currently estimated to be \$2.8 billion a year in Canada and \$30 billion in the United States) could escalate dramatically.

Prevention is, of course, critical in controlling the future burden

of stroke. But the needs of those who have already had a stroke – and their families – must not be overlooked. There is now convincing evidence that stroke mortality, morbidity and costs (particularly hospital and long-term care costs) can be significantly reduced if there is effective, organized care throughout the acute and rehabilitative phases (see *New Treatments, New Hope*). In a related development, there are also new ways of assessing the functional ability of stroke patients – assessments which can give anxious patients and families a better idea of not only what has happened but what to expect in the future.

From his office at the Henderson campus of the Hamilton Health Sciences Corporation, Dr. David Harvey, director of rehabil-

The brain is revealing itself to have greater "plasticity" than was once thought.

itation services and an associate professor at McMaster University, notes that Hamilton hospitals were among the first in the country to use the Functional Independence Measure (FIM) scale. FIM scores assess, in a standardized manner, the ability of stroke survivors to complete a number of activities of everyday life such as grooming, toileting, feeding and getting around, as well as social, memory and cognitive functioning.

"We test a stroke survivor's FIM score at three points in time: before beginning rehabilitation therapy, during rehabilitation (usually between 4 to 6 weeks post-stroke) and at three months," explains Dr. Harvey. "As well as being a valuable research tool, FIM scores have a number of practical uses. They enable us to predict how independent a stroke survivor is likely to become and how much care they'll probably require."

This information improves the ability of families and home-care agencies to plan and prepare for the return of patients to their home. And planning is essential. Up to 80 per cent of stroke survivors eventually return to their homes but close to a third (31 per cent) will require assistance in the activities of daily living and 20 per cent help walking.

Since 1993, the rehabilitation program in Hamilton has submitted FIM score data to an Unified Data System (UDS). With one of the largest and most complete data bases in the country at their disposal, the Hamilton researchers have been able to research and demonstrate the effectiveness of rehabilitation therapy.

"We can now state with confidence," explains Dr. Harvey, "that rehabilitation improves a stroke survivor's FIM score an average of 20 points. What does a 20-point improvement mean? It means that by the time a patient leaves in-hospital rehabilitation, he or she will require one hour less per day of help with the activities of everyday life." For family members and caregivers, this represents a significant reduction in the burden of daily care.

Up the hill from Dr. Harvey's unit sits the Chedoke campus, home of the Chedoke-McMaster Stroke Assessment scale. Developed over a twenty-year period (1972 to 1992), the scale assesses

and helps to predict motor functioning and recovery after stroke.

"In the early 1970s, stroke therapists at the Chedoke Rehabilitation Centre realized they required a quantitative measure of client status on which to base treatment decisions and determine treatment impact," recalls Susan Barreca, a therapist, researcher and clinical lecturer in the School of Rehabilitation Sciences at McMaster University. "The scale that evolved is a valuable research tool, particularly as it enables us to objectively measure change over time. It gives all of us – therapists and researchers – a common, standardized language with which to accurately describe the abilities and disabilities of patients. The scale is highly useful, as it helps us to predict what sort of outcomes we can expect in terms of motor abilities. This enables us to determine where we should assign our rehabilitation resources."

The Chedoke-McMaster Stroke Assessment and the FIM scale make it possible for health care providers to set attainable goals for rehabilitation. Doing so goes a long way in helping stroke survivors and families set reasonable expectations for the future. For the majority of stroke survivors, complete recovery (the sort of recovery touted in TV movies) is probably not in the cards. But almost all survivors can recover at least part of whatever functioning has been disrupted by stroke. Furthermore, current research is showing that recovery can continue much longer than once thought. Although the greatest and most rapid functional and neurological recovery occurs within the first one to three months after a stroke, there is increasing evidence that recovery continues, albeit at a slower rate, well beyond six months. The brain is revealing itself to have greater "plasticity" than was once thought. This "plasticity" enables the brain to develop new pathways ("collateral sprouting") to bypass damaged areas and to shift control of lost functions to alternative areas.

"The brain's control over different parts of the body recovers at different rates and at different times," says Ms. Barreca. "Part of what we are trying to do is to tap into what you could call 'well-worn grooves' of common everyday activities such as reaching for a glass of water or scratching your head



Bruce Dobie with therapist and researcher, Susan Barreca.

A Stroke Primer

A stroke is a sudden loss of brain function caused by the interruption of the flow of blood to the brain or the rupture of blood vessels in the brain. There are two main types of stroke: ischemic (caused by a blood clot blocking

an artery to the brain) and hemorrhagic (the rupture of a blood vessel and uncontrolled bleeding into the brain). The effects of a stroke depend upon how much of the brain is involved (the size of the stroke) and which part of the brain is affected (its location). Effects of a stroke can include the following deficits: motor (e.g. paralysis or neglect of an arm or leg, typically on one side of the body); communication (*aphasia*); sensory or perceptual; cognitive (e.g. memory lapses or difficulty problem-solving); and/or difficulty swallowing (*dysphagia*). Emotional changes are also common following a stroke.

and use them to help ‘retrain’ the brain.”

The Chedoke-McMaster Stroke Assessment scale is accepted and used at institutions around the world, but the Chedoke team is not prepared to rest on their laurels.

“For example, to date there has been no comprehensive, tested scale for upper-limb functioning,” says Ms. Barreca. “So we started developing a new measure. We tested stroke survivors to see what they could do with their hands and arms; as well, we asked them what they would like to do but couldn’t. Content and construct validity studies have been conducted and once the new outcome measure has been thoroughly validated, we’ll incorporate it into the scale. This will add a new and valuable dimension.”

The rehabilitation studies are only part of the overall research on stroke underway in Hamilton. Some of this work, such as that of the new Heart and Stroke Foundation of Ontario/J. Fraser Mustard Chair in Cardiovascular Research, builds on McMaster’s strong tradition of hemostasis and thrombosis research (the formation and dissolution of blood clots). Other studies look at the health service delivery and health economics issues. And since 1998, Hamilton has been one of Ontario’s four Coordinated Stroke Strategy pilot sites.

“The goal of the Coordinated Stroke Strategy program is to optimize the use of stroke resources on a regional basis,” explains Dr. Suzette Salama, Coordinator of Research for the Hamilton Health Sciences Corporation and an associate professor at McMaster University. “Although perhaps more ambitious than its predecessor, in many respects the program can be said to have developed out of our pre-existing interest in improving stroke care. Long before the Coordinated Stroke Strategy, there was the HASTE program – Hyper-Acute Stroke Treatment and Evaluation.”

The HASTE program coordinated the efforts of pre-hospital (emergency medical

services) and hospital resources in order to reduce unnecessary delays in identifying and treating stroke victims. A study conducted in Ottawa in 1996 suggests that only 21 per cent of stroke victims arrive at hospital within three hours of the onset of their symptoms or since “last seen normal.” This means that up to three-quarters of stroke patients arrive too late for the newest development in stroke treatment: the use of thrombolytic therapy (“clot-busting” drugs). Research in the U.S. and elsewhere suggests that thrombolytic therapy not only stops the effects of stroke but can actually reverse them – provided the right strokes are treated within a narrow window of opportunity. Currently, that window is three hours within onset of symptoms. To meet this narrow window, the public, emergency services and hospitals will need to rework their handling of potential stroke cases.

The Coordinated Stroke Strategy expands the mandate of the original HASTE program in that it extends past the acute care phase of treatment. The goal is to provide seamless, patient-centred care that includes everything from the pre-hospital phase (emergency medical services, such as paramedics and ambulance), to emergency and acute care, rehabilitation and reintegration back into the community. A stroke registry which tracks patients over time will make possible benchmarking and analysis, both for the purpose of research and for continuous quality improvement.

“All of these developments have a research arm,” notes Dr. Salama. “With the support of a Health Transition grant, our stroke coordinator, Sera Nicosia, will be studying the effectiveness of what we do and the changes we make. Are we reducing the time to CT scanning? Are we increasing



David Harvey



Suzette Salama

the proportion of patients eligible to receive thrombolytic therapy? Most important, are patients benefiting from the changes? And as we set up a stroke clinic for follow-up and prevention, Sera will be studying its impact on patients, primary care providers in the community and the public.”

Together, the basic, health services and rehabilitation research underway in Hamilton is changing knowledge and attitudes about stroke. The days of stroke being one of Canada’s “most neglected diseases” is thankfully coming to a close. ○

New Treatments, New Hope

Some of the key recent developments in stroke treatment include:

Meta-analysis of several trials showed that organized stroke care (stroke teams using written stroke protocols) can reduce mortality by 19%, death or institutionalization by 25%, and death or dependence on others for the activities of daily living by 29%. Other



Susan Barreca with Bruce Dobie.

people with stroke expertise. The treatment must be administered within three hours of the onset of symptoms. ○

benefits included shorter lengths of hospital stays (and thus reduced health care costs), fewer admissions to long-term care facilities and improved functional status at discharge.

In 1999, Health Canada approved the use of thrombolytic therapy (tissue plasminogen activator or t-PA) for the treatment of acute ischemic stroke (stroke due to a blood clot). Conditions for using the treatment include timely, expert CT scanning and the presence of