

JEN BOGART, 42
Stroke survivor

MIND THE CONNECTION:

Preventing stroke and dementia
2016 Stroke Report

STROKE AND DEMENTIA — IT'S ALL IN OUR HEADS

Stroke and dementia have much in common. Both are diseases of the brain. Stroke happens when the blood flow to the brain is interrupted and cells die as a result. Vascular dementia is often a further result of stroke damage, from either larger strokes or smaller ones accumulating over time.

Patients with stroke and dementia often share the same vascular risk factors including high blood pressure, high cholesterol and diabetes, as well as unhealthy behaviours such as tobacco use, physical inactivity and poor diet.

Both are age-related diseases — the older we get, the greater the chance of having a stroke and developing dementia. Yet, at the same time, both are increasing among younger people.

“We must focus on better vascular brain health,” says Dr. Sandra Black, Director, Brain Sciences Research Program, Sunnybrook Research Institute. “We have made progress managing vascular risk factors and this is paying off, but there is much more we need to do.”

The Heart and Stroke Foundation 2016 Stroke Report looks at the link between stroke and dementia, including the covert strokes that we don't even know are happening. By preventing one of these devastating diseases, we can also prevent the other.

For this report we analyzed data from the Canadian Institute for Health Information (CIHI), reviewed the latest research studies, inventoried stroke prevention services across the country, and polled Canadians to understand their awareness of stroke and dementia.



A WIDENING REACH

“Stroke and dementia need to be studied together because in some ways they are one and the same,” says Dr. Andrew Demchuk, Director, Calgary Stroke Program. “Stroke causes brain cells to die and this can precipitate dementia or worsen pre-existing dementia. There are different causes of dementia, and research now shows that stroke is a major contributor.”

There are 62,000 strokes in Canada each year and 405,000 Canadians are living with the effects of stroke. According to our poll, almost half of Canadians have been touched by stroke; they've either experienced it themselves or have a close family member or close friend who has had a stroke.

Having a stroke more than doubles someone's risk of developing dementia.

Hundreds of thousands of Canadians over the age of 65 have dementia. Not surprisingly, our poll revealed that more than one-third of Canadians know someone who has been diagnosed with dementia.

THE VASCULAR CONNECTION

The vascular system, also called the circulatory system, includes the arteries and veins that carry blood with oxygen and nutrients through the body.

Vascular cognitive impairment (VCI) occurs when blood vessel problems prevent brain cells from getting the oxygen they need, causing them to die. It is a syndrome where at least one cognitive domain is impaired, for example, attention, memory, language, perception or executive function. VCI encompasses a range of cognitive deficits, from relatively mild to vascular dementia, the most severe form. VCI is usually the result of stroke.



ALL STROKES ARE NOT THE SAME

A stroke happens when blood stops flowing to any part of the brain. This interruption causes damage to the surrounding brain cells which cannot be repaired or replaced; 1.9 million brain cells die every minute after stroke. Strokes can be large or small, and the effects of stroke depend on the part of the brain and the extent of damage.

Ischemic stroke is the most common form of stroke, caused by a blood clot.

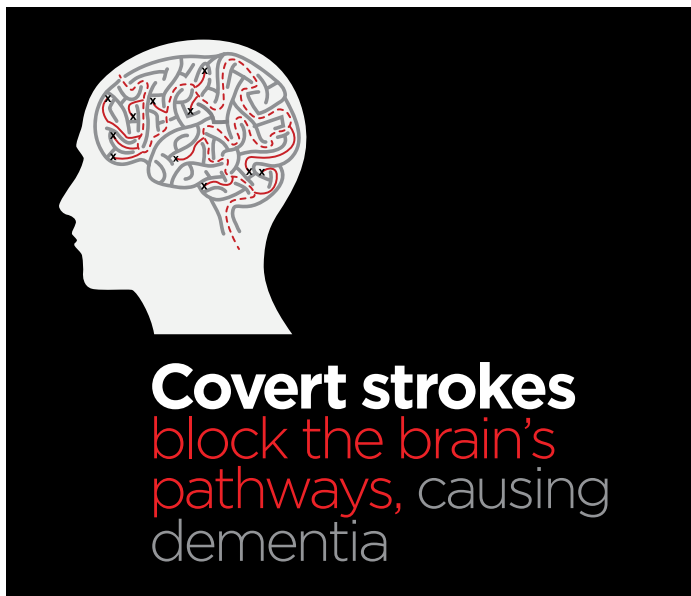
Hemorrhagic stroke occurs when a blood vessel ruptures, causing bleeding in or around the brain.

A **transient ischemic attack** (TIA) is sometimes referred to as a mini-stroke. TIAs are caused by a small clot that briefly blocks an artery and stops blood flow to part of the brain for a short period. Acute TIA symptoms might last only a few minutes; most are resolved within an hour and all symptoms are gone within 24 hours. However TIAs are an important warning that a more serious stroke may occur — 20 per cent of people who experience one will have a bigger stroke within three months, with the majority happening in the first few days after the TIA. Anyone who experiences a TIA should seek medical help immediately.

A **covert stroke** occurs when a small blood vessel in the brain becomes permanently blocked. Although cells around the affected area die, there is no obvious immediate outward physical damage or functional impact. Covert strokes do not affect muscle or motor skills — there is no paralysis, slurred speech or face droop.

Most people who have covert strokes don't know it, as the name implies.

"They happen to people who don't have a history of stroke, but it's important for people to realize that covert



strokes can have subtle symptoms for which they should seek attention from their doctor. In particular, the importance of covert strokes seems to be on changes in memory as people get older, which can interfere with their daily activities," says Dr. Eric Smith, Stroke Neurologist, Calgary Stroke Program.

Unlike obvious (or clinical) strokes which happen in the brain's grey matter that controls specific functions, including movement, speech, and vision, covert strokes usually involve white matter which acts as pathways in the brain, connecting various grey matter regions. Covert strokes weaken connections necessary for what is often referred to as **executive function**. This includes processing information, remembering recent events, word-finding, finding your way around, multi-tasking, problem-solving, planning, decision-making and reasoning.

CANADIANS LACK BASIC STROKE AWARENESS

Less than half of Canadians know what a stroke is, and one-third cannot name any of the FAST signs of stroke (see below), according to our poll. This is a serious gap in knowledge, putting many Canadians at risk if they experience or witness one. Stroke is a medical emergency and the faster someone receives treatment to restore blood flow, the greater the likelihood of a good outcome — both physically and cognitively.

LEARN THE SIGNS OF STROKE

FACE is it drooping?

A RMS can you raise both?

S PEECH is it slurred or jumbled?

T IME to call 9-1-1 right away.

ACT **F A S T** BECAUSE THE QUICKER YOU ACT,
THE MORE OF THE PERSON YOU SAVE.

© Heart And Stroke Foundation of Canada, 2014

The immediate results of stroke can be devastating and include weakness or paralysis, speech problems, vision problems, memory loss and other issues. Further consequences such as cognitive impairment and eventually dementia can come on quickly or take longer to develop. Rehabilitation is key to recovery and can help patients regain independence and recover to the fullest extent they can.

WHAT DEMENTIA DOES

Dementia is not one specific disease; it is a combination of symptoms that has many different causes, and symptoms can range from mild cognitive impairment to severe dementia. Alzheimer's disease is one common cause of dementia, but vascular cognitive impairment, usually caused by strokes, is almost as common. Alzheimer's disease and vascular dementia often occur together. This is referred to as "mixed dementia."

"Dementia is a major problem in Canada, especially with an aging population. It refers to memory and thinking problems that prevent people from doing the things that used to be routine for them," says Dr. Smith.

Dementia erodes the ability to remember things, find words, solve problems and follow directions — all of which interfere with daily activities. In its mildest form dementia causes difficulties with day-to-day activities like shopping, managing money, driving, housework, and taking medications. More severe dementia causes difficulty performing even basic tasks such as getting dressed and bathing. It can come on suddenly but in some cases — especially with vascular or mixed dementia — its appearance can happen slowly. Effects can also happen in stages, where abilities deteriorate and then level off for a time before declining again.

THE LINK BETWEEN STROKE AND DEMENTIA

Stroke is now understood to be a powerful predictor of dementia — one-third of dementia risk can be attributed to stroke. The strokes that cause dementia can be large or small, and the results can be identified immediately or develop gradually over years.

"The amount of dementia does not always directly reflect the severity of the stroke," says Dr. Smith. "A big stroke may not cause much dementia or any — depending on where it hits. On the other hand, tiny strokes can cause a lot of dementia."

MORE STROKE = MORE DEMENTIA

Evidence continues to reinforce the connection between stroke and dementia — the incidence for each increases the risk for the other. Research confirms this disturbing association: 10 per cent of stroke patients are diagnosed as having prior dementia, and an additional 10 per cent develop dementia after their first stroke. Having recurrent strokes further increases the chances of cognitive decline.



1 in 3 Canadians will develop stroke, dementia or both

More than one-third of patients develop dementia after a second stroke.

According to estimates based on the most current Canadian data, of every 100 stroke patients without a past history of dementia, 16 are likely to develop dementia after their first or recurrent stroke.

One in three Canadians will develop stroke, dementia or both.

Many Canadians understand this link. Approximately 70 per cent of poll respondents report knowing that if someone has a stroke they are at higher risk of developing dementia, and that the more strokes someone experiences the more likely they are to develop dementia.

UNCOVERING COVERT STROKES

Around the world, evidence has emerged over the last few years that strokes among younger people are increasing. In Canada all stroke risk factors for younger adults are on the rise. Alarming, according to most recent CIHI data, 17 per cent of hospital admissions for stroke and TIA were for patients between the ages of 20 and 59.

According to new research, covert strokes can also happen at an early age. This is difficult information to collect given that covert strokes go largely unrecognized and undiagnosed.

Brain scan technology can identify changes to the brain that indicate someone might have had covert strokes. Experts are now realizing that these small and hidden strokes are unfortunately helping lay the groundwork for vascular dementia.

"About three per cent of Canadians in their 40s have evidence of a covert stroke. This is especially true of people who are in poorer health because of vascular risk factors (see the list on p. 10). They can experience small strokes and they do not even realize it, and then it is too late as the damage is not reversible," says Dr. Smith.

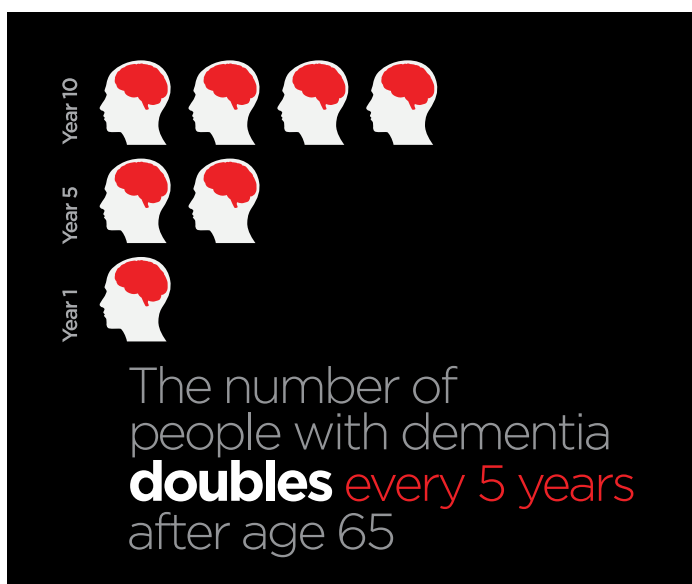
This may not be such a surprising statistic given that covert strokes occur five times as often as obvious (or clinical)

strokes. The incidence increases as people age; almost 20 per cent of 70-year-olds have experienced covert strokes.

The good news is that once evidence of covert strokes is uncovered, the focus can be put on a patient's blood vessel health to ensure that vascular risk factors are being managed to prevent further damage including a bigger stroke.

Stroke at an earlier age brings with it the threat of dementia at an earlier age. Currently one in 10 Canadians over 65 has dementia, and this increases to three in 10 over the age of 85. The number of people with vascular dementia doubles every five years after age 65.

Diagnosing dementia in people under 65 can be difficult and can take years as family doctors rule out other causes for changes in behaviour. Health professionals should start considering stroke and dementia when diagnosing younger patients.



“The first signs of early-onset dementia can be work related,” says Dr. Theresa Green, Associate Professor, Faculty of Nursing, University of Calgary. “There can be a decline in performance but nobody knows why.”

Dementia in middle age can result in new challenges that older patients do not face. Those who are still of working age can experience challenges at work or face financial difficulties if they have to leave their jobs. Their spouses can feel overwhelmed with new responsibilities as caregivers and increased responsibilities taking care of children and teenagers, and older parents, as well as running a household.

“Early dementia can be unravelling for the entire family,” says Dr. Green. “Children and teenagers tend to dissociate from a parent with dementia, and the whole dynamic of a marriage can change.”

People in their 40s and 50s tend to be involved in a broader range of activities that they want to continue compared with more elderly patients. Their families



“My executive function and word-finding skills are damaged and this is permanent. I cannot multi-task the way I used to, and I have very little short-term memory so I have a white board in the kitchen and I write everything down. Everything also goes in my calendar. Thank goodness for technology; it is my lifeline.”

Susan Robertson

A full-time working mother when she had a stroke at 36.

READ [Susan's story](#) and more at: blog.heartandstroke.ca/tag/stroke

also require support to cope with their new situation. Unfortunately support and services appropriate for these specific patients and their caregivers are lacking.

THE COST IN LIVES

According to the latest CIHI data, patients hospitalized for stroke and who also have dementia are at a much greater risk of dying than those without dementia. The mortality rate is just over 20 per cent for patients with both stroke and dementia, as compared with 13 per cent for those with just stroke.

Almost half of stroke patients (45 per cent) without dementia are sent home from hospital without the need for additional support services. This is in striking contrast to only 14 per cent of those with dementia — many fewer because they are not able to manage without support. It is no surprise then that 29 per cent of stroke patients with dementia are sent to long-term care instead of returning home, compared with just five per cent of stroke-only patients.

Even in hospital, once out of acute care, stroke patients with dementia require more complex care — at more than double the rate of those without dementia.

On average, people with vascular dementia live for five years, with a shorter lifespan than the general population and those who have Alzheimer's.

The consequences of dementia stretch beyond the significant challenges individuals face navigating their everyday lives. Depression and vascular cognitive impairment — whether milder forms or more severe dementia — are related; they may both be caused by something called white matter disease, and are often seen in stroke patients. Depression can also be the result of trying to cope and adjust to the many changes and loss after a stroke. [Canadian Stroke Best Practice Recommendations](#) state that post-stroke patients with suspected cognitive impairment should be screened for depression.

AGE IS STILL A SIGNIFICANT RISK FACTOR

In most age groups, rates of stroke have been declining, which is welcome news. “The age-standardized risk for dementia has also decreased and we suspect much of the

decline is linked to better vascular risk factor management,” says Dr. Smith.

Unfortunately the somewhat lower rates of stroke and dementia at any given age are more than matched by the dramatically increasing number of older Canadians; age is a risk factor for both stroke and dementia. As the population ages the actual numbers of strokes will rise, along with the number of people who develop dementia. Clinicians are already seeing more strokes and more dementia, and are treating more patients.

“This is an emerging crisis as our population is aging and people live longer,” says Dr. Black.

PREVENTING STROKE PREVENTS DEMENTIA

If having stroke increases the risk of developing dementia, it follows that preventing stroke also prevents dementia and vascular cognitive impairment. It is never too early to prevent both stroke and dementia and it is never too late to reduce risk.

“Reducing stroke risk protects your brain. Healthy living is about dementia too. Everything you do to protect your body protects your brain,” says Dr. Smith.

Canadians do not understand the risk factors for stroke. High blood pressure is the number one modifiable risk factor for stroke and more than 60 per cent of people admitted to hospital with stroke have high blood pressure. Yet according to our poll, less than one-quarter of Canadians know it is a risk factor at all. Managing this modifiable risk factor is important as there is also a link between high blood pressure in middle age and cognitive decline.

Three-quarters of Canadians understand there is link between stroke risk factors (see p. 10) and dementia. However, when we asked them to identify those risk factors, just over one-quarter named smoking, one-third identified poor diet, and less than one-fifth noted physical inactivity.

A WORLD FOCUS ON PREVENTION

The World Stroke Day Proclamation 2015 drew the link between stroke and potentially preventable dementias, calling them the “leading causes of serious disability, sparing no age, sex, ethnic origin or country.” Stroke prevention strategies including lifestyle changes and identification and treatment of risk factors can also prevent dementia.

Canadian neurologist Dr. Vladimir Hachinski was the primary author of the declaration and it was endorsed by many leading global health bodies including the Heart and Stroke Foundation. [Read the full proclamation.](#)

WHY SECONDARY PREVENTION MATTERS

Once someone has had a stroke or TIA, their odds of having another one increase. The risk of a second stroke is high for five years following a first stroke, with 30 per cent of survivors having a second stroke.

This is where secondary prevention comes in.

Secondary prevention is essentially preventing a new stroke from happening after a first TIA or stroke. Prevention services are delivered in dedicated clinics or through other models across the country, to support Canadians who are identified as at high risk of having another event following a first TIA or stroke.

To identify the cause of the initial stroke or TIA, clinics carry out a complete medical history and neurological examination. They identify modifiable risk factors such as high blood pressure, high cholesterol, atrial fibrillation and diabetes and consider other lifestyle risk factors such as tobacco use, physical inactivity, poor diet and alcohol misuse.

Clinics also check if patients are taking their medications and identify related vascular conditions such as diabetes and cardiac disease. They educate patients and caregivers on stroke prevention and lifestyle changes, and refer patients for other medical, surgical or rehabilitation care as part of an individualized management plan. They can provide access to a broad range of health professionals with expertise in stroke care, cognitive problems and rehabilitation. See [Post-Stroke Checklist](#).

Other important services that can be offered include helping patients and families navigate the healthcare system, assessing a patient's home situation, helping them to reintegrate into the community with appropriate support, and arranging assessments to resume driving or return to work.

PREVENTION SERVICES ACROSS CANADA

The Heart and Stroke Foundation carried out an inventory of stroke prevention services across the country, and received detailed information from 117 of the 124 identified services. Results reveal that prevention services exist to some extent in every province including at least one in every urban health region. Together they see more than 51,000 patients each year. For the most part these services have been designated stroke prevention clinics by their hospital or health region, and all follow the [Canadian Stroke Best Practice Recommendations](#).

The majority of patients are referred from emergency departments or family doctors, and other sources include hospital inpatient units or rehabilitation centres, or other medical specialists or clinics.

The prevention teams can include stroke neurologists, internists, family physicians, nurses, dietitians, occupational therapists, physiotherapists, speech language pathologists and other professionals. Patients may

HALIFAX NURSE PRACTITIONERS PROVIDE CONTINUITY IN PREVENTION CARE

The **Neurovascular Clinic at the Halifax Infirmary** is a full-time clinic providing services to former inpatients diagnosed with stroke or TIA, patients discharged from the emergency department, or patients referred from the community. New patients are seen by both stroke neurologists and specialty nurse practitioners. The nurse practitioners spend a significant amount of time with each new patient, educating them around stroke and explaining the tests they underwent. They focus on each patient's relevant risk factors and develop an individualized prevention plan. The four nurse practitioners specialize in stroke care and neurology, and also work on the acute stroke ward — which provides continuity for those patients who were treated on the ward.

Patients can be referred to other services and professionals including social work, physiotherapy, occupational therapy, speech language pathology, physical activity and nutrition programs, diabetes centre and hypertension clinic. Follow-up care is provided by the nurse practitioners through telephone management or a return clinic visit before patients are referred back to their primary care physician.

SASKATOON CLINIC SERVES PATIENTS FROM NEAR AND FAR

Saskatoon Health Region's Stroke Prevention Clinic (SPC) is an integral part of the Saskatoon Stroke Program. The SPC operates out of Royal University Hospital, Saskatchewan's tertiary stroke centre. It provides continuity of care for patients with symptoms of a transient ischemic attack (TIA) and mild stroke, from diagnosis to initial treatment to education for ongoing management of stroke risk factors.

The clinic sees approximately 700 patients a year from across central and northern Saskatchewan. Patients are referred to the SPC by local and rural emergency departments, walk-in clinics and family physicians, as well as from remote nursing stations. Patients travel to the clinic from as far away as 800 kilometres. Typically, high-risk patients and those coming from remote areas receive testing on the same day as their clinic visit.

The staff includes four neurologists, a clinical nurse coordinator and a medical office assistant. This dedicated team works closely with other departments to provide rapid access to testing without admission to hospital.

receive treatment, have tests and be referred to a specialist, and the majority are sent to their family physician for follow-up and monitoring. The care is based on the individual needs.

Just over half of the clinics can get access to a CT scan within 48 hours. Generally clinics that are open more than 2½ days a week have the most access to diagnostic equipment.

Almost 20 per cent of clinics see and assess a patient only once, and more than half see patients two to three times for assessment and initial management before they are referred back to their family physician.

“The number of times a patient visits a clinic varies depending on an individual’s risk and need. We speak to them about their risk factors and provide a report to their family doctor,” says Dr. Robert Côté, Director, Stroke Prevention Clinic, McGill University Health Centre. “If they have access to a family doctor who can provide the follow up and management they need, they don’t need to return to the clinic unless they experience a new event.”

Only half of the clinics screen for cognitive impairment or depression or both.

ACCESS VARIES ACROSS THE COUNTRY

“Over half of the clinics run full-time and some run one day or several half days a week, and not surprisingly there are more clinics and better access in the big centres,” says Dr. Côté. “There is a spectrum of services; no two clinics are the same but most focus on secondary prevention for

high risk patients who have had a stroke or TIA.”

Secondary prevention services differ from region to region. Urban centres with designated stroke programs have the resources to better meet best practice recommendations. Stroke prevention services are available in some, but not all, rural and northern areas, but with limited availability and services. Most of the stroke prevention services (69 per cent) are in urban areas, but many of them accept patients from rural areas outside of their catchment area.

Mapping revealed that 89 per cent of the Canadian population is within an hour’s drive of prevention services. However there are many other factors that limit patients’ access including hours of operation, availability of stroke experts, and availability of required diagnostic tests.

The higher the risk, the quicker the patient should be seen according to [Canadian Stroke Best Practice Recommendations](#). The stroke prevention services inventory revealed the highest risk patients are seen the same day “most of the time” in 40 per cent of cases, and “some of the time” in 12 per cent. Clearly there is room for improvement to ensure those who need access most get it in a timely manner.

RAPID ASSESSMENT CLINICS

About one-quarter of the clinics are “rapid assessment” — specialized clinics that provide same- or next-day access for the most high risk patients. They provide services such as assessment by a vascular neurologist and nurse clinician, brain/vascular imaging scan, and assessment by a rehabilitation specialist.

INTER-PROFESSIONAL MONTREAL TEAM AT THE CENTRE OF SUCCESS

The **McGill University Health Centre Stroke Prevention Clinic** works with patients who have experienced a stroke or transient ischemic attack (TIA) and are at risk of having another stroke. The clinic identifies and treats the cause of the initial stroke in order to prevent subsequent events.

Most patients come as inpatients from the hospital or from the emergency department; others are referred by rehabilitation centres at other hospitals or by family doctors.

The clinic looks at risk factors such as high blood pressure or cholesterol and diabetes and assesses how they are being managed, and sends a report to the patient’s family doctor with recommendations for long-term management. Other risk factors such as atrial fibrillation (irregular heart beat) or carotid stenosis (narrowing of the artery) may be identified, and appropriate follow up is arranged. Patients set goals around healthy eating, physical activity, and tobacco and alcohol use. Links are provided to community services such as CLSCs, and referrals can be made to physiotherapists, occupational therapists, and psychosocial support groups.

The success of the clinic can be partially credited to the inter-professional team that helped put its structure in place including stroke specialists, rehabilitation, radiology, administration and social services. Current staff include six neurologists (at least two available onsite each day), two administrators, a nurse clinician and a research nurse. All patients are triaged, allowing those at highest risk to be seen within 24 hours. Agreements with departments within the hospital, such as radiology and rehabilitation services, ensure these patients are prioritized to receive the services they need in a timely manner.

These clinics provide an essential service to urgent patients, reduce stress on emergency departments, and have been proven to be cost effective. In fact, rapid assessment TIA clinics are one of four services identified as having the potential to save the healthcare system considerable costs due to fewer hospitalizations, less time spent in hospital, and fewer deaths.

Rapid assessment clinics provide the only specialized secondary prevention services available on weekends. Currently there are eight centres in the country with weekend access, all attached to emergency departments.

“Rapid assessment clinics are an important resource,” says Dr. Côté. “They provide a critical service for patients who are at risk of having another stroke within 48 hours.”

WHERE TO FIND CLINICS

Stroke prevention clinics provide their services in a variety of settings:

- 62 per cent are outpatient clinics within a hospital
- 16 per cent are in emergency departments
- 12 per cent are clinics within a physician’s office
- 10 per cent are clinics in the community

INCREASING THE IMPACT OF SECONDARY PREVENTION

Evidence shows secondary prevention services are effective. Patients who are referred to a secondary prevention clinic have a 25 per cent reduction in mortality. Some experts estimate that current stroke prevention strategies could prevent half of all strokes and a UK study found that urgent assessment and treatment can reduce the short-term risk of having another stroke by 80 per cent.

Secondary prevention and management results in better patient outcomes and this translates to significant cost savings in part because treatment and care for people disabled by stroke is very costly. It has been estimated that even modest improvements in stroke prevention within Ontario could avoid 7,000 deaths and save \$500 million over five years.

Dr. Côté notes that weaknesses in the system stand in the way of some patients receiving the best care. The transition from assessment at the stroke prevention clinic to primary care (family doctor) is not always seamless and timely. Some patients do not have a primary care provider, or are not getting the support they need to manage their risk factors.

More access to primary care, better communication with primary care providers, and improved awareness around



“I knew from the moment I arrived at the stroke secondary prevention clinic at the General Hospital in Montreal that I was where I needed to be to understand both what had happened to me and to make sure it did not happen again. I was provided lots of new information that helped me concentrate on positive changes and avoid another event.”

Martin Pronovost

Father of two young children, had a stroke at 36.

KNOW YOUR RISK FACTORS

Nine in 10 Canadians have at least one risk factor for stroke and heart disease. This includes risk factors Canadians can do something about, and those they cannot change.

RISK FACTORS CANADIANS CAN CHANGE

- Know and control your blood pressure.
- Eat a healthy balanced diet that consists of a variety of natural/whole and minimally processed foods.
- Be physically active. Accumulate at least 150 minutes of moderate- to vigorous-intensity aerobic physical activity per week, in bouts of 10 minutes or more.
- Be smoke free.
- Manage diabetes.
- Limit alcohol. Women should limit themselves to no more than two drinks a day, to a weekly maximum of 10; and men to three drinks a day or a weekly maximum of 15.

Take the Heart&Stroke Risk Assessment at heartandstroke.ca/ehealth

RISK FACTORS CANADIANS CANNOT CHANGE

- having had a previous stroke or TIA (mini-stroke)
- family history of stroke or blood vessel problems
- age — the older you are, the higher your risk of stroke
- sex — until women reach menopause, they have a lower risk of stroke than men
- ethnicity — people of African or South Asian descent are more likely to have high blood pressure and diabetes
- people of Indigenous heritage are reported to have higher incidence of high blood pressure and diabetes.



risk factor management for TIA and stroke patients would address some of the gaps in the transition in care.

THE PREVENTION OF EVERYTHING

“It is never too late to start preventing stroke or dementia, but earlier is better,” says Dr. Vladimir Hachinski, Professor of Neurology and Epidemiology, Western University. “The difficulty with prevention is that it is not sexy — if you are successful nothing happens.”

Stroke — either a first stroke, subsequent stroke, TIA or covert stroke — can be prevented by managing vascular risk factors. The same is true for dementia. Dementia can be prevented, it can be delayed or its progression can be slowed by the same approaches.

Vascular risk factors — including high blood pressure — are noted in the box at left but a few behaviour stand-outs are emerging:

- **Long-term, regular physical activity**, including vigorous activity and walking, has been shown to be beneficial. One study noted that 21 per cent of dementias may be attributed to physical inactivity and overall sedentary lifestyles. This supports consistent evidence that physical activity in midlife is associated with better cognitive functioning and less vascular dementia.
- Evidence continues to emerge to support how **new learning promotes good brain health**, for example, learning a new language or musical instrument. The key is that it must be a new activity, not just something habitual. Exercising the brain and developing new skills creates new pathways that can be called upon later to perform tasks.

HOW HEART AND STROKE FOUNDATION FUNDED RESEARCH IS MAKING A DIFFERENCE

CURRENT RESEARCH STUDIES

Identifying early risks

In his research, Dr. Eric Smith at the University of Calgary is looking at brain health, including brain blood vessel health, in people as they age. The PURE-MIND study will deepen our understanding of how covert strokes are related to problems with memory and thinking, or to the risk of a large stroke.

Dr. Smith's project is the first to focus on this area in Canada, and also among the first to look at covert strokes that happen not just in people in their 70s and 80s, but people in their late 30s, 40s, and 50s. Results of his work will help to identify people in midlife who might be at risk in later life for memory and thinking problems, or dementia.

Prevention is key

Pulse pressure — the difference between the systolic and diastolic blood pressure readings — is dependent on the force that the heart generates when it contracts and the elasticity of the large arteries. As we age, our arteries become more rigid (atherosclerosis) which causes the pulse pressure to increase. High pulse pressure in turn increases the risk of stroke, and consequently dementia.

We know that increased pulse pressure can cause damage to the brain, but we don't know how. Dr. Eric Thorin at the Montreal Heart Institute is focusing his research on preventing increased pulse pressure.

Using a unique system that generates pulse pressure to an isolated cerebral artery, combined with specific imaging technology, Dr. Thorin and his team are gaining new insights into the impact of pulse pressure on the arteries that provide blood to the brain. His work will help to identify interventions and prevention strategies — including the role of exercise — to protect Canadians from both stroke and dementia.

PAST RESEARCH MILESTONES

2015

ESCAPE, a Canadian-led, international clinical trial co-funded by the Foundation, shows remarkable results in the treatment of major strokes caused by blood clots, and heralds the most significant change in stroke treatment in the last 20 years.

2014

The Foundation supports research that uses improved heart monitoring to better detect atrial fibrillation, a risk factor for stroke.

2011

Quality of Stroke Care in Canada is released, a report based on the first Canada-wide stroke audit and a survey of stroke service availability, co-led by the Foundation. The Foundation produces annual stroke reports based on a range of data sources to continually monitor the quality of stroke care delivery.

2010

The INTERSTROKE study, co-funded by the Foundation, identifies 10 risk factors that account for 90 per cent of the risk of ischemic and intracerebral hemorrhagic stroke worldwide.

2006

The Foundation co-leads the development of the **Canadian Stroke Best Practice Recommendations** leading to increased consistency and standardization of stroke care in Canada.

2003

The Foundation leads the development of the Canadian Stroke Strategy, which will revolutionize stroke prevention, treatment and care.

2000

A Foundation-funded project discovers that ACE inhibitors significantly reduce the risk of heart attacks and strokes.

1983

Foundation-funded researcher Dr. Robert Côté designs and validates the Canadian Neurological Scale, a clinical tool that measures neurological deficit following an acute stroke. The scale is now used in Canada and all over the world.

1976

Dr. Henry Barnett conducts the first clinical trial using Aspirin to prevent strokes. Dr. Barnett was instrumental in increasing funding for stroke research.

PREVENTING STROKE AND DEMENTIA

What can Canadians do?

- Learn the signs of stroke and act FAST by calling 9-1-1 immediately. Visit heartandstroke.ca/FAST.
- Know and manage your stroke risk factors. Take the Heart&Stroke Risk Assessment at heartandstroke.ca/ehealth.
- Take control of your blood pressure with the Heart&Stroke Blood Pressure Action Plan at heartandstroke.ca/ehealth.
- Use the Heart and Stroke Foundation patient resources:
 - ***Your Stroke Journey: A Guide for People Living with Stroke*** is a comprehensive guide to help stroke survivors and their families understand the effects of stroke and manage their recovery. Available to [download](#) or in [print](#).
 - ***Taking Charge of your Stroke Recovery: A Survivor's Guide to the Canadian Stroke Best Practice Recommendations*** is a resource for stroke survivors and their families that describes key recommendations for stroke care. Available to [download](#).
 - ***Post-Stroke Checklist*** for clinicians and patients is an easy-to-use guide to ensure important aspects of stroke prevention and follow-up are addressed. Available to [download](#).
 - ***Canadian Stroke Best Practice Recommendations*** provide comprehensive guidelines for healthcare professionals working with stroke patients and their families; patient and professional education resources have also been developed. strokebestpractices.ca.

What can healthcare providers do?

- Incorporate the prevention and screening of post-stroke dementia as an integral part of stroke care.
- Follow the Canadian Stroke Best Practice Recommendations at strokebestpractices.ca.
- Advocate for expanded stroke prevention services in all regions across the country.

What can governments do?

- Support the development of public education/awareness campaigns to prevent, reduce and delay the onset of dementia by addressing high blood pressure and lifestyle risk factors such as poor nutrition, physical inactivity, tobacco consumption.
- Increase awareness of the signs of stroke and the need to take action by implementing and expanding campaigns to raise awareness of the FAST signs of stroke across the country. Visit heartandstroke.ca/FAST.
- Improve access to stroke prevention services across the country including expanded hours of operation and access to timely diagnostics.
- Ensure rehabilitation and community support services are available to patients as part of post-stroke prevention plans, including support services for people with post-stroke dementia.
- Ensure prevention and screening of post-stroke dementia is as an integral part of stroke care.
- Take a leadership role in stroke care and continue to fund and support provincial stroke strategies leveraging the Heart and Stroke Foundation's [Canadian Stroke Best Practice Recommendations](http://strokebestpractices.ca).

DATA SOURCES AND ACKNOWLEDGEMENTS

- Canadian Institute for Health Information (CIHI) administrative data
- The poll with Canadians was conducted by Environics Research Group. A total of 3,100 respondents 18 years and older were interviewed by telephone during the period February 3-14, 2016. The results were weighted to match the demographic makeup of the Canadian population.
- Heart and Stroke Foundation Stroke Prevention Services Resource Inventory 2015-16
- Current published research around stroke and dementia
- Key informant interviews with stroke and dementia experts and survivors (noted below)

Dr. **Sandra Black**, Director, Brain Sciences Research Program, Sunnybrook Research Institute; Executive Director, Toronto Dementia Research Alliance; Site Director, Heart and Stroke Foundation Canadian Partnership for Stroke Recovery | Dr. **Ken Butcher**, Canada Research Chair in Cerebrovascular Disease; Heart and Stroke Foundation Professor of Stroke Medicine; Associate Professor of Neurology, Division of Neurology, University of Alberta | **Larry W. Chambers**, Scientific Advisor, Alzheimer Society of Canada | **Bernene Cohen**, Manager, Stroke Prevention Clinic, Stroke Services, Saskatoon Health Region | Dr. **Robert Côté**, Director, Stroke Prevention Clinic, McGill University Health Centre; Professor, Departments of Neurology, Neurosurgery and Medicine, McGill University | Dr. **Andrew Demchuk**, Director, Calgary Stroke Program; Heart and Stroke Foundation Chair in Stroke Research, Professor, Departments of Clinical Neurosciences and Radiology, Cumming School of Medicine, University of Calgary | Dr. **Gail Eskes**, Professor, Departments of Psychiatry and Psychology & Neuroscience, Dalhousie University | Dr. **Thalia Field**, Assistant Professor, Faculty of Medicine, University of British Columbia; Stroke Neurologist, Vancouver Stroke Program | Dr. **Theresa Green**, Associate Professor, Faculty of Nursing, University of Calgary; Adjunct Assistant Professor, Department of Clinical Neurosciences, Cumming School of Medicine, University of Calgary | Dr. **Vladimir Hachinski**, Professor of Neurology and Epidemiology, Western University | Dr. **Antoine Hakim**, Professor, University of Ottawa, Faculty of Medicine, Division of Neurology; Emeritus Professor, Ottawa Hospital Research Institute | Dr. **Brian Levine**, Senior Scientist, Rotman Research Institute, Baycrest; Professor, Departments of Psychology and Medicine (Neurology), University of Toronto; Site Leader, Baycrest, Heart and Stroke Foundation Canadian Partnership for Stroke Recovery | Dr. **Patrice Lindsay**, Director, Best Practices and Performance, Stroke, Heart and Stroke Foundation | **Michelle MacKay**, RN MN NP, Specialty Nurse Practitioner, Neurovascular Clinic, Halifax Infirmary | Dr. **Jennifer Mandzia**, Assistant Professor, Department of Clinical Neurological Sciences, Western University; Co-medical Director, Southwestern Ontario Stroke Network | **Heather Perkins**, N., MSc(A), Nurse Clinician, Stroke Prevention Clinic, McGill University Health Centre | Dr. **Eric Smith**, Medical Director, Cognitive Neurosciences Clinic; Kathy Taylor Chair in Vascular Dementia; Stroke Neurologist, Calgary Stroke Program; Associate Professor, Department of Clinical Neurosciences, Radiology and Community Health Sciences, Cumming School of Medicine, University of Calgary | Dr. **Rick Swartz**, Medical Director, North East GTA Regional Stroke Program; Director, University of Toronto Stroke Program; Assistant Professor, Department of Medicine (Neurology), University of Toronto | Dr. **Theodore Wein**, Assistant Professor, Neurology and Neurosurgery, McGill University; Stroke Prevention Clinic, McGill University Health Centre