

## GERIATRIC MEDICINE

*Many people experience increasingly debilitating health problems as they age. Capital Health clinicians and researchers are working to better understand and care for the complex needs of geriatric patients.*

### Geriatric medicine researchers pioneer new methods to assess health and frailty

At first glance, it might not seem that math has much to do with caring for elderly patients with multiple health problems. Yet a closer look reveals that once a person is frail, mathematical analysis is essential to charting an appropriate health care course.

“We need to make informed care decisions, based on a person’s degree of frailty and how a particular intervention may impact them,” says Dr. Kenneth Rockwood, a professor in the Department of Medicine’s Division of Geriatric Medicine at Capital Health and Dalhousie Medical School. “There are many situations where an intervention, such as elective surgery, does more harm than good. We are quantifying that risk.”

Dr. Rockwood and his colleagues are world pioneers in developing scales for assessing health—including cognition, function, medical status, mobility and social supports—in the elderly. Working with Dr. Arnold Mitnitski, a mathematician employed fulltime in Dalhousie’s Department of Medicine, the geriatric medicine team has found ways to predict how a person’s health will improve, hold steady, or decline, over time.

Such measurements and predictions can be applied to entire populations to assist in health care planning. This is critical in Canada, where 20 per cent of the population will be elderly by 2020. China is keenly interested as well. In fact, the Capital Health geriatric medicine team has embarked on the Canada-China Collaboration on Aging and Longevity to explore what factors influence healthy aging and how an aging population impacts the health care system.

“With increasing pressure on our health care resources, we must look ever more carefully at what we do,” says Dr. Laurie Mallery, head of the Division of Geriatric Medicine. “Research helps identify what we need to change to provide organized, efficient and effective care.”

As Dr. Mallery notes, proactive health management—before a person becomes frail or ill—is key. “We look for preventable situations and reversible problems and the best ways to manage them,” she says. “At the same time, we are finding ways to improve communication and coordination among health professionals so everyone who works with a patient understands their entire situation and can respond appropriately.”

### A matter of attitude

As Marian Shannon stepped onto the sidewalk following a routine medical appointment, the 86-year-old tripped and fell. The moment was both frightening and maddening. As she fell, she fractured her left thigh bone. But her immediate concern was her left knee, which had undergone joint replacement surgery several months earlier.

“I couldn’t believe this was happening, after all I had been through,” says Marian from her room at the Camp Hill Veteran’s Memorial Hospital. “It seems like I’ve been in the hospital more than out in the past six months.”

The mother of seven, Marian has been healthy most of her life, apart from some cardiovascular issues and a bypass operation nearly 20 years ago. Only at the age of 86 was her knee osteoarthritis so painful she needed surgery. It was after this surgery that the problems began piling up.

“I developed a heart problem, then a bladder infection, and then a serious bout of pneumonia,” she says. “I was just getting back on my feet when I broke my leg.”

Marian remains positive in spite of the setbacks. She is exercising her leg and looking forward to going home to the condo she shares with her sister. “We live in a social community, it’s very stimulating,” says Marian, who also enjoys singing in her church choir, playing bridge, knitting hats for homeless people, reading and staying abreast of current affairs. She says her confidence in her recovery has a lot to do with attitude: “You have to keep yourself happy, stay involved and have faith.”



Marian Shannon broke her left thigh bone just months after knee replacement surgery on the same leg. She is recovering well and looking forward to her return home.

## Toward a holistic model of care

### *Geriatricians take broad view to meet patient needs*

Capital Health geriatricians are leading the way to a more sensitive, effective approach to caring for elderly people with multiple complex health issues. This approach puts the diverse needs and feelings of patients and families first and relies on open communication and seamless teamwork to provide the most appropriate care.

With the myriad of health issues facing a person in their eighties or nineties, it is a challenge to gather and share the necessary information about medications, physical fitness, frailty, cognitive function and social supports. Yet, it is vital.

“We must have the complete picture about people’s health status and goals, the life factors that impact their health, and where they are in the trajectory of decline,” says Dr. Laurie Mallery, head of the Division of Geriatric Medicine. “We need to communicate information about these layers of health and illness to other health professionals, patients and family members in order to put the right measures in place.”

Clinician researchers are developing and testing several tools to make this happen, including the Collaborative Geriatric Assessment and a user-friendly computerized patient information system. These tools allow occupational therapists, nurses, social workers, continuing care workers and others to add information to a patient’s central file, which is then available to everyone who works with that patient.

The patient information system includes a unique goal-setting module that can be used concurrently by multiple team members. “This means more time can be spent working together on solutions rather than documenting problems,” says geriatrician Dr. Paige Moorhouse, adding that the system also tracks patient and caregiver preferences and satisfaction. “It allows us to store and re-visit goals, interventions and results to gain a better understanding of the patient’s improvement or decline.”

### **Revealing the impact of social vulnerability**

The geriatric medicine researchers are shedding light on the importance of social factors in healthy aging. Having support networks of family and friends and a sense of control over one’s life situation promotes good health. The researchers have found



### **Geriatric medicine principal investigators**

(l to r): Dr. Kenneth Rockwood, Dr. Paige Moorhouse, Dr. Laurie Mallery, Dr. Melissa Andrew. Missing from photo: Dr. Susan Freter, Dr. Chris MacKnight

that the opposite – social vulnerability – increases risk of sickness and death. “Participants with the most social problems had the highest risk of dying over the next five to eight years, regardless of age, gender or frailty,” says geriatrician Dr. Melissa Andrew, lead investigator on a recent study. The researchers continue to probe the impact of social vulnerability and to inform policies and programs that support healthier aging.

### **Finding a path to more sensitive end-of-life care**

While geriatric medicine remains focused on preserving and restoring function, there comes a time when interventions are no longer helpful. Drs. Mallery and Moorhouse are leading Palliative And Therapeutic Harmonization (the PATH Clinic) for frail adults at end of life, to ensure that elderly people with multiple advanced illnesses fully understand the risks and often limited benefits of available treatments. “We need to shift the focus,” says Dr. Mallery, “so that people with serious end-stage illness receive care that alleviates suffering and provides individuals with a more meaningful, dignified end-of-life experience.”

To learn more about the projects undertaken by the Geriatric Medicine Research Unit, visit

<http://geriatricresearch.medicine.dal.ca>

### ► Preventing delirium after surgery

Frail elderly people commonly experience delirium after hip fracture surgery. Delirium can persist and make individuals more vulnerable to falls and even premature death.

Dr. Susan Freter is leading a pilot project to test new post-operative orders that may reduce the risk of delirium.

### ► Canadian study examines healthy aging

Dr. Susan Kirkland is a co-principal investigator of the Canadian Longitudinal Study on Aging. This national study is examining social, economic, genetic, biological, health system and other factors that influence healthy aging. It promises to be the world’s largest study of its kind, with findings that have far-reaching impacts on health education, research, practice and policy. [www.clsa-elcv.ca](http://www.clsa-elcv.ca)

### ► Gender differences in aging hearts

Dr. Susan Howlett has discovered that the ability of heart cells to contract declines with age in heart cells from males, but not females. She is shedding light on these and other differences in the way male and female heart cells age, so heart disease treatments can be fine-tuned to benefit both men and women.

## Canadian Dementia Knowledge Translation Network

*Nationwide network shares research and findings to improve patient care*

More than 120 researchers across Canada have come together to make life better for people with Alzheimer and other diseases that affect memory, attention, language and problem-solving abilities. They have formed the Canadian Dementia Knowledge Translation Network to ensure that research findings are widely shared and put into practice so patients everywhere can benefit.

“Historically, research results have only been applied in the local area where the research was done, since there hasn’t been a way to centrally gather, package and distribute new knowledge,” says Dr. Kenneth Rockwood, the network’s principal investigator. “This network provides a vehicle for translating research findings and lessons learned across the country into more effective treatments and services for people with dementia.”

The Canadian Dementia Knowledge Translation Network is not limited to researchers. Health care administrators, policy makers, leaders of Alzheimer societies, caregivers and people living with dementia are also involved.

“Broad stakeholder engagement is the key to ensuring that patient and caregiver needs are appropriately and effectively served as we go forward,” says project director Cathy MacNutt, who oversees the network from its central office at

Capital Health. “We are forging a wide range of partnerships to help parlay research findings into real-world settings.”

One of the network’s first tasks is to identify gaps where research findings are not being put into action, and to take steps to fill those gaps. Some voids are already clear. As Dr. Rockwood notes, “Too few patients with Alzheimer disease are enrolled in drug trials, while too many are prescribed anti-psychotic medications that do no good. Palliative care for dementia is underdeveloped and many care programs are poorly designed. These are just a few areas where applying the research findings more broadly will have a major positive impact on people’s lives.”

The network will ensure that new knowledge is incorporated into clinical practice and education and training programs for health care providers. It will also reach out to patients and caregivers to learn more about their needs and put knowledge in their hands that will help them in their daily lives.

The \$4-million project is funded by the Canadian Institutes of Health Research (CIHR), the Alzheimer Society of Canada, the Ontario Ministry of Health and Long-term Care, AstraZeneca Canada Inc. and Pfizer Inc.

For more information about the Canadian Dementia Knowledge Translation Network, visit: [www.lifeandminds.ca](http://www.lifeandminds.ca)

### Driving safety

More than 5,000 people with dementia in Nova Scotia continue to drive, posing a serious safety hazard to themselves and others. But convincing people with dementia to give up their keys is a major challenge. They often do not recognize that they can no longer drive safely, even when their family physician advises them to stop. Family members, especially female caregivers, often perpetuate unsafe driving by agreeing to act as ‘co-pilot.’

Dr. Paige Moorhouse is spearheading a project to see if a public awareness campaign has an impact on caregiver behaviour, in terms of persuading their loved ones to stop driving and refusing to act as co-pilot. She and her team are also developing and testing a web-based resource to provide family physicians with information, guidance and tools to help them get their dementia patients out from behind the wheel.



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Family, caregivers and physicians can work together to keep Alzheimer patients from driving.

### Good days/bad days

Dr. Kenneth Rockwood is leading a project to uncover what factors make a good day good—and a bad day bad—for people with dementia and their caregivers. The researchers will use their findings to create resources to support caregivers and patients in their daily lives.

### Clinical trials offer hope for Alzheimer and dementia patients

New-generation drugs being tested in international clinical trials have the potential not just to manage symptoms but to stall, halt or reverse the disease process itself, according to Dr. Chris MacKnight, director of the Division of Geriatric Medicine’s clinical trials office. Several promising drugs are being tested in phase III clinical trials at Capital Health.

Capital Health researchers were the first to ask patients and caregivers about their goals for drug treatment. Thanks to their leadership, clinical trials in Alzheimer disease now routinely assess how well test treatments are meeting the stated goals of patients and caregivers.

## Pathways to early intervention

*Researchers explore ways of detecting early Alzheimer disease*

As many as 500,000 Canadians have Alzheimer disease or a related dementia, yet a definitive diagnosis cannot be made while these people are living.

“We can only tell for sure if a person has had Alzheimer disease by examining the brain tissues under a microscope after death,” says Dr. Sultan Darvesh, a neurologist and Alzheimer researcher at Capital Health and Dalhousie Medical School who is also director of the Maritime Brain Bank. “If it is Alzheimer, we will find distinctive plaques and tangles within the brain, along with specific changes in certain brain enzymes.”

Dr. Darvesh has been studying one of these enzymes, butyrylcholinesterase, for more than 15 years. Because it is found in high concentrations in plaques and tangles, the enzyme is a target not only for potential treatments but also as a diagnostic marker.

For people with early-stage dementias, a definitive diagnosis combined with targeted treatment could slow or halt progression of the disease before major symptoms occur.

On the diagnostic front, Dr. Darvesh is testing a radioactive molecule he has developed to home in on butyrylcholinesterase. “The molecule is designed to bind to the enzyme in the brain and emit energy that allows for detection of signs of Alzheimer using a PET or SPECT scanner,” he says. “Our goal is to detect these signs before the disease damages brain function.”

Meanwhile, other Capital Health researchers are collaborating with the National Research Council (NRC) Institute for Biodiagnostics to study early Alzheimer disease. They are using functional magnetic resonance imaging (fMRI) to scan the brain at work.

“We are comparing the brain activity of healthy older adults with that of patients with presumed early Alzheimer disease,” says the NRC’s Dr. Xiaowei Song, who works closely with Dr. Kenneth Rockwood. One study looks at brain regions involved in memory and the effect of medications in these regions, while others look at differences in brain function, chemistry, structure, and blood perfusion between the two groups of participants.

“Understanding early brain changes will help us identify neurological signs that may be relevant to detecting the disease early and monitoring the effectiveness of treatments,” says Dr. Song. “This will assist future research and ultimately benefit people with the disease.”



### Hands-on brain research

Dr. Sultan Darvesh studies brains donated to the Maritime Brain Bank to determine if the donor suffered from Alzheimer disease or another form of dementia. Donated brain tissue is helping him unravel the secrets of Alzheimer disease and develop potential methods of early detection.

The brain in Dr. Darvesh's left hand shows evidence of Alzheimer disease. The healthy brain in the foreground is both larger and plumper than the diseased brain.

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