



## VASCULAR SURGERY

# Taking care to a new level

PATIENTS BENEFIT FROM ADVANCED NURSING INITIATIVE

“It’s all about continuity of care,” notes Sue DeVries, describing the objectives of the Advanced Practice Nurse (APN) initiative at Peter Munk Cardiac Centre’s Division of Vascular Surgery.

DeVries is one of two APNs currently working in vascular care, along with Alexandra Papadopoulos. Together, they play a leadership role in providing comprehensive care for vascular surgery patients – a level of care that is beyond the traditional scope of the staff nurse.

“Advanced practice nurses work under a unique set of medical directives developed and supported by the hospital,” explains Linda Belford, the APN Practice Leader. “Medical directives enable an expanded scope of practice to maximize efficiency and autonomy. With this expanded scope of practice, APNs collaborate with the interprofessional team to ensure our patients are provided with the best care possible.”

### An expanded clinical role

The APN’s expanded role includes increased clinical responsibilities, such as ordering medications and diagnostic testing, arranging for consultations with in-hospital specialists and other health professionals, and being proactive in patient evaluation and treatment planning.



Advanced Practice Nurses Sue DeVries (left) and Alexandra Papadopoulos are taking a leadership role in providing comprehensive care for vascular surgery patients.

Naturally, this expanded role is matched by an expanded level of training. “To become an APN you need a Master’s Degree in Nursing, as well as further training in the provision of advanced care,” explains Alexandra Papadopoulos. “This includes training in medications, diagnostics, and patient evaluation and management. We also have special training in our particular area, which is vascular care.”

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## ABOUT THE PETER MUNK CARDIAC CENTRE

The Peter Munk Cardiac Centre is the premier cardiac centre in Canada. Each year, approximately 17,000 patients receive innovative and compassionate care from the Centre’s world-renowned multidisciplinary heart team. The Peter Munk Cardiac Centre is based at Toronto General Hospital and Toronto Western Hospital. Both hospitals, along with Princess Margaret Hospital, are part of University Health Network. All three are research hospitals affiliated with the University of Toronto.

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With this expertise, the Centre's APNs play a lead role in a multidisciplinary team that includes physiotherapists, occupational therapists, social workers, clinical nurses, pharmacists and others. Their role is 80 per cent clinical with the rest designated to activities directed toward advancing the nursing profession, as well as the enhancement of patient care.

"Since the Peter Munk Cardiac Centre is a designated Centre of Excellence in Vascular Care, it's a very busy environment, and our patients have very complicated needs," notes DeVries, who, in addition to being an APN, is currently President of the Canadian Chapter of the Society for Vascular Nursing. "We work very closely as a team with our physician colleagues throughout each day. Each of us is assigned specific patients and our expanded role allows us to provide the very detailed holistic care our patients need.

"The patients and families know us; we know them, and their particular needs or challenges. We can network with internal resources as needed, such as speech language pathology, or infectious diseases. We can follow each patient and help guide their progress – not only while they are in the hospital, but even after they leave."

This is part of the continuity of care that DeVries believes is a guiding principle behind the APN initiative.

### Care beyond the hospital

Both DeVries and Papadopoulos are intimately involved in discharge planning and coordinating the care that each patient may require in the community. And that care can be complicated. "Discharge planning for someone following vascular surgery can involve a lot of complex care," says DeVries. "You might be dealing with physical frailty, mobility impairment, limb loss, wound care, pain management, and more."

"It can be especially challenging in situations, as with some elderly patients, where family and social support may be lacking," adds Papadopoulos.

As Linda Belford points out, it's not just patients and family who might need support. "One of the most important roles of the APNs is to link with professional care providers in the community, particularly those who don't have the resources or expertise to provide the complex care that many of our vascular surgery patients may require," she says.

As such, the APNs ensure that all relevant community care providers, from family physicians to rehab professionals and visiting nurses have their phone numbers – as do patients when they leave the Centre.

"Just the other day I had a call from a nurse at a retreat on behalf of one of our recent patients," recalls DeVries. "She wanted to discuss if his symptoms were consistent with recovery from surgery."

Although the APN role is not new to University Health Network, the APN vascular surgery initiative at the Peter Munk Cardiac Centre is – DeVries has been involved since January of last year and Papadopoulos joined a few months later – but everyone involved believes it is already having a positive impact.

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*"It hasn't been formally measured yet, but we believe the comprehensive coordinated care is already helping to reduce re-admissions and mortality rates."*

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Next steps include a working group to examine the implementation of the APN initiative and officially evaluate its effectiveness. "A future possibility may be to consider having more APN coverage in the ambulatory clinic to optimize continuity," says Belford.

In the meantime, the focus will remain on continuity of care, and the Peter Munk Cardiac Centre's ongoing mandate to strive towards excellence in patient care.

## CARDIAC SURGERY

# Mechanical heart program leads the way

### CLINICAL MILESTONES PUT CENTRE AT THE FOREFRONT

For patients awaiting a heart transplant, life can seem precarious, with long waiting lists and limited medical resources. "Waits can be as long as two years for some blood types," notes Dr. Vivek Rao. "We still lose one in five patients waiting for transplants, even with vastly improved clinical care. Unfortunately, many of these patients die suddenly, without any chance of medical intervention."

Dr. Rao believes recent developments in technology – specifically the new generation of ventricular assistive devices (VADs) – could play a major role in reducing these deaths by helping to keep patients on waiting lists alive longer, and even providing an alternative to transplants.

As Surgical Director, Heart Transplant Program, Dr. Rao, along with his colleagues at the Peter Munk Cardiac Centre, is playing a major role in advancing the frontiers of this exciting area of medicine.

"These devices are often referred to as mechanical hearts," explains Dr. Rao. "They are essentially introduced to support circulation in patients whose hearts are failing for various reasons until a new heart can be found and transplanted. But we are now seeing some patients who are doing so well on VADs that the possibility of not transplanting them becomes an option."

The Peter Munk Cardiac Centre is one of the busiest VAD implant facilities in Canada, and current

work is helping to identify the best applications of emerging technologies.

"We have already done some very important work on VADs," Dr. Rao says. "We were one of the first centres in Canada to implant the Heart-Mate<sup>R</sup> II, and we were the first to have a patient successfully transplanted from this device, after an impressive 134 days of cardiac support."

However, Dr. Rao believes that it is pending advances that will really establish the Centre's leadership in the use of VADs.

#### Taking a leadership role

"This fall we hope to be the first to implant the new, state-of-the-art WorldHeart Levacor<sup>R</sup> Rotary Ventricular Assist Device," he notes. "This really represents the latest advance in VAD technology. It's a device that theoretically has an infinite lifespan, so it could change how we approach treatment. Successful implantation of this device would be the biggest clinical milestone not only in the recent past, but for the next few years. It would really put the Peter Munk Cardiac Centre on the world VAD map."

Of course, there are still many challenges to overcome.

"While early results are promising, we still need to look at long-term results, with five to 10 years of data, to really see how effective these devices are," Dr. Rao explains.



Dr. Vivek Rao believes the Centre will play a major role in perfecting new ventricular assistive devices – or mechanical hearts as they are commonly known.

"Also, there are still many more requests for procedures and transplant patient care than the hospital can currently support," he adds. "The Heart Transplant Program really needs the resources to develop a stand-alone heart failure unit. This would allow us to manage patients more efficiently and improve outcomes."

With this in mind, however, Dr. Rao is enthusiastic about the potential of new generation ventricular assistive devices to positively impact the treatment of patients awaiting heart transplants, and about the contribution of the Peter Munk Cardiac Centre. "Other cardiac care institutions around the world will be closely watching what we are doing," he concludes.

## CARDIOLOGY

# Seeking clues to sudden death

## DOES ELECTRICAL INSTABILITY HOLD THE KEY?

Researchers have long struggled to understand why and how cardiac arrhythmias can cause sudden death in some patients with heart disease, while not seriously affecting others. It's a question that Dr. Vijay Chauhan and a team at the Peter Munk Cardiac Centre may be getting closer to answering.

Cardiac arrhythmia essentially refers to abnormal electrical activity in the heart. The heart may beat too slowly or too fast, or it may be irregular, or even seem to skip beats. It is the complex nature of arrhythmias that some may seem merely annoying to the person (such as the feeling that their heart sometimes skips a beat) while others have no symptoms at all. However, the sobering fact is that some arrhythmias can unexpectedly lead to sudden death, even in heart patients who seem apparently stable.

"Sudden death from lethal arrhythmia is a major worldwide problem," states Dr. Chauhan, Director of Electrophysiology Training at the Centre. "In North America alone it is linked to approximately 400,000 deaths a year. This is significantly more than many other better known conditions, such as stroke, lung cancer and breast cancer combined."

Dr. Chauhan is a clinician-scientist who has been with University Health Network for seven years. After receiving his medical degree from the University of Ottawa, he received specialty training in electrophysiology in London, Ontario and at Duke University in North Carolina.

This training combined with his extensive clinical experience is proving invaluable in his quest to unlock the mysteries of arrhythmia and sudden death.

"What is abnormal about the electrical system in heart patients with arrhythmias who suffer sudden death?" Dr. Chauhan asks. "That is the first question that needs to be answered. We feel that these people have some degree of electrical instability from their heart disease that becomes more pronounced during physical activity or sleep. If that is the case, then we have to find some way to measure this electrical instability during activities of daily living, rather than at one point in time."



Dr. Vijay Chauhan and his team are looking for abnormalities in the heart's electrical system in patients who are at risk of dying suddenly.

"Once we have identified an index of electrical instability, the challenge then becomes how well and how accurately we can identify patients at the highest risk and, therefore, those who need and will get the most benefits from treatment, such as use of a defibrillator [a device that applies a therapeutic dose of electrical energy to the heart to treat a cardiac arrest]."

"Because resources are not unlimited, the treatment dilemma is to not provide defibrillators to patients who don't need them, but to ensure we don't miss those who really do," Dr. Chauhan adds.

### Guiding treatment decisions

The overall objective of the research at the Centre is to develop efficient *risk stratification algorithms* – a kind of model of the decision pathway that would guide clinicians to the appropriate and timely treatment.

"The team here includes myself, post doctorate fellows and engineers," says Dr. Chauhan. "We are working with special ECG equipment – a specially designed 120 electrode vest – to provide sophisticated measurement of the heart's electrical function. Naturally, you can't measure those signals in the heart itself, but you can through the skin. This is a process called Body Surface Mapping (BSM)."

“To be precise, we are measuring something called T-wave alternans,” he continues. “These are periodic beat-to-beat oscillations in the electrical signature of the heart. Compare this to a suspension bridge swinging to-and-fro. If the amplitude of those swings continues to increase, the bridge will suffer structural damage and eventually collapse, no matter how strong it is.”

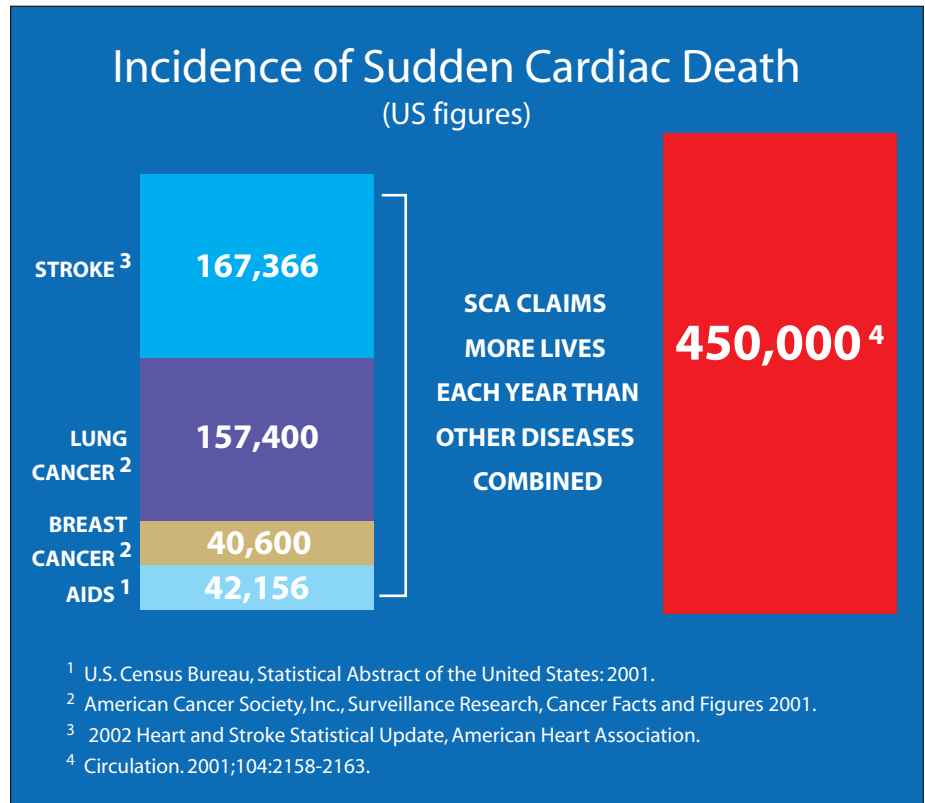
### Combining techniques

However, the research at the Centre is taking this a step further by adding MRI images of the heart – specifically scar tissue in the heart, which may indicate where the abnormal electrical activity is arising. “These two techniques already exist, but we are the first centre to combine the two in an attempt to understand arrhythmia and sudden death,” notes Dr. Chauhan.

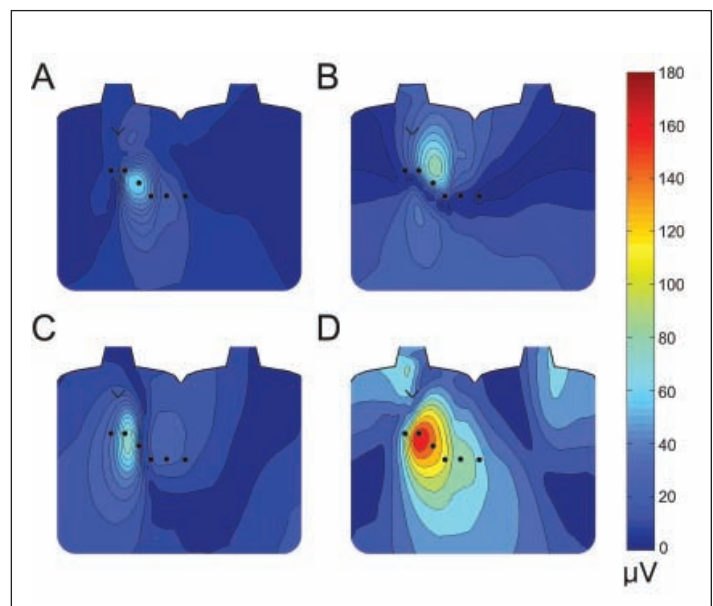
The team will look specifically at the distribution of the scar tissue – its location and structure (e.g., is it solid or patchy?). “Our work will look at if and how the abnormal electrical function and distribution of the scar tissue are linked,” Dr. Chauhan says. “Any risk stratification algorithm is naturally going to be more accurate and useful with multiple parameters, in this case electrical activity and scar distribution.”

At present, the research, which is being funded by the Heart and Stroke Foundation of Canada and the Canadian Foundation for Innovation, is focusing on perfecting the most accurate way of measuring electrical and scar properties of the heart, and there is still a lot of work to do.

“Once we are satisfied with the accuracy of our measures of arrhythmia risk, we need to test it in a large patient group before it moves to final development and clinical use,” explains Dr. Chauhan. “But we feel this work is exciting and has great potential to help clinicians everywhere to better meet the challenges of arrhythmia and sudden death management.”



Sudden death from cardiac arrhythmia is a major problem in North America and around the world.



A Body Surface Mapping image of the chest (front and back). All images show some degree of abnormal electrical activity in the form of large amplitude oscillations of T-wave alternans (in normal activity the image would be completely blue). Image D illustrates excessive oscillations indicating a high risk of sudden death.

## INTERVENTIONAL CARDIOLOGY

# Offering solutions where none existed before

## PERFECTING LEADING-EDGE VALVE TECHNOLOGY

There is a technological revolution occurring in interventional cardiology and according to Dr. Eric Horlick, the Peter Munk Cardiac Centre is playing a leading role.

Dr. Horlick is an interventional cardiologist with the Centre's Division of Cardiology and an Assistant Professor at the University of Toronto. "Transcatheter Valve replacement is possibly the most exciting area in clinical cardiology right now," he states. "In the last two years alone, there have been revolutionary technological developments and explosive growth of transcatheter valve replacement, and we have been centre stage for all of it."

As the first and one of the only institutions in the world to provide all three types of valve replacement – aortic, mitral and pulmonary – the Munk Centre has lead the way on a number of fronts. For example, the Centre is the only facility to have worked with both of the two most advanced pulmonary valve implants – the Medtronic Melody<sup>R</sup> Transcatheter Pulmonary Valve and the still investigational Edwards SAPIEN<sup>R</sup> Transcatheter Heart Valve. In fact, three of the first five procedures in man using the SAPIEN<sup>R</sup> valve were performed at the Centre.

"The Centre is influential, not only in working with the latest



The Centre's culture of innovation and clinical excellence allows them to work with the latest valve replacement technology, according to Dr. Eric Horlick.

technological advances, but also in determining how these devices should be used in clinical practice," Dr. Horlick explains. "We help set the standards that will govern future practice."

### A culture of innovation

The trust that the developers and manufacturers of these leading-edge devices continue to show in Dr. Horlick and his colleagues is a sign of the international respect the Centre has. "It really argues to our position as a world leading institution," he says. "The industry chooses its partners very carefully. They look for key fundamentals – a proven track record, a culture of innovation, inter-professional

collaboration and a combined research-clinical focus. We are one of the very few centres trusted to work with, and help perfect, the very latest innovations."

He credits the belief and support of every one involved, from the clinical team, to the administration, to the Foundation, as well as the Centre's commitment to innovative research and clinical excellence. "The culture here is extremely supportive," comments Dr. Horlick. "There is just extraordinary collaboration between cardiology, cardiac surgery, vascular surgery, anesthesia and many other departments. The team believes strongly in what we are doing and there is a great deal of excitement. It's really contagious, and that

makes us even more committed to repaying that trust.”

So far that trust has been more than repaid in terms of the all important aspect of patient care. “It’s great to talk in terms of technological advances, but the real issue is what that ultimately means to our patients,” Dr. Horlick notes. “And there are great, tangible benefits in that regard. The fact that we have access to the latest devices means that we can provide treatments that others can’t.”

He cites a recent referral from famed Columbia University Medical Center in New York, because they didn’t have access to technology available in Toronto.

“The bottom line is that our unique role allows us to offer treatment options for many patients who are desperate,” he adds. “We can provide novel solutions – often so new that very few can offer them – where solutions didn’t exist before. We can sometimes offer new hope. This includes patients who may have been turned down for being

too high risk for conventional surgery. “There was an 88-year-old patient who was simply too high risk for open surgery,” Dr. Horlick relates. “He didn’t want to live to be 200; he just wanted to be able to enjoy life and spend time with his grandchildren. In cases like this our program can offer new options.”

“A 67-year-old university professor had similarly been found too high risk, but after a transcatheter valve procedure he feels he has been reborn, and is back to work”

### Spectacular results

Dr. Horlick cites the 24 aortic valve procedures that have been performed – some with an incision in the leg, and others with a tiny incision in the chest. “We’ve had spectacular results,” he says. “Even we were surprised by how well the patients did following surgery. And they were thrilled by both the results and the fact they could get treatment so close to home.”

There are currently over 30 people involved in the program, including

cardiologists, cardiac surgeons, vascular surgeons, cardiac anethetists, nurse coordinators, clinical nurses, laboratory technicians, imaging professionals, infection control, pharmacists, and others. Together, they have helped make the Centre an international model. “Others talk about what we are doing here,” notes Dr. Horlick. “Clinicians come from across Canada and the world to learn from us and see how our model of dedication, teamwork and infrastructure has helped establish our transcatheter valve program.”

As to what the future holds... “The sky’s the limit,” Dr. Horlick says. “We are currently working with first generation devices, and we know industry will be constantly trying to improve them, just as we will be trying to perfect our procedures. There may be a potential in treating other patients, with more moderate risks for surgery, but we will have to work very hard to match the superb standard of care set by our worldclass surgeons. It all adds up to very exciting times.”

## PETER MUNK CARDIAC CENTRE - CLINICAL & RESEARCH REPORT

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## IN THE NEWS

# Symposium welcomes international ACHD experts

Over 300 medical professionals from around the globe gathered in Toronto in June for the 18th Annual *Adult Congenital Heart Disease Symposium* hosted by University Health Network.

Dr. Erwin Oechslin, Symposium Course Director, and Director of the Toronto Congenital Cardiac Centre for Adults at the Peter Munk Cardiac Centre, is proud of how the symposium has evolved to meet the needs of the dynamic field.

"In the past, mostly cardiologists and surgeons attended, but now electrophysiologists, nurse practitioners, diagnostic imaging experts, psychologists, and pulmonary hypertension specialists among others are part of the discussion," notes Dr. Oechslin. This is what makes the symposium unique and it reflects our multidisciplinary provision of care."

"Now that congenital heart disease patients are living longer, they want to start families," he adds. "There is a lack of knowledge in this area, but international physicians have a lot to learn from Toronto experts, particularly from those in the Mount Sinai-Peter Munk Cardiac Centre Special Pregnancy Program."



Dr. Erwin Oechslin believes clinicians around the world have a lot to learn about ACHD from the Centre.

This was the first conference utilizing UHN's new online conference service which enables conference attendees to register, book hotel space, submit an abstract and view the program from [www.uhn.ca](http://www.uhn.ca)

## Vascular nurses recognized for leadership excellence

Advanced Practice Nurse Sue DeVries and Cindy Dickson, RN, of the Outpatient Clinic, Division of Vascular Surgery were recently honoured with Leadership Excellence in Clinical Practice awards.

This was the inaugural year for the awards which were presented in May on behalf of Mary Ferguson-Paré, Chief Nursing Executive of University Health Network.

Award recipients were nominated by their colleagues across UHN.

For more information about the Peter Munk Cardiac Centre please visit [www.petermunkcardiaccentre.ca](http://www.petermunkcardiaccentre.ca)

**For questions or comments about this newsletter or for more information on how you can help support the Centre, contact:**

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