

It's a small world after all: A Canadian resident's perspective on COVID-19

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COVID-19 has infected millions of people, with an estimated total dead in the hundreds of thousands. This has significantly impacted health care, including who is delivering it, how it is delivered, and how it is taught. This article describes challenges of the COVID-19 pandemic from the perspective of a Canadian nuclear medicine resident, including new risks with nuclear imaging, navigating new and sometimes challenging guidelines, as well as working and living within the confines of social distancing. (J Nucl Cardiol 2020;27:2283–6.)

Key Words: Infection • metabolic • diabetes • PET • SPECT • molecular imaging



At the time of writing this article, it has been 113 days since the World Health Organization declared COVID-19 a public health emergency, and 72 days since it was declared a Pandemic. From the Johns Hopkins COVID-19 online interactive dashboard,¹ there are approximately 5 million global cases with an estimated 328,000 deaths. There is even concern about multiple COVID-19

waves with the potential to extend the pandemic out for a year or longer.² Pretty impressive, and frankly scary, for a virus that is less than a year old.

SYSTEMWIDE ISSUES AND CHALLENGES

I was on call the weekend my home province of Ontario declared a state of emergency. My department is located in a city of approximately 400,000 people—a midsize Canadian city. There were two COVID-19 patients in the hospital. These patients were very short of breath and the physician in charge of their care requested that each has a ventilation-perfusion (V/Q) study. Under normal circumstances, if a patient had a clear chest x-ray and an appropriate Wells score, our department would arrange for imaging as quickly as possible. As a nuclear resident, I see it as an excellent study, with very high sensitivity, a low radiation dose to the patient, and no need for iodinated contrast. Unfortunately, a V/Q study takes longer to perform than a CT angiogram (tens of minutes vs. seconds), and the ventilation portion of the study requires the patient to deeply inspire a radioaerosol, which often induces coughing. All staff take steps to minimize risk, such as donning appropriate personal protective equipment (PPE), but risk is not eliminated.

There are several ventilation radiotracers available for V/Q imaging. In Canada, we are fortunate to have access to Technegas, a technetium-based radioaerosol

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with small average particle size allowing deep penetration into the lungs.³ The setup is composed of two parts: the first is a Technegas generator that acts as a furnace for heating high-purity graphite and pertechnetate, while the second is a single-use patient administration set (PAS). The PAS contains a one-way valve and filter to prevent cross-contamination between patients. In contrast, popular options in the United States include both ¹³³Xe gas and ^{99m}Tc-DTPA radioaerosol. ¹³³Xe, a noble gas, allows true ventilation imaging, but at the cost of poor image quality, low photon abundance, and rapid clearance limiting studies to one projection. ¹³³Xe is performed with a closed-loop leak-resistant breathing circuit allowing wash-in, equilibrium, and washout phases to be assessed. Negative pressure rooms are recommended, but unfortunately no longer required. ^{99m}Tc-DTPA uses the Bernoulli Effect to generate aerosol droplets and allows administration of radioaerosol in the presence of oxygen, but at the cost of increased particle size. These droplets are either inhaled by the patient or trapped in a particle retentive filter.

Understandably, the availability of multiple ventilation radiotracers, each with a unique setup, has contributed to significant conflict in the recommendations of many medical imaging societies about the appropriateness of a V/Q study in a probable or known COVID-19 patient. On the one hand, several international nuclear medicine societies recommend performing the study without modification despite an increased risk to the technologist and nursing staff in the room.⁴ On the other hand, the American College of Radiology (ACR) recommends not performing a ventilation study.⁵ While the Society of Nuclear Medicine and Molecular Imaging (SNMMI) has suggested the physician should look to their local health care facility policy as the primary source of guidance. Compounding these events, Canada, a resource-rich nation, imports many essential goods (drugs, PPE, etc.) limiting our access to them during a global catastrophe, like a pandemic. The thought of performing this study with insufficient PPE reinforced the risk this study could pose to oneself, co-workers, and family.

Since that time, our department has evolved tremendously to face new COVID-19 challenges. We are fortunate that our program covers three separate hospitals. This has allowed us to distribute personnel over the entire city. In terms of workload, two of these three centers may perform up to a total of 16 myocardial perfusion studies per day. We have modified protocols to favor pharmacologic stress testing per the COVID-19 information statement from the American Society of Nuclear Cardiology (ASNC) and SNMMI.⁶ The third center specializes in oncologic PET/CT studies and performs some cardiac sarcoid studies as well. Each

center continues to perform some general nuclear medicine, including bone scans, V/Q studies, and renograms.

ACADEMIC AND PERSONAL CHALLENGES

With the establishment of social distancing, it is not uncommon to find oneself, the only learner in a center. The consensus of my fellow residents is that this provides excellent hands-on experience. This experience is most advantageous to the more senior residents. They call upon their personal experience, including comfort with technologists, known staff preferences, and their extensive readings. In the case of junior learners, fewer experiences to draw upon and unfamiliarity with the department can leave them confused and frustrated with how to proceed in atypical or challenging cases.

Social distancing does not lend itself well to departmental academic presentations, such as grand rounds, physics lectures, and other educational topics. If not planned, technical problems, such as background noise and internet connectivity, as well as difficulty engaging the audience, can cripple a presentation. Yet, there are high-quality web-based seminars (webinars), including the ASNC Nuclear Cardiology Virtual Elective, and those offered by the SNMMI.

The residents in our program always appreciate seminars and lectures from visiting speakers, and the webinar format is a natural extension of these opportunities. These individuals present us with a new perspective on the topic and often provide unique cases that we might otherwise only see in a textbook. For example, in the ASNC Nuclear Cardiology Virtual Elective, the presenters were from centers of excellence in the field of cardiac imaging. This series of webinars brought a breadth of experience that is otherwise very challenging to organize. Most of the webinars have also included a "read with the experts" section reinforcing a standard approach to cases while challenging us to think on our feet. Our residents also very much like to re-watch webinars they attended live. Recordings allow us to stop the lecture and look up unfamiliar terms, fit the talk into a workday, and rewind to catch a missed word or listen again to more challenging concepts. As a whole, webinars are a highly versatile and effective teaching modality.

Since most of our learning now happens through webinars, future curricula need to revisit learner location, and mechanisms to protect time. There is a tendency for nuclear medicine academic and educational events to occur in the morning. Somewhat uniquely, in the area of general nuclear medicine, patient injections happen in the morning, and the radiotracer takes on the order of hours to distribute. Departmental workload is

highest in the afternoon, and events are scheduled for the morning.

The webinar series developed as a response to COVID-19 have all occurred at lunch or early afternoon when work starts to pick up. Prominent advertisement of these online seminars has allowed staff and technologists to be aware of the disruption with mixed success. These advertisements also provide the more reserved junior learners the opportunity to bring up the interruption in a less direct fashion. The department typically provides residents with a quiet space. If one is not available, they are excused from the department for the duration of the meeting virtually.

The COVID-19 pandemic has been particularly stressful to our senior residents, as accreditation exams have been postponed until the fall of 2020. Fortunately, the College of Physicians and Surgeons of Ontario (CPSO) has created a 6-month provisional license that allows final-year residents to practice while waiting for their final certifying exam. The college has even had the foresight to create an expedited path for retired physicians to re-enter practice.

Each resident in our program, particularly, those with families has adopted unique self-care strategies to minimize risk to loved ones. It is not uncommon for residents with homes to change out of work clothing in the garage, wash their hands, and clean potentially COVID-19-contaminated surfaces such as the car steering wheel, laptops, and books. Then, a final handwashing followed by an evening shower.

In the extreme, healthcare workers have self-isolated from family members considered to be at risk. As an example, this past winter, my one-and-a-half-year-old daughter developed several episodes of bronchiolitis requiring hospitalization. Her mother, a nurse practitioner, very early on, recognized the dangers an active health care worker might bring to the home. To minimize the risk to our child, I have had no physical contact with her for almost 3 months. Fortunately, I live in a time when social media is advanced, and I can easily organize high-quality electronic visits. Of course, these do not replace physically “being there.” At times, I cannot help but feel left out of her life. Still, electronic visits are a significant improvement from phone visits, particularly with young children.

FUTURE CONSIDERATIONS

The more we learn about this virus, the wider the net of “vulnerable patients” grows. It started with easily identifiable groups, such as the elderly, the immunocompromised, as well as those with diabetes, kidney, heart, or lung disease. Now what is frightening is that progressively younger groups are at risk of having

severe adverse events, such as a cerebral vascular accident in young adults⁷ and Kawasaki-like disease in children.⁸ It remains to be seen if these groups are indeed “at risk,” or if there are other unknown risk factors. What is important is that there is currently no risk-free group and underscores the necessity of social distancing and “flattening the curve.”

Despite all this, there is hope that both the United States and Canada are flattening the curve. While there is a PPE shortage, we have yet to run out, and domestic suppliers are retooling local factories to supplement our current needs. Canada has, as the US has for some time now, started discussing the possibility of bringing manufacturing back home. If only one good comes from COVID-19, it would be the creation of multiple sources of both PPE and antibiotics, stabilizing a global supply during a pandemic.

For the most part, people seem to be respecting social distancing. Although, as the weather improves, news reports tell us more and more people are traveling to cottages. Unnecessary travel could promote a second COVID-19 wave. A report from the University of Minnesota's Center for Infectious Disease Research Policy outlines multiple scenarios involving periodic resurgences of COVID-19 that could last for several years.² This emphasizes our continued vulnerability until either an effective vaccine is made available, or enough of us have contracted the virus that it burns out.

For this reason, many people have adopted the mantra, “Welcome to the new normal,” or “this is the new normal.” I sincerely hope they are wrong. However, for at least the foreseeable future, some social distancing elements will continue, and both residents and programs will evolve to face these challenges. With electronic resources, departments could benefit from each resident having their own unique staggered academic time. If there are at least some pre-recorded webinars/lectures, then there is no reason for all residents to watch them all at the same time. If so inclined, a program could break a half-day down into several hours over several days. On any given day and at any given time, most residents would be on service, limiting departmental disruption. Alternatively, if several affiliated departments from separate institutions could agree on a schedule, similar-year residents could have virtual half-days with their peers. This format could foster community in the medical field, promote uniformity in training, and potentially improve medical research. The impetus is on those programs willing to experiment with these technologies.

Ultimately, maybe this was a good wake-up call for each country's medical system. When we do not have an effective treatment, a vaccine, or infrastructure to handle those infected and those at risk, we make ourselves

vulnerable. Pandemics are not a thing of the past and are not something that happens in “other” countries. To quote the Sherman Brothers, an American songwriting duo, “It’s a small world after all.”

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