HEALTH CARE PROVIDERS PREPARE FOR EXTREMES

Climate Change Factors into Facilities Planning

Photo courtesy of Nanaimo Regional General Hospital

By Kent Waddington, Linda Varangu, Peter Berry and Jaclyn Paterson

CANADA'S HEALTH CARE facilities are becoming more vulnerable to the impacts of climate change, which can disrupt facility services and care delivery. Extreme weather events (e.g. storms, floods, wildfires, heat waves) can create emergencies by damaging infrastructure, compromising access to critical resources (e.g. medical supplies and equipment, transportation, food, water) and threatening the safety of patients, visitors and staff.

Climate change also increases risks to Canadians from some water- and food-borne diseases and it is expected to worsen air quality in many communities. Taken together, impacts on health from these climate-related hazards can have significant implications for demand on health care facility services.

The World Health Organization has called on decision makers to prepare for climate change impacts through efforts to increase resiliency in the health sector.

This entails mainstreaming climate change into risk assessments, considering climate change when developing plans and programs, and engaging in broader community discussions and initiatives around climate-related issues. For example, health care and public health officials can prepare by assessing risks from extreme weather events, increasing readiness to manage climate-related infectious disease outbreaks or atypical cases and increasing understanding of how gradual shifts in weather can affect institutional risk profile.

Most recently, southern Alberta provides tangible evidence of what can happen when an extreme weather event strikes. Several hospitals and tertiary care facilities were shut down due to the flooding in late June, 2013 in and around Calgary.

Alberta Health Services closed the hospital in High River and ordered an evacuation; minor injury nursing services were offered at the fire hall. Surgery schedules had to be scaled back and many elective surgeries were cancelled. Residents from a number of area facilities were transferred to safer, operational sites until the hospital was able to reopen. It was reported by the Canadian Press that the Canmore hospital was entirely surrounded by a moat and the basement had flooded, putting an end to all food service from the kitchen which was located in the basement.

Health care facilities can reduce risks of climate change through proper planning by staff and through careful management of critical resources during extreme weather events and disasters. A resilient health care facility also commits to sustainable practices, such as water and energy conservation, and promotes active transportation and local food procurement. By investing in such activities, organizations can reduce operating costs and increase resilience in the broader community.

RESILIENCY TOOLKIT

To help health organizations evaluate their preparedness and become more resilient to climate-related risks, the Canadian Coalition for Green Health Care, together with Climate Change Nova Scotia and Health Canada, developed the *Health Care Facility Climate Change Resiliency Toolkit*, which includes three components: a resiliency assessment checklist; a facilitator's guide; and an information resource guide.

The *Assessment Checklist* includes questions to measure resiliency in many organizational areas including emergency management, facilities management, health care services and supply chain management. Completion of the checklist by officials with information and experience in these areas can identify gaps in preparedness and inform resiliency activities to reduce climate change risks.

It was developed using information obtained from an international literature review and input from an advisory committee of Canadian health care executives, facility managers and engineers, and climate change impacts and adaptation experts. It was designed for use by officials within the health care setting to obtain data on current efforts to prepare for climate change impacts.

The checklist questions are based upon key indicators of resilience and respond to the needs of specific health care facilities. To ensure the checklist was formatted and presented so that it could be completed by officials with expert and practical knowledge relating to different aspects of health care facility functioning, a draft version of the checklist was piloted in six Canadian facilities.

"Participating as a pilot site has been an invaluable experience for our team," observes David MacKenzie, Vice President, Operations, with the Guysborough Antigonish Strait Health Authority. "The toolkit challenged how we are planning for events and with the recent experience of [Hurricane] Sandy in New Jersey and New York, reinforced our conviction in these strategies."

The *Facilitator's Guide* is an electronic presentation for hospital officials leading the assessment, which can be tailored to the specific needs of their health care facilities. It provides instructions for conducting the resiliency assessment and can be used to engage facility officials, promote discussion around questions and results, and capture information.

The *Resource Guide* provides a listing of resources for those seeking more information about climate change impacts on the health services sector and adaptation options to increase resiliency. It provides resource summaries along with references for a wide range of publications and reports on topics such as emergency management, supply chain management, health services, facilities management and infrastructure.

INSPIRING EVENTS

Some health care facilities have already begun to factor climate change into their strategic planning and are making strides in efforts to increase resiliency. Notably, engineering staff at The Ottawa Hospital (TOH) started thinking about the far-reaching implications of the loss of emergency power and their preparedness for other serious disaster response necessities after a "near miss" incident a few years ago.

A ruptured sprinkler line caused flooding that threatened the room that housed the facility's emergency backup generator, which has capability to power 17 operating suites, and water, sewer and HVAC services for two million square feet of building space. This became a catalyst for the rethinking of future generator placement.

"About the time we began discussions on replacing emergency generators at our Civic campus, I had attended a conference where one of the speakers presented on the impacts Hurricane Katrina had on his hospital in New Orleans. Their generators were in a bunker 21 feet above sea level. When Katrina hit, all he could see were the exhaust stacks poking out above the water. The net effect was complete evacuation of the building," recalls Brock Marshall, TOH's Director of Engineering & Operations. "Our new generators are now housed on the third floor of the powerhouse, well above any anticipated flooding threat."

Looking to the prairies, in the summer of 2007, the Regina Qu'Appelle Heath Region (RQHR) experienced a somewhat unprecedented 10 consecutive days with the humidity index rating exceeding 45° Celsius. These environmental extremes created uncontrolled humidity conditions throughout RQHR facilities causing the shutdown of all operating rooms except for the most life-critical cases.

To safeguard against future unplanned disruptions, RQHR upgraded and added cooling towers, replaced the cooling coils in many HVAC systems and added additional building automation controls to monitor and control humidity in real time to maintain the humidity within acceptable ranges.

"We designed a BAS to automatically take control of the room temperature setting during periods of excess humidity, automatically increasing the spatial temperatures and reducing the relative humidity (RH). Generally speaking, for every degree of temperature rise we see a corresponding decrease of 5% RH," explains Peter Whiteman, RQHR's Energy Centres Manager.

Once the team communicated throughout the organization that the environmental extremes were beyond the facilities' original design limitations, everyone came onside to design and develop solutions that enabled building operators to maintain the indoor environment within acceptable standards.

"Leadership in health care isn't restricted to doing things right; it's also about doing the right things," Whiteman reflects. "Management was very supportive once they understood how climate change was impacting our ability to deliver quality health care."

HARMONIZED WITH GHG REDUCTION

While RQHR faced the challenges of its original 1980s-era technology, the Nanaimo Regional General Hospital is a new 247-bed facility, opened in 2012, to primarily serve central Vancouver Island's 160,000 residents, but also as a referral hospital for an additional 400,000 B.C. residents.

All public sector organizations in British Columbia, including Vancouver Island Health Authority (Island Health), were legislated to be carbon neutral by 2010. New buildings must be a minimum of LEED Gold. Island Health aimed to minimize greenhouse gas emissions with this new building, and designers provided many features that have the co-benefit of mitigating risk in the event of extreme weather.

To reduce energy use and concomitant GHG emissions, building design includes use of displacement ventilation, wood products with lower associated GHG emissions, solar shading, extra roof insulation, a heat recovery chiller and a subterranean labyrinth for heat storage.

During daylight hours, for example, the majority of the building operates with very little artificial light compared to the old Emergency Department, which had no natural light. Designers provided daylighting in most areas in the building (even in the trauma room) as well as operable windows to allow natural ventilation.

The building's dedicated heat recovery chiller provides preheat for the domestic hot water and heating when required by exterior zones. This system is 100% backed up by the main hospital's existing plant. Design and technology is in accordance with LEED Gold and the BC Hydro New Construction Standard. The building energy performance index (BEPI) is 524 kWh/m^2/yr and an annual savings of 939 GJ gas; 1,071,892 kWh electricity and a 39 kW demand reduction for a total annual savings of $59,815.

Kent Waddington and Linda Varangu are with the Canadian Coalition for Green Health Care. Peter Berry and Jaclyn Paterson are with Health Canada. For more information about the **Health Care Facility Climate Change Resiliency Toolkit,** see the website at www.greenhealthcare.ca. The preceding article is excerpted from **Canadian Healthcare Facilities,** Summer 2013.