



PREPARING FOR THE IMPACTS OF CLIMATE CHANGE

How ready is your health care organization?

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 vector-, 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.

We have only to look to the southern Alberta for 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. In all, it appears over 100,000 Albertans were forced from their homes due to the flooding and three residents of High River lost their lives. 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 resiliency in the broader community.

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.

Assessment Checklist (PDF) - 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. For more information, click www.greenhealthcare.ca/climateresilienthealthcare/CCGHC-HealthCareFacilityResiliencyChecklist.pdf

Facilitator’s Guide (PowerPoint®) - 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. For more information, click www.greenhealthcare.ca/climateresilienthealthcare/CCGHC-ResiliencyToolkit-FacilitatorPresentation.ppt

Resource Guide (PDF) - 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. For more information, click www.greenhealthcare.ca/climateresilienthealthcare/CCGHC-ResiliencyResourceGuide.pdf

The Assessment Checklist 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 including St. Martha’s Hospital (Antigonish, NS), Soldiers Memorial Hospital (Kentville, NS), the Queen Elizabeth II Hospital (Halifax, NS), Aberdeen Hospital (New Glasgow, NS), the Ottawa Hospital (Ottawa, ON) and the Stonewall and District Hospital and Health Centre (Stonewall, MB).

“Participating as a pilot site has been an invaluable experience for our team,” said David MacKenzie, VP – Operations with the Guysborough Antigonish Strait Health Authority. “The toolkit challenged how we are planning for events and with the recent experience of Sandy in New Jersey and New York, reinforced our conviction in these strategies. Extreme weather events are happening more frequently and can be catastrophic for communities that don’t understand or prepare appropriately.”

Support for the initiative was also received from the CHES Maritime Chapter. Representative Robert Barsz (Manager, Facility Services, South Shore District Health Authority) speaks on their behalf. “As the managers of health care’s infrastructure, CHES Maritime was excited to help the Coalition and its partners develop the assessment tool and explore opportunities to make our hospitals more resilient and more sustainable in the face of growing climate change and worsening climactic incidents. It is incumbent upon us to be as prepared as possible and to be ready to deliver the best possible patient care from a safe and functional healing facility during times of disaster.”

Some health care facilities have already begun to factor climate change into their strategic planning and are making strides in efforts to increase resiliency.

The Ottawa Hospital - A few years ago, the Ottawa Hospital (TOH) had an incident where a sprinkler main line in a service tunnel ruptured and water



Environmental extremes forced staff at the Regina Qu'Appelle Health Region to rethink how they controlled humidity during periods of high summer temperatures. Upgrading cooling towers helped improve the indoor environment and reduced the incidents of unplanned disruptions to operating room schedules.

began to fill the tunnel, rapidly encroaching upon the room housing their back-up emergency generator and main electrical distribution system. The City of Ottawa repair crew was able to stop the leak and restore service just short of the water breaching the doors to the emergency generator set, which, if it had, would have resulted in the loss of emergency power to 17 operating suites, curtailed emergency provision of water and sewer services to two million square feet of building space, and the shutdown of HVAC service for 100% of the campus. Patient care would have been seriously impacted by a forced shutdown of all power.

This incident got TOH engineering staff thinking about the far-reaching implications of the loss of emergency power and their preparedness for other serious disaster response necessities, and was a catalyst for the rethinking of future generator placement.

“About the time we began discussions on replacing emergency generators at our Civic campus,” says TOH Director of Engineering & Operations Brock Marshall, 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 twenty-one 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. Our new generators are now housed on the third floor of their powerhouse, well above any anticipated flooding threat.”

Regina Qu'Appelle Health Region (RQHR) -

“Here in Saskatchewan, during the summer months we historically have one or two periods of high temperatures coupled with high humidity each year,” reports RQHR’s Energy Centres Manager Peter Whiteman. “However, these occurrences were generally short-lived; usually lasting no more than a day or two, and our building could ride through them without developing any significant adverse reactions. Unfortunately, these events now have a tendency to last much longer.”

During the summer of 2007, however, RQHR experienced a period of ten consecutive days with the humidity index rating exceeding 45 degrees Celsius. These environmental extremes created uncontrolled humidity conditions throughout RQHR facilities and Whiteman and his team had to shut down 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.

For the most part, RQHR’s OR HVAC systems were designed for 100% outside air, which was the norm back in the mid-eighties. Medical, environmental and technical advancements since then have significantly



The Nanaimo Regional General Hospital includes extensive use of day lighting and natural light which helps decrease reliance on electricity. Research also shows natural lighting helps improve patient outcomes, and reduces staff stress.

altered how these critical care areas are ventilated and controlled. Mixed air or return air systems can significantly reduce operating costs and improve indoor environmental conditions. “We would have much preferred incorporating these

modifications into our facilities years ago, however, the spatial and resource limitations just didn’t allow for it at the time,” says Whiteman who would like to see humidity conditions monitored, recorded and reported in critical care areas by the building

automation system (BAS) with the ability to alarm and modulate control within the desired range.

“Subsequently, we designed a BAS to automatically take control of the room temperature setting during periods of excess humidity,



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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.”

“While we’ve made significant gains with our facilities environmental controls, they are not perfect; we can always do better. Safety over comfort always,” declares Whiteman.

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. In terms of justifying the cost of the changes, Whiteman says “leadership in health care isn’t restricted to doing things right; it’s also about doing the right things. Management was very supportive once they understood how climate change was impacting our ability to deliver quality health care.”

Nanaimo Regional General Hospital Emergency Services, Psychiatric Emergency Services and Psychiatric Intensive Care Unit (NRGH ED) -

Opened in 2012, the Nanaimo Regional General Hospital is a 247-bed facility serving central Vancouver Island’s 160,000 residents and serves also as a referral hospital for an additional 400,000 BC residents. The original hospital building was constructed in the 1960s and has undergone numerous additions and renovations over the years to meet the growing demands of the central island. The NRGH Emergency Department addition provided additional floor area (6,200 m2) and improved functionality for one of the busiest emergency rooms on Vancouver Island (53,000 visits per year).

Vancouver Island Health Authority (Island Health), and all public sector organizations in British Columbia, were legislated to be carbon neutral by 2010. New buildings must be a minimum of LEED Gold and Island Health wanted to minimize

greenhouse gas emissions with this new building. The designers provided many features that have the co-benefit of mitigating risk in the event of extreme weather.

1. 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.
2. Designers provided day lighting in most areas in the building (even in the trauma room) as well as operable windows to allow natural ventilation.
3. The building’s dedicated heat recovery chiller provides preheat for the domestic hot water and

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heating when required by exterior zones. This system is 100% backed up by the main hospital's existing plant.

4. Design and technology in accordance with LEED Gold and BC Hydro New Construction Standard
5. The building energy performance index (BEPI) is 524 kWh/m²/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: \$59,815.

Province of Manitoba - Office of Disaster Management (ODM) - The Province of Manitoba's Office of Disaster Management's recently created a Hazard Risk Vulnerability Analysis Tool (HRVA) which embraces the scope of disaster management from a climate change perspective. Developed with financial assistance from Health Canada, the tool provides heavier weighting on natural hazards to better prepare the health system and the communities it serves towards climate change and resiliency.

During the initial test rollout of the initiative, it was discovered that many in the province were not as comfortable in the knowledge around climate change and its impacts on health care facilities, so the project team took this knowledge and used it to better enhance emergency preparedness for the health sector. This now enabled ODM to advance a greater level of resiliency with respect to natural hazards and how they could be managed or mitigated.

According to the project lead, Robert Munro, Disaster Management Specialist with Manitoba Health, "The tool is unique in that it is web-based and contains links to several websites, including Statistics Canada, Environment Canada, and the Inter-Governmental Panel on climate Change (IPCC), thereby permitting users to search for information by specific geographic area. In addition, it contains links to specific disaster information related to key hazards such as flooding, wildfires, drought, and disease outbreaks." The HRVA tool also includes a lengthy glossary to help clarify terminology for all users. For more information on Manitoba's HRVA, contact Robert Munro at robert.munro@gov.mb.ca.

To learn more about how you can help your health care organization prepare for the impacts of climate change, visit www.greenhealthcare.ca/climateresilienthealthcare. ■

The Canadian Coalition for Green Health Care is Canada's premier green health care resource network; a national voice and catalyst for environmental change. www.greenhealthcare.ca
Kent Waddington is Communications Director with the, Canadian Coalition for Green Health Care

Linda Varangu, Executive Director, Canadian Coalition for Green Health Care

Peter Berry, Senior Policy Analyst, Health Canada

Jaclyn Paterson, Environmental Health Specialist, Health Canada

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