



# Portable head computed tomography for rural centres

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**M**edical decisions are often based on diagnostic imaging, but computed tomography (CT) is still rare in rural areas. The Alberta Provincial Stroke Strategy (APSS) found that the 40% of Alberta's population living outside the tertiary centres of Calgary and Edmonton needed a series of full-time rural primary stroke centres for early intervention. Two comprehensive centres, 5 regional hospital centres and 4 other primary stroke centres were set up through the APSS and the Alberta Stroke Council. The Alberta Stroke Council was comprised of the health regions, the Heart and Stroke Foundation and Alberta Health and Wellness. They were supported by a \$20 million, 2-year grant. Each site has a CT scanner, picture archiving and communication system (PACS), transmission of digital images and videoconferencing with a stroke neurologist who decides the need for thrombolytic therapy (a service known as "TeleStroke").

Wainwright, Alta., was selected as the second of 2 primary stroke centres in the former East Central Health (now Alberta Health Services) because we are central to the eastern underserved part of the former health region. The whole former region has a population of about 3 people/km<sup>2</sup> for each of the 38 000 km<sup>2</sup>: a total population of about 110 000. Wainwright lies 200-km southeast of Edmonton, and has 5500 permanent residents and a 20-bed primary care facility staffed by 8 rural family physicians. We are home to a large infantry training base where thousands of Canadian, US and British soldiers have completed manoeuvres.

Like many rural facilities we had all the "usual problems": limited funding, very limited space to house a machine and no local CT technicians. Mr. Pat Crumley, medical services coordinator, Medical Services in East Central Health, realized that the CereTom head and neck CT scanner would allow us to become a primary stroke centre for about one-third of the cost of a full-body scanner: in rural terms this is the cost of a combine harvester! Our 3 medical radiation technologists can operate the user-friendly machine, and Wainwright now has the first rural portable CT scanner in the world. We serve about 35 000 people for stroke from communities up to 1 hour away, including all out-of-hours strokes from Lloydminster, Sask. (they have a full scanner working 9–5).

The portable scanner can fit in just 4 ft beyond a patient's bed and has built-in shielding. There is no weight limit because patients stay on their emergency department (ED) stretcher — we scanned a 480-lb man sent specifically from southern Alberta because no other scanner could accommodate him. Initial findings by Mr. Crumley show that Wainwright has an average door-to-scan time for stroke-protocol patients of about 15 minutes. Each scan takes 2–3 minutes and about 5 minutes for transmission. About half of our 170 scans to date are for transient ischemic attack or stroke patients, with 7 patients treated with recombinant tissue-type plasminogen activator. We have a 94% reduction in transfers from emergency medical services for stroke because only those needing tertiary care are sent to Edmonton



Mrs. Helen Buzik, medical radiation technologist, with the CereTom in our radiography department.

(a road ambulance transfer costs about Can\$1200 and air ambulance is about 3 times the cost). We have a reduction in our use of local beds because of the rapid testing, treatment and rehabilitation. With the advent of 24-hour digital radiography reporting we have also been able to sometimes use the scanner for emergency nonstroke applications.

A case report shows the capabilities of the system.

### CASE

- 8:56 am Call to 911: Independent 71-year-old smoker had 10-minute loss of consciousness
- 9:00 am Emergency medical technicians found patient obtunded and paralyzed in his left leg
- 9:18 am Arrived at ED. Patient was asymptomatic, with some residual amnesia, but was otherwise neurologically intact (amnesia cleared within minutes)
- 9:31 am CT request
- 9:57 am CT scan
- 10:08 am Critical care call to stroke neurologist, intraventricular blood seen on the scan
- 10:18 am Call from the radiologist, confirmed subarachnoid hemorrhage and developing hydrocephalus

### The CereTom

- is small: about the size of a portable radiography machine
- is portable: can be moved by 1 person (there is a motorized option)
- is fast: 2-minute scan and 3–5-minute transmission
- is detailed: 8-slice CT, variable thickness, 512 × 512 image resolution
- is shielded: technicians need to be only 20 ft away or have extra shielding
- has no weight limit: patients use an ED stretcher
- uses regular power: a normal wall socket
- is low cost: about Can\$340 000
- is easy to use: video clips of the CereTom are available on YouTube and Facebook: [www.youtube.com/watch?v=pJJO2v32HtQ](http://www.youtube.com/watch?v=pJJO2v32HtQ); [www.facebook.com/video/video.php?v=253732611479](http://www.facebook.com/video/video.php?v=253732611479)

- 10:33 am Call from neurologist after reviewing scan on PACS, links though critical care line arranging transfer, angiogram and air ambulance dispatch from Edmonton
- 10:50 am Patient complained of a 3/10 headache, but was still neurologically intact
- 12:20 pm Air ambulance left Wainwright Health Centre

Later that day, the patient had an angiogram and surgery at University Hospital, Edmonton. His tube was removed the next morning, and he was reading the newspaper within days. At about 6 weeks he was home, living independently, with only minimal short-term memory loss and no personality changes.

Portable head CT scanning gives rural physicians the ability to provide advanced treatments for some of the most devastating conditions our patients face. Nevermind “changing” the face of rural medicine in North America ... now we can scan it!

**Competing interests:** None declared.