

and Surgeons at Columbia University, found that some older forms of electroconvulsive therapy were still in use in the New York metropolitan area. "The use of sine wave stimulation and the [bilateral] electrode placement were both associated with greater short- and long-term deficits," he and his colleagues write in *Neuropsychopharmacology*. "There appears to be little justification for the continued first-line use of BL ECT [bilateral electroconvulsive therapy] in the treatment of major depression."

Delva is conducting a national electroconvulsive therapy survey called CANECTS, which aims to ultimately reveal how many facilities now offer electroconvulsive therapy, which conditions are being treated, what type of equipment is being used, what consent processes are being followed and what information is being revealed to pa-

tients. Teaching, budgets and patient access will also be assessed.

"There was no information of this sort for Canada," he says. Preliminary results indicate electroconvulsive therapy is now offered at 177 sites.

International data comparing the use of electroconvulsive therapy as a treatment for depression among seniors are unavailable. But what limited international data exist on overall electroconvulsive therapy use suggest that rates are lower in Canada than elsewhere (*J Affect Disord* 2006;90[1]:67-71). The overall rate in Denmark was 30.5 per 10 000 in 1999, 11.4 in India in 2002, 10.9 in Great Britain in 1999, 6.8 in Belgium in 2003 and 1.8 in the Netherlands in 1999. Using CIHR and Statistics Canada data, the rate for Canada was 4.6 in 2005. — Hannah Hoag, Montréal, Que.

DOI:10.1503/cmaj.080360

Notes on electroconvulsive therapy

Although electroconvulsive therapy is accepted by the Canadian and American psychiatric associations as a treatment for major depression and bipolar disorder, it has a checkered history. It once was administered without muscle relaxants or anaesthetics. Full body convulsions caused serious complications, including changes in heart rhythm and vertebral compression fractures. Early generations of electroconvulsive therapy machines delivered electricity at much higher doses, and in a waveform later found to be less efficient at inducing brain seizures and more likely to cause memory impairment. In the 1950s to 1970s, during which consent procedures were less sophisticated, there was misuse; for example, to "treat homosexuality" (*BMJ* 2004;328:955-6). Many activists continue to demand that it be banned.

Electroconvulsive therapy delivery has been significantly refined, while the risk of fracture has been virtually eliminated. Patients receive anaesthesia, a muscle relaxant, ventilation and oxygen. Two electrodes are placed on the scalp, either on both temples (bilateral electroconvulsive therapy) or on one side of the head (unilateral electroconvulsive therapy). A pulse of electricity is typically used for a few seconds.

Some people respond rapidly, requiring only 5 or 6 treatments, Enns says. Patients usually take an antidepressant and a mood stabilizer to delay a relapse; a 2006 study found that electroconvulsive therapy — 1 dose every 4 to 6 weeks — can have similar effects (*Arch Gen Psychiatry* 2006;63[12]:1337-44).

Some studies in animal models suggest that electroconvulsive therapy may in fact produce new brain cells. It increases the expression of brain-derived neurotrophic factor, a peptide that has been shown to support neuron growth in brain regions key to the regulation of mood and behaviour (*The Pharmacogenomics Journal* 2008;8:101-12). Decreased serum brain-derived neurotrophic factor levels have been reported in depressed patients (*Psychiatry Research* 2002;109[2]:143-8). Other studies have found that plasma BDNF levels of patients receiving electroconvulsive therapy for major depression increased following treatment (*J Clin Psychiatry* 2007;68[4]:512-7).

The strains of Ebola

Inside tiny Kikyo Health Centre nestled high in the Rwenzori Mountains of Uganda, a sheet on the office wall entitled "Weekly epidemiological cases," tracks incoming patients. The list gives testimony to the challenges faced when a 10-bed facility with no doctor on staff has to cope with medical conditions that, in Western countries, rarely surface anywhere but in text books: acute flaccid paralysis, rabies, dysentery, Guinea worm, meningitis.

And now, added to the bottom of the list, in big black block letters, is "EBOLA."

This health centre, reached only by foot across the Bwamba Pass or by an arduous mountain drive from Bundibugyo town, was the epicenter of an Ebola outbreak late in 2007 that killed 37 and confounded medical experts for months, until they realized what they had on their hands was a new strain of the deadly virus.

While the experts grappled with the "mysterious illness," people in western Uganda began dying of it in August 2007. It was not until Nov. 29, 2007, that the government publicly announced the Ebola outbreak. In all, 91 of the 149 reported Ebola cases that surfaced in western Uganda between August 2007 and January 2008 were admitted to Kikyo, where staff struggled to manage the outbreak without even rubber gloves or face masks.

"We were not so much prepared for an epidemic of that proportion," says Julius Monday, an animated man who runs the health centre and is now something of a local legend for having



Christopher Mason

Kikyo Health Centre, high in the Rwenzori Mountains overlooking the Democratic Republic of Congo.

handled the virus for months without himself getting sick.

But others did. In all, 6 workers at the health centre contracted Ebola and 1 died. The first to get sick was a nurse named Isaac Kiiza, who had been ordered to take stool samples from some of the first patients.

Kiiza recovered (though the nurse who treated him contracted Ebola and later died), and 2 days after being discharged from hospital, was back at work. "What choice did I have?" he asks. "We were understaffed and more and more patients were coming in." The situation in Uganda is similar to that faced by many countries in Africa and other developing regions. There are not enough staff, equipment or medicines to handle everyday health care needs, so an outbreak like Ebola breaks the back of an already overburdened system.

What baffled experts for so long was the lack of bleeding among those who were getting sick. Because of that, as late as Nov. 18, 2008, more than 3 months after the first case surfaced, Ugandan Ministry of Health officials discounted Ebola as a possibility.

The fact that a neighbouring area was then managing a Marburg virus outbreak also delayed the Ebola diagnosis because the 2 hemorrhagic fevers have similar symptoms.

Ebola first surfaced in humans during simultaneous outbreaks in Sudan and Zaire (now the Democratic Republic of Congo, whose border is within walking distance of Bundibugyo town). Those outbreaks in 1976, and subsequent ones, have had a mortality rate between 50%–90%. The fact that the Bundibugyo outbreak had a 25% mortality rate further delayed diagnosis as the virus's behaviour was uncharacteristic of known Ebola strains. Symptoms were less extreme and the mortality rate much lower because the strain was much weaker than previously known forms of Ebola, according to Ministry of Health officials.

"The disease presented in a very unusual manner, very different from the previous Ebola outbreaks," said Uganda's health minister, Dr. Stephen Mallinga, in declaring the outbreak over in February 2008. World Health Organization guidelines say an Ebola outbreak can be declared over after 2



Christopher Mason

Isaac Kiiza, a nurse at Kikyo Health Centre, was the first health worker to get Ebola. He was asked to take stool samples, without gloves or a mask, from the first patients to come in and became sick shortly afterwards. He survived but the nurse who treated him contracted Ebola and died.

incubation periods (totaling 42 days) have passed without a new case.

This region tucked closely along the Congolese border is familiar with serious medical conditions. The district has an officer in charge of managing tuberculosis and leprosy, and the district's main hospital in Bundibugyo town has a ward dedicated to treating cholera. It is not uncommon for the health centre in Kikyo to treat 850 malaria cases a month.

Despite that familiarity with dangerous illnesses, Ebola carries with it here the same stigma as a deadly and highly contagious virus that it carries elsewhere in the world.

As such, those who were infected, and their families, were shunned. In a neighbouring district, where a teenage girl died as a suspected Ebola patient, villagers threatened to stone any member of her family who tried to leave their home, for fear they would spread Ebola. Elsewhere, a community ransacked an Ebola isolation ward, sending 5 suspected Ebola patients fleeing into the surrounding hills.

"That was the worst because we didn't know where [the patients] had gone because they ran away," says Catherine Kemigabo, a health educator in Fort Portal, a town on the other side of the Rwenzori Mountains. The pa-

tients were eventually found and quarantined. In all, the Fort Portal area had 48 suspected Ebola patients, but none who had samples taken tested positive for the virus.

By the time humanitarian agencies like Médecins Sans Frontières, the International Committee of the Red Cross and UNICEF stepped in, most of the reported cases had already surfaced. Once proper isolation wards were established, protective gear supplied and information on avoiding infection circulated to the communities, the outbreak was quickly contained.

Officials have acknowledged that the outbreak's impact was compounded by the lack of protective equipment and shortage of facilities. For instance, several people contracted the virus when they came into the health centre with other ailments, Monday says. One woman was exposed when she came into the centre to give birth.

In response to the outbreak, the Ugandan government released about US\$3.5 million, half of which was spent on stocking facilities with protective gear. There has been no talk, however, of a long-term plan beyond the one-time influx of cash. — Christopher Mason, Bundibugyo, Uganda

DOI:10.1503/cmaj.080524