EMS

Paramedics Sarah Gibson, and Andrew Gibson demonstrate "intravenous access on patient" Cynthia Routledge

of awareness between seizures. Service in Ontario Older definitions were 30 minutes or is 6.0 minutesmore. Status epilepticus (SE) lasting much less in some of the larger approximately 30 to 45 minutes can cause cerebral injury, so the sooner urban areas. treatment is initiated, the better the Average response outcome3 time for EMS is SE is a true emergency and will approximately 13.1 minutes.

Firefighters

provide rapid

can in many

assistance, and

cases "stop the clock."5

The City of Peterborough, Ontario

has a population of 74,600 (County

135,000.) John Bowker is the EMS

Coordinator for Peterborough Fire

Department, which runs out of 3

strategically located firehalls. "Our

response time average is 5 minutes,

dispatch answering the 9-1-1 call.

to arriving on-scene. In 2007 we ran

which were EMS oriented. For non-

example a broken ankle we can also

respond if the Ambulance is going to

and that's measured from fire

more than 4,000 calls, 40% of

emergency medical calls, for

be delayed 20 minutes."

medical

lead to hypoglycemia, hypoxia, acidosis, and ultimately brain damage if there is no (medical) intervention4

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In Ontario, most urban and many rural Fire Services have tiered response agreements with Ambulance or Emergency Medical Services (EMS). Life threatening medical emergencies such as chest pain/ heart attack, trouble breathing, motor vehicle collision (MVC), decreased level of consciousness (LOC), and severe bleeding triggers a firefighter first-response, along with

EMS paramedics. Urban fire departments respond to many more medical calls than they do fires. In many cases, patients not only require immediate life saving treatment, but they may also require physical rescue. The average response time for the Fire

EMS

Fire and EMS, for motor vehicle collisions (MVC), there is a local agreement with 9-1-1 to send an alert right away. This way Fire doesn't have to wait for the alert from Lindsay Central Ambulance Communications Centre (CACC). Firefighters training includes an

In addition to the tiered response

agreement between Peterborough

initial 16-hour Red Cross Standard First Aid Course, and automated external defibrillator (AED), Basic Life Support (BLS) cardiopulmonary resuscitation (CPR) is recertified every year along with AED. Firefighters are also certified in Basic Trauma Life Support (BTLS), a 16-hour course through International Trauma Life Support (ITLS). Quarterly BLS-D, and BTLS training incorporates theory with practical rescue scenarios, such as

child bag-valve-mask (BVM).

oropharyngeal airways, portable

oxygen (O2 tanks) and regulator.

adult and child non-rebreather O2

they secure the scene, assess the

of EMS, a medical assist report is

assumes responsibility for patient

with firefighters assisting. When

requested, a firefighter will also

enroute to hospital.

care as the higher medical authority

given to paramedics and EMS

patient, and provide care. On arrival

electric suction equipment,

masks, and a trauma kit.

hi-angle, and water rescue. Medical equipment on each fire apparatus includes AED, adult and therapy) on the outcomes of patients6. The first controlled trial to of-hospital seizures in children

shows a substantial number of children receiving prehospital still seizing on arrival to the emergency department (ED)7.

to imagine the worst case-scenario, then I'm into 'work mode'. Enroute. I think through protocols, consider the closest hospitals, and discuss the plan with my partner," said Andrew Gibson, Advanced Care Paramedic with Peterborough County-City EMS. "Seizure calls typically get me thinking about febrile causes, but I keep an open mind as to other causes: toxins, medications, tumors, head injuries, hypoglycemia, and the like."

Peterborough County-City EMS has 4 bases in their response area of 3,750 square kilometres. According to Don Oettinger, Quality Assurance and Training Supervisor, within city limits the average ambulance When firefighters are first arriving, response time is 6.9 minutes. measured from the time they are notified of the call by the CACC. Legislated response time in the County is 19 minutes. "Sometimes a remote location may make patient access difficult." said Oettinger. "They may be on an island, at a cottage, hunting camp, or canoeing assist paramedics in the ambulance, in the back country.

Peterborough EMS runs about

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Advanced Life Support (ALS) training for paramedics was introduced into many Ontario cities starting in 1998. The Ontario Prehospital Advanced Life Support (OPALS) study is the largest controlled out-of-hospital study ever conducted. It is evaluating the impact of ALS programs on 35,000 adult patients, in systems with firefighter BLS-D first response. Phases of the study include cardiac arrest, trouble breathing, trauma, with the current (final) stage being chest pain.

EMS

Pediatric patients constitute a significant proportion of all ambulance transports by EMS, with the most common conditions being trauma, respiratory distress, and seizures. Building on the adult study, the Pediatric OPALS study is evaluating the benefit of introducing a prehospital program of full ALS measures (intubation and IV drug critically ill and injured pediatric

evaluate full ALS programs for outanticonvulsants and fewer children

"Pediatric calls are stressful-I try

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Jack's

Brainstorm

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edog at the second annual fundraiser for SickKids, Starting with pocket change, Jack, then 4, hoped to raise \$1,000 for SickKids. Jack and his dad built

the lemonade stand, posters were

Two and a half year-old Jack printed, and the community was Yielding was in his highchair at invited to the first "Jack's Lemonade home in Oakville, Ontario. While Stand" in support of SickKids having breakfast with his mother Foundation, held in May of 2007. Jodi, he became unresponsive and "SickKids is a world leader in cyanotic (turning blue.) children's health, research and care, "I thought he was dying," Jodi treating children with the most

said, "I remember screaming into complex conditions from across the phone with 9-1-1, begging for Canada and around the world," said someone to help my little Jack was liagnosed witl epilepsy, neaning his highly resista up to 8

seizures per Even after countless tests, Jack ooked forward to going to The Hospital for Sick Children in Toronto (SickKids), because the doctors and nurses were so kind to him. On the way to a procedure, he noticed another child walking in the hallway with an IV pole and asked his parents what was wrong with the child. "Jack seemed more concerned about the other kids, than himself." Jodi said "From there we had a conversation about helping kids, and we came up with the idea to have a

Lori Abbott, Public Affairs Officer at SickKids Foundation. "We are considered one of the top three children's hospitals in the world. SickKids vision statement is "Healthier children. A better world." That vision was born in the spring of 1875 when Elizabeth McMaster, with a group of Toronto women rented an 11-room house in downtown Toronto, and declared open a hospital "for the admission

and treatment of sick children."

long history of discoveries at

One example of what is now a

SickKids was the development of a

fant cereal in 1930, diet still is working very well. There are a number of pieces to the puzzle round the world as and I know that over the next month Pablum." This stanle or so we're going to have some tough decisions to make.' death from the lemonade stand an annual malnutrition, which event. The second Jack's Lemonade stand was in May, 2008. Special had been a major guests included Oakville's Mayor cause of infant

In 2007, Jack

high in fats with

High functioning

children like Jack can

for about 2 years, so

he is being evaluated

for another non-

pharmacological

"We've had a lot of neurosurgical

consults recently, and the consensus

explore the surgery," Jodi said. "It's a

is that Jack is at a good age to

reatment—brain

generally be on the diet

began treatment with a

adequate proteins, and low in carbohydrates.

Rob Burton, and Firefighters who as medical first responders have often provided care for Jack, but his favorite guest was Sparky the Firedog. The Yieldings try to make epilepsy a small part of an otherwise normal life. "Jack was diagnosed at an early age so it's very important that he grow up knowing he can achieve great things despite his challenges.

He has something to deal with, but

so do lots of other kids. Jack's wish

EMS

is for every kid to be healthy and not need needles.' Over the past 2 years, Jack's original goal of raising \$1,000 has been surpassed by more than

seventy times. For more information visit http://jackslemonade.com.

tough thing to decide because the NO PRICE INCREASE for **z** years to **TECHNICAL** save time and save £11 / \$15 RESCUE TECHNICAL 1-YEAR /4 £28. £28.

£45. £45. **GROUP SUBS/4 issues:**

2-YEARs/

£175 / \$300 www.trescue.com....

...shopping.....subscriptions **RESCUE POLLs.**

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ittle lemonade stand.'

ABOVE: "4508 en-route to emergency call". Note the snow conditions typical of every Canadian winter.

17,000 calls per year, of which 4.3% are for patients aged 16 or younger. "Most seizures last only minutes, and usually we arrive after the seizure is over, so our on-going care

is supportive," Gibson said. "However if the patient is still seizing upon our arrival, then we will use our Seizure protocol, as we have done many times. Until recently we either had to establish IV access during the seizure, or administer Diazepam rectally. Now we also have the option of administering Midazolam (Versed) intranasally with a mucosal atomization device (MAD). Intranasal absorption rate is rapid, and we can typically end the seizure within a minute.'

Gibson said that the Peterborough (City) Fire Department is supportive on medical calls, and he is always glad to see them.

"As Emergency workers, we all too-often assume that everything is fine after we have fixed the present problem. Our brief interaction with a patient is, in reality, only the first step in a path that may change the direction of their life, directing them into the health-care environment. I want our patients to arrive at the FD door calm, and informed as to what to expect, both short-term, and in

the larger picture." Primary Care Paramedics generally have the skill sets of defibrillation, and drug administration including symptom relief-ASA, nitro, ventolin, glucagon, and epinephrine (for anaphylaxis.) The Advanced Care Paramedic has an additional skill set including advanced airway management, IV therapy, and a greater scope of drugs. Andy Benson is the Manager. Education Programs, Central East

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Pre-hospital Care Program. "We provide training, certification, medical delegation and oversight of the paramedics that work within the EMS services in our area. When paramedics encounter a patient that requires treatment not specifically addressed within medical directives, they can patch to one of the Base Hospital Physicians including at Peterborough for additional or alternative care."

SEIZURE TYPES⁸ AND CLASSIFICATION9

Generalized seizures are thought to begin in the entire brain at the same · Absence: child briefly stares, does

not see or hear what is happening Atonic: goes limp, falls . Myoclonic: twitches or jerks in all or part of body Tonic: child goes stiff

· Clonic: jerks rhythmically . Tonic-clonic: child goes rigid, then convulses, shaking or jerking rhythmically

Partial seizures begin in part of the

spreading to involve the entire brain (secondarily generalized.) · Simple partial: child is aware of what is happening, may have motor, somatosensory, autonomic, or psychic symptoms · Complex partial: consciousness is

impaired There are 3 classifications of epilepsy by cause (etiology): idiopathic, symptomatic, and

cryptogenic About 30% of childhood epilepsy is idiopathic, with no apparent underlying cause. It may be caused by abnormalities at the cellular level.

Between 25% and 45% of

childhood epilepsy is symptomatic, caused by known structural abnormalities or damage in the brain from an underlying disease, such as congenital brain malformation, injury or trauma (at birth or later,) lack of oxygen to the brain, infection with permanent damage, tumor, tangle of blood vessels, stroke, or metabolic disorders.

In cryptogenic epilepsy, it is suspected that a child's epilepsy is symptomatic, but the underlying cause cannot be determined.

TERTIARY CARE

"We usually treat epilepsy with medication as the first approach, however up to 30% of children have seizures that can't be controlled with medication. For those kids, we consider surgical or diet therapies." Doctor Elizabeth Donner is a Pediatric Neurologist, and Epileptologist at the Hospital for

Sick Children (SickKids) in Toronto.

"When seizures are not controlled by medication, we perform investigations to determine if the brain (the focus,) remaining there, or seizures are coming from one place in the brain, and if we can safely remove that brain area, that is the best way of achieving a cure for epilepsy.'

Other surgical techniques that do

not excise the specific area where the seizures come from, include corpus callosotomy, which severs the connection between the hemispheres to stop seizures from spreading. There is also an implantable device called the vagal nerve stimulator. Diet therapies are also very

successful, but Donner said that

may be a more healthy way of

while some people think that a diet

treating seizures, that is not really



of the anti-convulsant Midazolam."

true. "The (ketogenic) diets are very

high in fat and low in carbohydrate, and they have just enough protein so, in fact, children may not grow as well, they develop bone loss, and the diets are not nutritionally complete, so supplements must be taken. They have to be managed very strictly by a doctor and a dietician with expertise in prescribing diets for epilepsy." For SE, the longer a seizure lasts. the less likely it is going to respond to medications. "We provide families with a benzodiazepine to use as a rescue medicine," Donner said. "Diazepam may be given rectally, and in Canada, lorazepam comes in a sublingual preparation that can be placed in the buccal cavity to melt, and absorbs very quickly. We tell families to use a rescue medication after 5 minutes of a generalized seizure, and of course when FMS encounters a patient with a generalized convulsion lasting more than 5 minutes, if they can administer a benzodiazepine, then

in my opinion they should do so." TRENDS IN TREATMENT

There is a new implantable brain device being evaluated called Neuropace, which provides responsive neurostimulation for the treatment of focal, or partial seizures. The device detects when a seizure is imminent, and gives a "zap" that is meant to abort the seizure.

restrictive, new diet therapies include a modified version of the Atkins diet.

In an attempt to become less

There is also a huge amount of work going into looking for genes in epilepsy, and underlying genetic abnormalities, "I don't know if at this point that treatment is

EMS



families," Donner said. **DEATH IN EPILEPSY** People with epilepsy have an increased general risk of mortality,

due to things that emergency responders see, like drowning, or having an MVC due to a seizure. If the underlying cause of the epilepsy is a neurodegenerative, or a productive disorder, then that could be fatal as well.

affected, but the research is

"It is rare to actually die from a seizure, unless it is prolonged," Donner said. In a rare condition called Sudden Unexplained Death in Epilepsy, (SUDEP), death does not always follow a seizure, and autopsy is unable to find a cause.

"It's potentially related to an electrical discharge in the brain causing a change in heart rate or respiratory function, but we really don't know that information yet.' Last year Donner co-founded SUDEP

Aware (www.sudepaware.org)

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along with Tamzin Jeffs, who lost her medication at lower doses, trying helping us to understand epilepsy sister to SUDEP. better, and epilepsies that run in SUDEP has become

> controversial. Traditionally, doctors have not wanted to tell people about it because they believed there was nothing that could be done to prevent it. In the UK, a group called Epilepsy Bereaved, is strongly advocating that SUDEP be made part of the normal communication between neurologist and patient. In North America, the American Epilepsy Society and the Epilepsy

Foundation struck a joint task force publishing a 2008 SUDEP report in Epilepsia. Research at SickKids and around the world is looking to better understand the cause of SUDEP, and how to prevent it.

"We are always trying to improve the way we treat epilepsy. We're improving the ways that we use medication, whether we use one medication at a high dose, or whether we use more than one

THE HEALTH CARE TEAM

to reduce side effects. We're improving the ways that we do surgery and how we evaluate patients for surgery," Donner said. "Epilepsy can have an effect on learning and we try and liase with schools. There are many issues that can affect a child with epilepsy at home and in the community.'

The Epilepsy Health Care Team¹⁰ includes caregivers from diverse backgrounds. The core team is neurologist or pediatrician, and a nurse. The extended team in addition to family members may include family practitioner or pediatrician, pharmacist, school personnel, recreation workers, and babysitters. Some cases may also require neurosurgeon, neuropsychologist, psychiatrist, clinical psychologist, dietician, special education teacher. counselor, and hospital ED staff. Donner has a different perspective from emergency

responders, who deal most often

with acute problems. "I treat children that are struggling with severe, chronic epilepsy. The disease affects the child in many ways: cognitively, medically, socially, developmentally, and it affects the family. I have the opportunity to have a positive impact on peoples' lives in many ways, and I find it very rewarding."

SickKids (206, Feb. 1). Types

Types-of-eizures.aspx?articleID=10122

Reviewed by:

· Elizabeth J. Donner, MD. FRCPC, Division of Neurology, The Hospital for Sick Children, Toronto

• John A. Lane, B.Sc., A-EMCA, Deputy Chief, Prince George Fire Rescue Service, British Columbia · Andrew Lee, A-EMCA, former RRT, Oakville Firefighter Roland Webb, Superintendant. Emergency Management Office, British Columbia Ambulance Service

· Christine White, RN, Peterborough Regional Health Centre

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