

Global & Community Health: Bringing neurologists into shelters for better patient care

Neurons on Wheels

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Neurology® 2020;95:91-93. doi:10.1212/WNL.0000000000009772

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Neurons on Wheels (NOW) is a team of 2 neurologists with tools in our backpacks, roaming the streets of downtown Ottawa to see our homeless patients in shelters, on the streets, and in supportive housing units.

How we started

I was a second-year neurology resident doing a general internal medicine elective with Ottawa Inner City Health (OICH), learning to work as a resident physician in the shelter system. I went to see a patient who was inexplicably falling, causing her to be relocated from independent living in a supportive housing unit to a shelter-based palliative care unit with more support staff. Supportive housing units are old hotels converted to studio apartments with staff supervision for medication administration and meals. The palliative care unit is a unique setting in which street-involved patients toward their end of life can be housed and cared for by experienced staff around the clock. I quickly realized I did not have the neurology expertise needed to make a diagnosis or recommend any treatment. Help was needed, and this was when NOW was born.

Before NOW, homeless patients did not have access to outpatient neurology expertise for various reasons. Some of these included not having a phone number to receive appointment times, lack of transportation, inability to keep an appointment that is months away while living in the shelters, being unable to remain for a prolonged period of time in the waiting room, and addictions to alcohol or drugs. All of these result in no-shows to outpatient appointments; eventually the patient is lost to follow-up or “fired” from physicians’ care. Homeless patients usually are only seen by neurologists in the hospital once they have deteriorated to having decreased level of consciousness or complete inability to care for themselves, at which point emergency medical services are alerted. They may also have acute neurologic deteriorations such as seizures or stroke that bring them into the hospital. While they are in the hospital, they may experience stigma from health care providers, other patients, or their families. Some of our homeless patients tell us that they feel judged and uncomfortable while in the hospital, or their cravings for their addictions arise, and often as soon as they are able, they leave the hospital against medical advice. This cycle continues as they miss their outpatient follow-up appointments. Ultimately, patients end up on the streets without neurology follow-up for seizures, acute strokes, subdural hemorrhage, or whatever medical problems they may have.

There is a need for neurologists in outreach medicine to bridge the gap in care for homeless patients, as well as to reduce costly emergency department assessments and repeated admissions to the hospital.

NOW is an outreach neurology clinic to bridge this gap. We go into the shelters to see patients in the early stages of their diseases so we can perform an appropriate workup and prevent or treat them before deterioration requires hospitalization. Importantly, this approach may reduce the stigma that our patients experience, helps us understand where they have come from and their

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unique issues, and starts to heal the broken patient–physician relationship with our homeless patients.

Ottawa Inner City Health

Ottawa, the capital of Canada, has a total population of 1 million people. Of these, 7,530 are homeless.¹ OICH is an organization that provides health care to the homeless and street-involved communities in Ottawa. OICH was created and is led by Dr. Jeff Turnbull (Medical Director) and Wendy Muckle (Executive Director). OICH comprises a team of 16 registered nurses and 100 client care workers, looking after approximately 1,500 homeless patients throughout the Ottawa region. Each nurse follows more than 15 patients in the shelters. They know these homeless patients as people, the ins and outs of what they are using, the obstacles to getting housed, and much more than we could ever learn from a single social work consultation in the hospital. Patients are able to move among shelters and as long as they remain in Ottawa, they will continue to be followed by OICH.

Our referrals come from the OICH team. We act as a consultation service. As we move from shelter to shelter, we bring bedside neurologic tools (reflex hammer, ophthalmoscope, tuning fork, et cetera) with us. After we have seen the patient, our recommendations including further workup (bloodwork, imaging, neurophysiology) or treatment interventions are followed up by the OICH team. Vital signs are taken as needed; medications are administered with documentation kept up to date in an electronic medical record. Bloodwork can be done on site by the patient's nurse and is picked up by a community laboratory on a daily basis. Imaging and neurophysiology (EEG, EMG) are done in the hospital and often require the patient to be accompanied by a client care worker (CCW). CCWs are support staff who can accompany patients to and from their appointments. This helps to ensure that patients make it to appointments and investigations offsite. Decisions to pursue investigations that require hospital visits are discussed with the patient ("Are they able to walk to and willing to wait in the hospital?") and nurse ("Will they stay for the appointment, be compliant with testing, and be sober enough to go to the hospital?"). Frequently, we have to adjust our expectations of best care to what the patient is ready to do. Sometimes this means not pursuing further invasive testing before initiating empiric treatments. After the initial consultation, we are asked to reassess patients by OICH as needed.

What we have seen in the shelters in 2 years

We have maintained monthly NOW clinics since November 2015.

In our first 2 years, from November 2015 to September 2017, we have seen 34 new consultations. The average age overall was 55 years and 74% were men. The most common reasons for

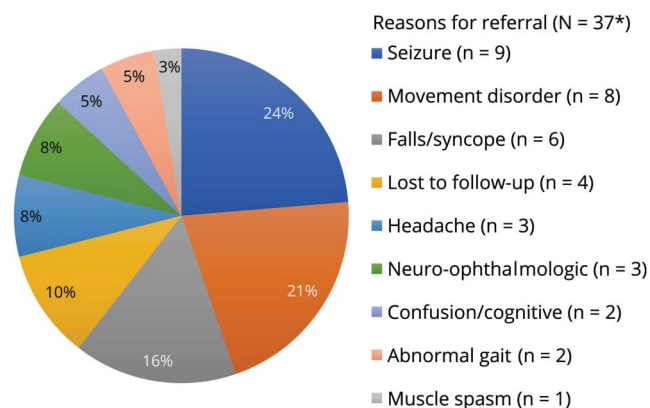
referrals were for seizures, movement disorders, and falls (figure). The most common diagnoses after consultation were focal seizures, essential tremor, cerebellar degeneration, and polyneuropathy. Patients lost to follow-up comprised 10% of our consultations. These included patients who underwent prolonged hospitalizations with extensive medical interventions including tissue plasminogen activator, craniotomy for subdural hemorrhages, and status epilepticus. Management was changed for 94% of the patients we saw. This included further investigations or initiating treatment.

Some rare conditions that we have encountered included patients with HIV/AIDS associated progressive multifocal leukoencephalopathy, progressive external ophthalmoplegia due to *SPG7* mutation, severe drug-induced reversible cerebral vasoconstriction syndrome requiring intra-arterial milrinone,² and Pisa syndrome.

Over the years, we have seen patients in countless makeshift offices, shared bunk bed shelter rooms, shelter-based primary care clinics, supportive housing units, patients' boarding rooms in the community, and curbside encounters close to the shelters where the patients had been expected to be found. These curbside encounters are necessarily brief. We make sure the patient feels comfortable with our interactions in a public place, perform an appropriately abbreviated examination, inform them of the plan, as well as update their registered nurse. After each patient encounter, an electronic medical record is created with details of the history, examination, assessment, and plan. Typically, we see the patients with at least 2 people present (staff, resident, with or without their registered nurse). We have not had any problems with safety over the years.

As of 2019, NOW clinics have been incorporated into the Division of Neurology at The Ottawa Hospital. A staff neurologist attends each monthly outreach clinic. All senior neurology residents attend NOW clinics, similar to other scheduled clinics when they are rotating through the ambulatory clinic rotation.

Figure Reasons for referral



*Patients may be referred for more than one reason.

This is a unique service provided by our division and provides an important learning experience for our residents.

Clinical pearls we have learned

In a large retrospective cross-sectional study published in 2019, Rosendale et al.³ found that homeless patients are at increased risk of 30-day readmission compared to housed patients. One of the most common reasons for homeless patients to be admitted to hospital was seizures. We recommend that seizures should generally be treated in homeless patients, regardless of their substance use status, especially if they have known focal brain abnormalities. This may help reduce readmission rates, especially when patients can be monitored in the shelters by a team like OICH.

Most of the patients with seizures we saw had focal seizures, diagnosed based on history, semiology, or electrophysiology. Reasons for focal seizures include a variety of lesions confirmed by CT head, including old stroke, intracerebral hemorrhage, traumatic brain injury with encephalomalacia, subdural hemorrhage, and subarachnoid hemorrhage. These homeless patients are at greater risk of recurrent seizures when they use substances that lower seizure threshold. We have been using antiepileptic medications in these patients to prevent further brain injury from seizures such as anoxia, falls, and traumatic brain injury. Given multiple comorbidities such as liver dysfunction, psychiatric disease, and noncompliance, choosing the right antiepileptic medication can be a challenge in this population. Levetiracetam is not ideal as it is twice a day and may worsen baseline psychiatric and mood disorders. We have found that once daily medications such as eslicarbazepine or phenytoin confer the best compliance. However, phenytoin may worsen cerebellar degeneration in this population, therefore increasingly we have been using eslicarbazepine. Hyponatremia and elevated liver enzymes are possible side effects, but we have not had significant trouble with this.

Future studies of interest include review of prevalence of neurologic diseases in homeless patients followed by OICH, prevalence of Wernicke encephalopathy, number of patients lost to follow-up who are homeless in our division of neurology, and whether the NOW clinic makes a difference in patient hospitalizations and patient engagement for investigations and treatments.

Reflections

Shelter neurology is interesting, empowering, and meaningful for those who like doing off-the-beaten-path medicine. Our homeless patients are kind and grateful when we make the effort to come see them in their temporary homes. Neurology consultation service within shelters is feasible when there is a primary care team to collaborate with. The front-line workers who are faced with patients with complex neurologic issues are very appreciative of having access to neurology consultants in the shelters. This is especially helpful for patients who do not present to hospital until end-stage disease is present.

Monthly or bimonthly consultations are sufficient to make an effect in our patient care. When conducted at an academic institution, this mobile clinic can be incorporated into residency programs to help build mutual respect, reduce stigma, and develop an understanding of our systemic pitfalls and the difficult problems of addictions and mental health. For those who are interested in global health, seeing our own homeless patients may be the first step to improving health care access in the world.

Shelter neurology is a different kind of medicine that requires an open mind and heart. It requires a harm reduction approach and ultimately doing what is right for the patient—perhaps the epitome of patient-centered care.

Acknowledgment

The authors thank their patients; the Ottawa Inner City Health team, including Wendy Muckle, Louise Beaudoin, Amanda MacNaughtan, Amy Towle, Anne Marie Hopkins, Beth Lusk, Kari Tomalin, Kim Van Herk, Lorraine Brownrigg, Lynn Burnett, Nora Cherner, Sophie Wheeler, Tammy Paterson, Wen Lin, and Yolanda Dare; neurology residency program director Dr. Christine De Meulemeester for her help with getting NOW started; Dr. Danny Lelli for support in maintaining resident involvement in NOW clinics; Orma Lester for helping with NOW organization; and Dr. Grant Stotts for continuing NOW's work.

Study funding

No targeted funding reported.

Disclosure

The authors report no disclosures relevant to the manuscript. Go to Neurology.org/N for full disclosures.

Appendix Authors

Name	Location	Contribution
Joy Zhuo Ding, MD	The Ottawa Hospital, Canada	Major role in initiation of the mobile clinic; manuscript concept, design, and draft; data analysis
Jeff Turnbull, MD, Med	Ottawa Inner City Health, Canada	Major role in initiation of mobile clinic, revised the manuscript
Chris Skinner, MD	The Ottawa Hospital, Canada	Major role in initiation of the mobile clinic, revised the manuscript

References

1. City of Ottawa. 10-Year Housing and Homelessness Plan Progress Report: 2014 to 2017. Ottawa: City of Ottawa; 2018.
2. Laneuville M, Ding J, Shamy M, Lum C, Dowlathshahi D. Intra-arterial milrinone may differentiate fulminant RCVS from vasculitis. *Neurology* 2017;89:1093–1095.
3. Rosendale N, Guterman EL, Betjemann JP, Josephson SA, Douglas VC. Hospital admission and readmission among homeless patients with neurologic disease. *Neurology* 2019;92:2822–2831.

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Global & Community Health: Bringing neurologists into shelters for better patient care: Neurons on Wheels

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Neurology 2020;95;91-93 Published Online before print June 12, 2020
DOI 10.1212/WNL.0000000000009772

This information is current as of June 12, 2020

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