Brain injury after overdose is a hidden epidemic: Recognizing and treating the survivors of the toxic drug crisis

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The toxic drug crisis is Canada's longest-standing public health emergency, but many are unaware of the brain injury epidemic that underlies it. June is brain injury awareness month, and as researchers investigating the intersections between brain injury, mental health and substance use, we want to shed light on one of the more under-recognized consequences of drug toxicity in Canada.

Despite limited surveillance, it is known that 16 Canadians died every day between 2016 and 2023 from toxic drugs, amounting to 42,494 deaths. That is equivalent to more than the number of passengers in 106 fully loaded Boeing 747SPs.

Beneath these numbers lie thousands of unaccounted survivors with overdose-induced brain injuries—what we refer to as the hidden epidemic. Our research is starting to shed light on the associations between the toxic drug and brain injury crises.

Drug-induced brain injury

A recent report using data from the United States estimated that the ratio between fatal to non-fatal overdose cases is 1–15, whereas older Australian data suggest ranges from 1 to 20–30. Using the more conservative 1–15 ratio and applying it to Canadian fatality data, it is possible that more than 600,000 overdose-related brain injuries have occurred in Canada.

Unregulated street drugs containing the opioid fentanyl and its analogs can be lethal to human brains. Synthetic opioids target the brainstem, which controls breathing, and in overabundance can cause respiratory depression—a breathing disorder characterized by shallow or ineffective breathing—that starves neurons of the oxygen they need for survival. In

just a few minutes, partial (hypoxia) or total (anoxia) oxygen deprivation can lead to neuronal death or damage, a type of injury recognized as hypoxic (or anoxic) brain injury.

In non-fatal cases, people with hypoxic brain injuries may experience cognitive impairments, such as problems with attention, memory, motor inco-ordination, emotional dysregulation and executive deficits like difficulty making decisions, completing tasks or solving problems.

Self-awareness can also be affected, reducing an individual's likelihood of viewing their substance use as problematic and seeking help. When they do, cognitive deficits can make it difficult to engage with and maintain treatment, while psychiatric symptoms can hinder brain injury rehabilitation. This confluence of factors can result in a vicious cycle.

Our research has identified a critical need for integrated health-care services that address these considerations, given that such specialized interventions are currently few and far between in the Canadian health-care system. Without integrated care, survivors must navigate a revolving door of siloed services, and in severe cases, succumb to death by suicide or drug poisoning before they receive support.

The recognition problem

There is a profound lack of awareness for overdose-related brain injury. By definition, any loss of consciousness is a hypoxic event, so any overdose with a loss of consciousness is a potential brain injury. However, our research found that this relationship is not common knowledge among health-care service providers, people who use substances and their family members.

Most overdoses occur in private residences, and due to stigma, many individuals do not seek or receive medical attention, limiting the

opportunity for formal evaluation. Even in hospitalization cases, routine brain injury screening and assessment is not common practice after overdose. Our research identified the need for accurate recognition and diagnosis of brain injury as a top priority.

Failure in diagnosis means that many overdose survivors are unaware they are living with brain injuries, limiting their eligibility for services. We found that community-based programs offered by brain injury associations are a strong source of positive support and rehabilitation. However, without an acquired brain injury diagnosis, these programs are inaccessible to most.

What can we do about it?

Prevention is the best intervention. Proven strategies, such as harm reduction services and Naloxone, are critical for decreasing the risk of brain damage secondary to opioid overdose. In combination with chest compressions, rescue breathing should always be used because it reduces the risk of hypoxic brain injury by supplying the brain with vital oxygen to prevent neuronal death.

With the toxic drug crisis continuing unabated, nation-wide efforts are needed. On May 1 and June 6, 2024, Members of Parliament cited the need for a coordinated approach to addressing drug-related and other forms of brain injury while debating Bill C-277, the National Strategy on Brain Injuries Act.

In part, Bill C-277 states that the Minister of Health must develop a national strategy to support and improve brain injury awareness, prevention and treatment. This includes developing and providing "enhanced and integrated mental health resources for persons living with a brain injury and for their families."

On June 12, 2024, Bill C-277 was passed by the House of Commons during its second reading. The vote was unanimous, demonstrating strong all-party support. This momentous legislation could provide a national framework for finally addressing the hidden epidemic of brain injury after overdose in Canada.

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