

The Role of Emergency Radiology in the Substance Use Disorder Epidemic

- The opioid epidemic in the US has led to a dramatic increase in the number of patients with complications related to substance use disorders, opening an opportunity for emergency radiologists to become more involved in opioid epidemic.
- Substance use disorders related to intravenous opioids can result in a range of complications, the most common of which are complications stemming from use of non-sterile needles.
- If emergency radiologists see imaging signs of opioid use disorders, even in patients with no known history of abuse, they can collaborate with other members of the care team to provide resources towards recovery.

The opioid epidemic in the US has led to a sharp increase in the number of patients arriving at hospital emergency departments (ED) with complications related to substance use disorders (SUD). This upsurge in ED visits has pointed up the need to identify these patients and address these potentially life-threatening complications before they become more severe. As a team of researchers at Massachusetts General Hospital has reported, emergency radiologists can play an important role in this effort.



Figure 1. Drs. Renata Almeida (left) and Efren Flores (right) and colleagues at Massachusetts General Hospital are exploring ways emergency radiologists can become further involved in the care of patients with substance use disorders.

Complications of Opioid Abuse

The use disorders related to intravenous opioids—including prescription pain relievers, heroin, fentanyl and other synthetic opioids—is a growing public health crisis. According to the National Institute on Drug Abuse, opioid overdoses rose by 30 percent from July 2016 to September 2017 in 52 areas in 45 states; the Midwest saw a 70 percent increase. Every day, more than 115 people in the US die as a result of an opioid overdose. The impact of the opioid epidemic extends beyond the healthcare system and affects everyone in our society. Factoring in the costs of health care, lost productivity, substance use disorder treatment and associated activity in the criminal justice system, the US Centers for Disease Control and Prevention estimates that the economic burden of prescription opioid misuse alone is \$78.5 billion per year.

Emergency departments (ED) are often the front lines of the opioid epidemic as an entry point to the healthcare system: many patients who suffer from substance use disorders require acute medical care for a complication related to their illness. For this reason, emergency radiologists should be aware of the imaging features of complications related to SUD, even in cases where there is no known history of abuse.

At the 2017 annual meeting of the Radiological Society of North America, a team of researchers from Mass General presented findings from a 12-year study that examined the prevalence and type of complications related to intravenous substance use disorders in patients seen in emergency radiology. The study group included 1,031 patients who underwent 1,673 imaging exams between 2005 and 2016, including 779 X-rays, 544 CTs, 292 MRIs and 58 ultrasounds. The findings revealed a high prevalence of complications stemming from intravenous substance use, the most common resulting from patients using non-sterile needles. Half of the imaging findings were seen on musculoskeletal exams (Figure 2).

The researchers further described some of these complications in a paper published in 2018 in the *Journal of Thoracic Imaging*, detailing the impact they can have on cardiothoracic and respiratory systems, as well as on musculoskeletal systems. They noted, for example, that using non-sterile needles can lead to a host of cardiovascular complications primarily related to infection. Here, the most common pathogens are *S. aureus*, streptococci, enterococci, pseudomonas and fungi (mostly *C. albicans*). Because intravenous drug users often believe the needles they are using are sterile, or rely on saliva for lubrication, polymicrobial infections and infections with organisms from the oropharyngeal flora are also often reported.

Complications of Cocaine Use

Emergency radiologists may encounter complications from substances other than opioids. Cocaine, the most commonly used drug in patients arriving in hospital emergency departments and the most frequently reported cause of drug-related deaths, can be responsible for several complications, including respiratory problems and various lung conditions.

While imaging findings arising from cocaine use can have a wide variety of imaging manifestations, emergency radiologists should consider some findings as possible indications of using the drug, especially when patients' profiles and medical histories suggest previous use. In a 2014 paper in the journal *Lung*, a Brazil-based team of investigators offered examples of such findings. For instance, if young patients present with barotrauma (Figure 3) or pulmonary hemorrhage with no history of infection or trauma, or unusually large bullous emphysema, especially in cases with upper-lobe predominance, the clinician should inquire about substance use.



Figure 2. A 43-year-old woman complaining that the tip of a needle broke off and lodged in the dorsum of her right hand while injecting heroin. **(A)** Lateral radiograph view of the right hand shows a metallic foreign body (arrow), compatible with a needle, in the soft tissues overlying the dorsal surface of third and fourth metacarpals. **(B)** Sagittal contrast-enhanced computed tomography image of the right hand, acquired two days later due to persistence of the pain and swelling again shows the metallic foreign body (arrow) with adjacent fat stranding and a small non-drainable fluid collection (arrowheads).

Looking Beyond the Reading Room: Additional Ways in Which Emergency Radiologists Can Contribute the Care of Individuals With Substance Use Disorders

The dramatic increase in the numbers of patients with complications related to use disorders provides an opportunity for radiologists to engage in multidisciplinary initiatives that directly impact the care of patients with substance use disorders. If they see imaging signs of opioid use, radiologists may be the first members of the care team aware of the patient's disorder. Thus, radiologists have a prime opportunity to alert other members of the care team about a potentially unknown substance use disorder that the patient is suffering. This can lead other members of the care team to connect them with hospital or community programs to help guide them toward recovery.

Such efforts are especially needed because patients with substance use disorders generally constitute an underserved population. For example, many are socioeconomically stressed and do not have the same access to health care resources that other populations do. For this reason, they may not receive care until their complications are advanced, and they decide to visit the ER. In this sense, providing care to patients with substance use disorders is a population health management concern. (See the [June 2018 issue of Radiology Rounds: "Population Health Management in Radiology Through Community Health Initiatives"](#).) Similarly, these patients may delay seeking care because of social stigmas associated with substance use disorders. Therefore, outreach initiatives to provide compassionate care without labels or stigmas at every step of the healthcare pathway are critical to ensure that optimal care is provided to this underserved population.

Further Information

For further information about the role of emergency radiology in treating opioid abuse and other substance use disorders, please contact [Efren Flores, MD](#), officer of Radiology Community Health Improvement and Equity, Massachusetts General Hospital, or [Renata Almeida, MD, MSc](#), Emergency Radiology, Massachusetts General Hospital. We would like to thank Dr. Flores, Dr. Almeida and David Kai-Ming Tso, MD, Diagnostic Radiology, Massachusetts General Hospital, for their advice and assistance in preparing this article.

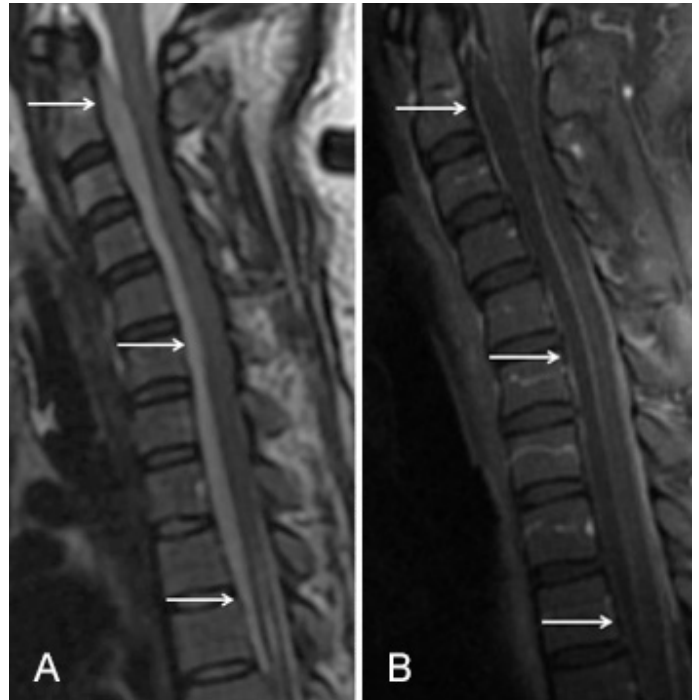


Figure 3. A 37-year-old woman presenting with posterior neck pain and fever for five days. She admits injecting heroin over the past year. Sagittal T2-weighted (**A**) and contrast-enhanced T1-weighted (**B**) magnetic resonance images show a mildly T2 hyperintense T1 hypointense peripherally enhancing fluid collection consistent with an epidural abscess extending along the ventral aspect of the spinal canal from the level of C2 through the T3 level (arrows).

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