

Heartsick: Medical and Ethical Challenges of Infective Endocarditis in the Opioid Epidemic

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The patient was a young man in his twenties, lying in a coma in the intensive care unit (ICU) of the Cleveland Clinic. Mark* was in the late stages of infective endocarditis—a heart valve infection that, until recently, was associated with a much older population. He had contracted the infection via an unsterile injection of intravenous (IV) drugs, and now his life was hanging in the balance, with nobody but his younger sister to speak for him.

Bryn Esplin, JD, was in the first month of her clinical ethics fellowship when she approached Mark's sister to get a sense of what he would have wanted next. Esplin wanted to establish what a good day looked like for the patient; this was a routine inquiry to gauge the patient's values and was usually answered with something cheerfully mundane, like a day spent with friends or getting to walk the dog before work. So when she asked Mark's sister, "Tell me a little bit about your brother. What does he enjoy doing?"

"Well," the sister answered, "he just liked to get high. He liked to check out."

In hospitals across the United States, physicians are seeing a new type of epidemic: young men and women, usually in their 20s to 40s, presenting with infective endocarditis (Figure 1) secondary to IV drug use. The rise of IV drug use-related infective endocarditis (IVDU-IE) is one of the many tragedies of the opioid epidemic currently sweeping the nation. Its young victims have disproportionately negative outcomes, higher rates of repeat infection, and costlier treatment.¹ As the medical community grapples for solutions, IVDU-IE is forcing physicians to confront heart-wrenching medical and ethical dilemmas and exposing the flaws of a system ill-prepared to treat and rehabilitate people with complex drug addictions.

RISING TIDE OF ADDICTION

According to the Centers for Disease Control and Prevention, the opioid epidemic has flooded the United States in three distinct waves. The first began around 1999 with the rise of

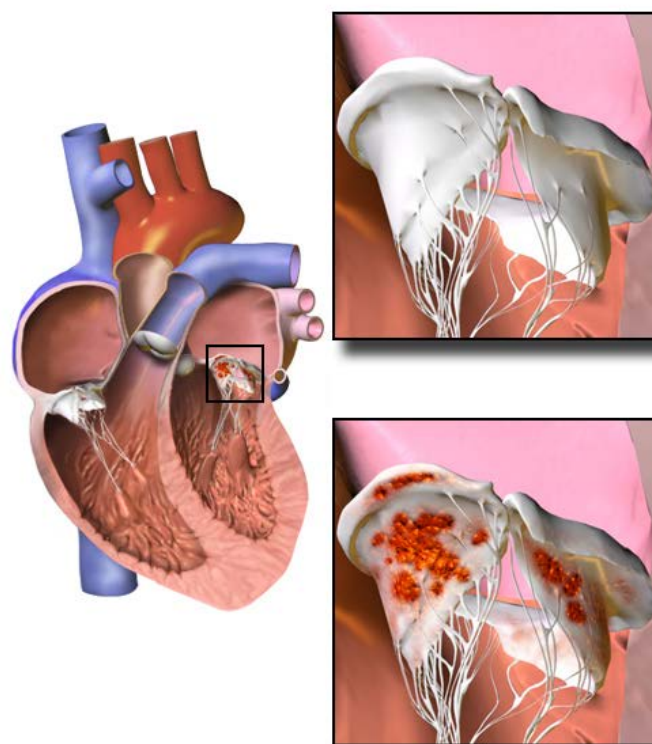


Figure 1. Drawing of endocarditis of affecting the mitral valve. The top image shows a healthy valve; on the bottom, the valve is infected with endocarditis. Source: Bruce Blausen, Wikipedia commons.

overdose deaths from opioid prescriptions. Second, around 11 years later, deaths from heroin began to skyrocket, heroin being a cheaper—and more dangerous—alternative to illicitly obtained prescription opioids. Synthetic opioids, especially fentanyl, caused the third wave of deaths, which have been rising exponentially since 2013.²

As the epidemic progressed, physicians and public health officials noticed a corresponding increase in infective endocarditis. To date, there is relatively little research on this

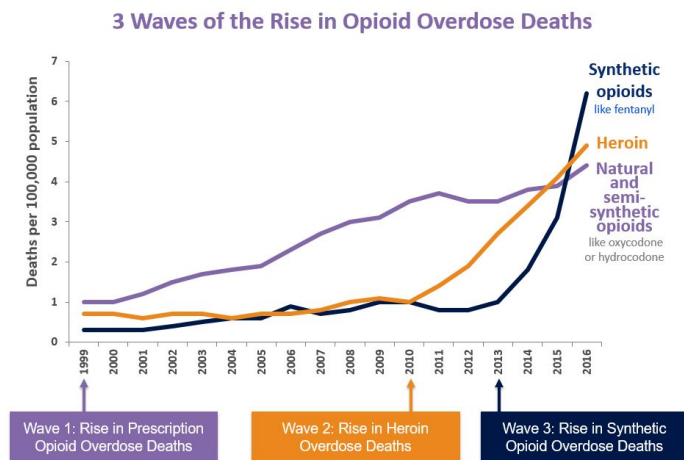


Figure 2.

The opioid epidemic in the U.S. has arrived in three waves: first prescription opioid abuse, then heroin, and now synthetic opioids. Source: Centers for Disease Control and Prevention

emerging public health crisis, but retrospective studies from around the country show an alarming trend. In North Carolina, IVDU-IE discharges increased 12-fold from 2010 to 2015 (with an 18-fold increase in hospital costs).³ A Massachusetts hospital saw the proportion of IVDU-IE double from 2004 to 2014.⁴ As the IVDU crisis spreads into the suburbs and rural areas, similar patterns are being reported around the country in places like rural Ohio and West Virginia, where opioids weren't a problem before.^{5,6} These patients are young, white, and usually male,^{1,2,3} although female admissions are rising.¹

Thanks to unsafe injection behaviors that introduce bacteria directly into the blood stream—from crushing or dissolving pills to licking, sharing, or reusing syringes^{5,8}—IV drug users contract IE at 50 to 100 times the rate of the general population.⁴ Adding addiction into the mix compounds the challenges of an already deadly disease. In-hospital mortality rates for IE, drug-related or otherwise, range from 11% to 26%, with 5-year mortality estimated at 12% to 50%.¹

SURGICAL CHALLENGES

The standard treatment for IE is aggressive antibiotic therapy and, for 60% to 70% of patients,⁴ valve replacement surgery.

“Valve replacement surgery for an infection is always more complicated and high-risk than it would be for non-infectious reasons,” says Ravi Ghanta, MD, chief of cardiac surgery at Ben Taub Hospital in Houston, Texas. He points out that patients with IE often have more extensive damage than those with a routine valve blockage; the infection can spread to the surrounding tissue or cause an abscess requiring debridement. If the infection reaches the aortic root, an aortic root replacement might be necessary. Moreover, the infection



Left.

Ravi Ghanta, MD, now chief of cardiac surgery at Ben Taub Hospital in Houston, first observed the rise in IVDU-IE cases while working in the Appalachian region of Virginia

Right.

Vanessa Medrano, MD, has seen an increase in cases of IVDU-IE at Ben Taub Hospital in Houston.

can affect other organs, and IE patients are more prone to having strokes, all of which frequently leads to longer stays in the hospital and ICU.

Furthermore, valve replacement surgery raises a patient's risk for repeat endocarditis. Man-made replacement valves, whether bioprosthetic (crafted from pig or cow valves) or mechanical, are more prone to infection; although the procedure can save the patient's life, it also could land them right back in the operating room with repeat IE. Ghanta calls it a “catch-22,” and it is particularly problematic for IV drug users. Patients with IVDU-IE have a significantly higher rate of repeat infection than non-IVDU-IE patients,^{1,6,7} with recorded readmission rates as high as 50%.⁹

WEIGHING TREATMENT OPTIONS

For physicians treating IVDU-IE, the treatment is essentially the same as it would be for non-IVDU-IE—until the decision of whether or not to perform surgery. Then things get complicated.

“I definitely look at things differently whenever I have a known opioid addict coming in and possibly needing surgery,” says Vanessa Medrano, MD, cardiologist at Ben Taub. “You have to consider whether surgery is in the patient's best interests, physically or mentally. Physically, would they recover? Would they survive? Then you have to consider the psychosocial aspects. Do they have the mental capacity to understand what is happening? Are they willing and able to quit using drugs? If they need a mechanical valve, will they take their anticoagulation medications?”

It's a multifaceted problem, and for now, there are no guidelines specific to treating IVDU-IE. Medically, IV drug users tend to have different comorbidities than the usual IE patient population. They are less likely to present with diabetes, hypertension, end-stage renal disease, or coronary artery disease. However, they are more likely to be smokers and have pulmonary embolism, large vegetations, tricuspid valve disease, multiple infected valves, and hepatitis C virus. IV drug users also more likely to have been infected with antibiotic-resistant staphylococcus aureus.^{4,6} Any of these comorbidities can make medical or surgical treatment more difficult.

That being said, overall survival of IVDU-IE patients isn't significantly worse than that of non-IVDU-IE patients, at least in terms of recovery from IE.^{4,6,7} That may have something to do with their age: the typical IVDU-IE patient is between 20 to 40 years old compared to typical IE patients in their 50s and 60s.

"In some ways, they're more resilient because young people can tolerate more insults to the body," says Mahesh Ramchandani, MD, cardiac surgeon at Houston Methodist Hospital. "That's the only thing going in their favor: their youth."

WHERE TO DRAW THE LINE

The biggest obstacle for IVDU-IE patients is addiction itself, particularly when it comes to reinfection. Repeat valve surgery is inherently more challenging and riskier than the initial intervention, and it is an expensive use of money, time, and hospital resources. But even patients who do well after the original valve replacement are at a high risk of repeat IE if they continue injecting drugs. The potential cycle of injection-infection-surgery to injection-reinfection-surgery has led many surgeons to decline to operate on repeat IVDU-IE patients. This cycle has spurred heated debate in the surgical community over when—or if—surgeons should refuse to operate. Ghanta explains:

"Repeat heart operations are sometimes necessary, but whenever a person's behavior is dictating the repeated interventions, we have to make tough ethical decisions. When I operate on a patient who has endocarditis that we believe is secondary to IV drug abuse, I explain to them the gravity of this operation and that if they continue to use drugs and get a repeat infection, there is no guarantee there will be another operation. I am hesitant to offer repeat valve surgery to a patient who has recurrent endocarditis and laboratory evidence of active IV drug use, and I think it comes down to a judgment call. Addiction is a disease that is very difficult to treat, so if the patient does have a relapse, we have to weigh whether it's reasonable to do this high-risk repeat operation and give the patient another opportunity to abstain from the

drugs. But where do we draw that line? Is it one time, two times, three times? I don't have the answer."

Moreover, as a consequence of addiction, IV drug users often come in with a host of difficult psychosocial obstacles that drag medical decision-making into an ethical gray area for which they often turn to ethicists like Esplin for help. Homelessness, isolation from friends and family, and psychological problems present challenges to recovery from surgery. Esplin, now an assistant professor in the Department of Humanities in Medicine at Texas A&M College of Medicine in Bryan, Texas, says these barriers can make it especially difficult for physicians to guarantee their patients a "safe discharge."

For instance, one of the obstacles to surgery for IVDU-IE patients begins after the operation; patients must receive 6 weeks of antibiotic therapy administered through a central line. But sending a drug addict home with an IV catheter is a problem, because it makes injecting opioids even easier.

At Ben Taub, Ghanta and Medrano have three options: keep the patient in the hospital, send them to an inpatient rehabilitation facility, or release them home with the catheter and plans for a home-health nurse or family member to inject antibiotics. The choice often comes down to finances, Ghanta explains, particularly since most IVDU-IE patients are uninsured. It's hard to justify keeping a patient in an expensive and much-needed hospital bed, and although an inpatient skilled nursing facility may be preferable, many patients can't afford it. Discharging them to receive infusions at home is the cheapest (and thus, most commonly used) option, but what if the patient is homeless or lives with other IV drug users (including family members, who by law are often their decision-making surrogates)? Unfortunately, there's no easy answer.



Left. Mahesh Ramchandani, MD, looks for innovative, minimally invasive valve surgery techniques, such as using an AngioVac to remove vegetations



Right. Bryn Esplin, JD, worked with IVDU-IE patients, families, and clinicians during her clinical ethics fellowship at the Cleveland Clinic.

RETHINKING THE QUESTION

Another component to these dilemmas is that IV drug use is an independent risk factor for death, regardless of reinfection. Long-term survival is worse simply because IV drug users have a higher risk for death from overdose, suicide, and trauma. Long-term users have a mortality rate nearly 7 times higher than the general population and lose an average of 18.3 years. The combination of shorter life expectancy, high treatment risks, and expensive care fuels controversy over resource allocation.⁴

“Physicians have an obligation to be stewards of resources, and that patient is taking up time in the ICU or the ER, diverting resources away from other patients. The tricky thing, the messy thing, is when we think in terms of who deserves those scarce resources,” says Esplin.

Esplin suggests that asking how many operations is too many is the wrong question. “We wouldn’t ask that question if addiction wasn’t so stigmatized,” she says. “Somebody could present with multiple heart attacks caused by obesity or other negative behaviors and we wouldn’t necessarily deny them treatment. We need to rethink this idea that addiction is a continually self-imposed disease because we’re not treating the underlying cause.”

Indeed, despite widespread recognition that opioid addiction is a public health crisis, evidence-based addiction resources are strikingly sparse in the United States. IVDU-IE patients in the United States rarely receive treatment for their underlying addiction. Fewer than 8% of IVDU-IE patients are treated with opioid-replacement therapy after hospitalization,¹ and at discharge, few patients have an addiction treatment plan in place or even a referral to treatment facilities.⁹

For IVDU-IE patients, failure to treat the underlying addiction means failing to completely treat the disease; it is “comparable to leaving the nidus of infection behind,” note researchers studying surgical outcomes for IVDU-IE patients at two Massachusetts hospitals.⁴ A study of outcomes at the Cleveland Clinic reported that the risk for reoperation or death rose sharply (then fell off again) between 3 and 6 months after surgery—just at the time recovering drug users are most likely to relapse.⁶

At Ben Taub, Ghanta’s patients have access to the county’s federally funded InSight Clinic, which screens patients for addiction and refers them to treatment facilities. However, Ghanta still points at the broader lack of addiction resources as one of the most frustrating aspects of treating IVDU-IE.

“As a medical society, we need to spend more time and energy determining how best to support these patients after they leave the hospital,” he says. “As a surgeon, it’s

THE FINANCIAL IMPACT OF IVDU-IE

The costs of treating opioid-related infections like IVDU-IE is soaring. One study of U.S. inpatient hospitalizations estimated that the cost per hospitalization for “opioid abuse/dependence with related infection” exceeded \$107,000, costing \$700 million nationally over 10 years.¹⁰ Since few IVDU-IE patients have private insurance, the costs fall heavily on hospitals. One West Virginia hospital billed \$17.3 million for IVDU-IE admissions, but was only reimbursed for \$3.8 million; that institution lost \$3.5 million caring for IVDU-IE patients in 2015 alone.¹¹

particularly frustrating when we decide to do this complex intervention that uses a lot of resources, but it’s hard to get the investment in the aftercare. If we’re going to do the high-risk, high-cost intervention, we should use this opportunity to help this person not abuse drugs anymore.”

WHERE WE’RE STUCK

Finally, one of the biggest struggles may be identifying and coming to terms with what the patient wants. Lost in the ravages of addiction, the patient may have different priorities than the physician. Medrano notes the importance of including the patient in decision-making but says it can often leave her feeling like she didn’t get to do enough to help. Several of her patients have refused treatment, some frankly admitting that they would continue to abuse drugs.

“It’s a very sad condition,” she says. “You often wish you could have done more. You just try your hardest, hope for the best, and hope that the patient wants the best as well.”

Looking back on her experiences with IVDU-IE patients, Esplin says her encounter with Mark and his sister still shakes her. Mark’s physicians and Esplin discussed his bleak future with his sister, talking about skilled nursing facilities for the uninsured, the possibility of never regaining consciousness, bed sores, sepsis, reinfection, and so on. The long-term outcomes didn’t look great, but his sister remained firm.

Esplin recalls, “She kept coming back with, ‘Well, Mark didn’t want to die. He wanted to check out, but he sure didn’t want to die.’ And that’s where we’re stuck.”

** The patient’s information has been modified to protect their identity.*

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