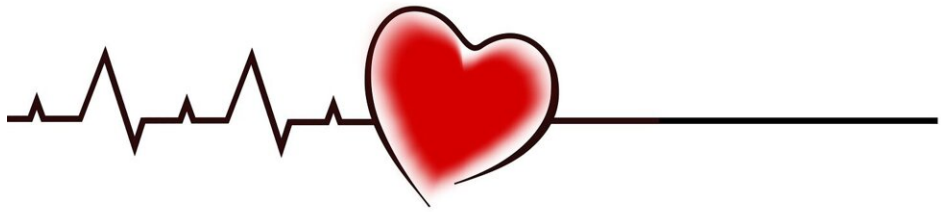
Drug overdose cardiac arrests involve younger, healthier people than other cardiac arrests

January 31 2024



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An analysis of data for more than 500,000 out-of-hospital cardiac arrests in the U.S. found key differences in outcomes between cardiac arrests caused by drug overdoses and cardiac arrests due to other causes, according to new research published today in the *Journal of the American Heart Association*.

Cardiac arrest occurs when there is an electrical problem with the heart that causes it to stop beating. Each year, more than 350,000 people in the U.S. have an out-of-hospital cardiac arrest, according to the American

Heart Association's 2023 Heart Disease and Stroke Statistics.

People who survive after cardiac arrest can have brain damage, injury to internal organs or other long-term consequences. Out-of-hospital cardiac arrests triggered by opioid overdose are a significant cause of death among adults 25 to 64, according to the Association's 2021 scientific statement on opioid-associated out-of-hospital cardiac arrest, and more than 15% of the opioid overdose emergency medical service cases in 2016 included cardiac arrest.

"Many communities face ongoing challenges with increases in drug overdoses, which tend to affect a younger, healthier population," said lead study author Aditya C. Shekhar, M.B.E., a medical student at the Icahn School of Medicine at Mount Sinai in New York City. "Given the recent increases in drug overdose-associated deaths, there is immense public health interest to better understand these types of cardiac arrests and how to treat them."

Researchers analyzed data from the national Cardiac Arrest Registry to Enhance Survival (CARES) to compare out-of-hospital cardiac arrests from drug overdoses to cardiac arrests from other causes. The study included more than 360,000 cardiac arrest cases from 2017 to 2021. Of those, 8% were caused by drug overdoses, and 92% of cardiac arrests were from other causes.

Drug-related cardiac arrests were defined in the study as all intentional and accidental cardiac arrests caused by a presumed or known overdose of medication, drugs (legal/illegal) or alcohol (referred to as overdose-related).

The analysis found that people with overdose-related cardiac arrests:

- had significantly higher survival rates and better neurologic

outcomes compared to people with cardiac arrests from other causes when the first monitored cardiac rhythm was not shockable, meaning a heart rhythm that doesn't respond to a defibrillator;
- were average age of 39 years old, compared to the average age of 64 years for those with cardiac arrests from other causes;
- also had fewer health conditions, such as Type 2 diabetes, high blood pressure, kidney disease, heart disease, respiratory disease, high cholesterol or stroke than those who arrested from other causes; and
- had better neurological outcomes. About 15% of people with drug overdose cardiac arrests survived with favorable neurological outcomes—meaning they can perform daily living activities independently and without assistance—compared to 7% of patients with non-drug overdose arrests.

Unfortunately, overdose-related cardiac arrests were less likely to be witnessed and less likely to have a shockable first-monitored heart rhythm, and therefore less likely to respond to a defibrillator. The analysis found:

- About 95% of overdose patients had non-shockable heart rhythm, compared to 79% of patients with cardiac arrests from other causes.
- When the first monitored heart rhythm was non-shockable, survival rates with good neurologic outcomes were significantly higher for patients with drug overdose cardiac arrests compared to cardiac arrests from other causes (10% and 3%, respectively).
- Drug overdose cardiac arrests and non-overdose cardiac arrests had similar survival rates when the first-monitored cardiac rhythm was shockable (29% and 24%, respectively).

"We were surprised that survival rates and neurological outcomes were

significantly better in patients with non-shockable heart rhythms from drug-related cardiac arrests, even after controlling for age and other factors," said senior study author Ryan A. Coute, D.O., an assistant professor of emergency medicine at the University of Alabama-Birmingham Heersink School of Medicine. "Our study suggests that different causes of cardiac arrest have unique features and, as a result, have different trends in their outcomes. There may be a growing need to treat different causes of cardiac arrest with different techniques."

The study also found that only 1 in 5 cardiac arrests from drug overdoses were witnessed by a bystander, compared to nearly half of cardiac arrests from other causes.

Shekhar noted the importance of learning CPR and knowing the signs that someone may have had a cardiac arrest. "When someone has a cardiac arrest, their brain is starved of oxygen, and brain cells begin dying off within minutes," he said. "Performing CPR has been shown to dramatically improve outcomes for cardiac arrest by helping get blood to the brain quickly."

Study details, background and design

- Cardiac Arrest Registry to Enhance Survival (CARES) is a multicenter registry across the U.S. for out-of-hospital cardiac arrests, established by the U.S. Centers for Disease Control and Prevention (CDC) and Emory University.
- The CARES database captures cardiac arrest data for more than 115 million people in 41 states.
- The CARES dataset analyzed in this study compared 29,500 overdose-attributable out-of-hospital cardiac arrests to 338,073 out-of-hospital cardiac arrests from all other nontraumatic causes, out of a total dataset of 537,100 cardiac arrests between 2017 through 2021, the year for which the data was most

complete when the authors began their analysis.
- The remaining 169,527 cardiac arrest cases were excluded based on predetermined exclusion criteria: younger age 18; people in long-term care facilities; patients with active cancer; and people who had cardiac arrest after arrival of the emergency medical team.

The study's limitations include the fact that CARES registry data represents only about half of the U.S. population. Communities not submitting to the CARES registry might be experiencing patterns of cardiac arrest that differ from those included in the registry, therefore, this study's findings would not be applicable in these communities. In addition, the registry did not include information about the type of drug involved in the overdose causing each cardiac arrest.

"What surprised me about this study was that survival was so much better in the overdose-related cardiac arrests. Most cardiac arrests without a shockable rhythm fall into two groups: pulseless electrical activity (PEA), where there is an electrical signal but the heart is not pumping hard enough for a pulse to be generated; and those in asystole, which is when there is no pulse and no electrical signals from the heart.

"These findings indicate that more people with PEA and asystolic overdose survived," said Cameron Dezfulian, M.D., FAHA, lead author for the Association's 2021 scientific statement on opioid-associated out-of-hospital cardiac arrest. Dezfulian is medical director of the Adult Congenital Heart Disease ICU at Texas Children's Hospital, senior faculty member in pediatrics, anesthesiology and adult critical care medicine at Baylor College of Medicine, both in Houston.

"Previous research has confirmed that unstable blood pressure resulting in another cardiac arrest is a leading contributor to cardiac arrest death rather than the care from the emergency response team. So, why did

people with overdose cardiac arrests have better blood pressure stability than the non-overdose patients?

"Additional research is needed to determine if the non-overdose patients have cardiac arrests that last longer, if they have another cardiac arrest or any other complication, each of which may play a role in poorer survival and outcomes. We also need more research to understand the biological and physiological effects of naloxone to determine if it may contribute," said Dezfulian.

More information: Aditya C. Shekhar et al, Cardiac Arrest Following Drug Overdose in the United States: An Analysis of the Cardiac Arrest Registry to Enhance Survival, *Journal of the American Heart Association* (2024). DOI: 10.1161/JAHA.123.031245

Provided by American Heart Association