Understanding the Potential Value of Cardiovascular Brain Death Donors to Increase the Heart Donor Pool.

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Abstract

Multiple approaches in recent years have been implemented to address the persistent shortage of heart donors, including a recent modification of UNOS heart allocation system, expanding donor acceptance criteria, and adoption of novel techniques to utilize hearts from donors with circulatory death. The opioid epidemic has resulted in an exponential increase in deaths in the United States in recent years, particularly affecting younger adults. A recent analysis of UNOS database by Jenser et al. reveals a relative underutilization of heart donors with cardiovascular mechanism of brain death which provide similar long-term survival as donors with other mechanisms of brain death, highlighting the potential role of these donors to provide life saving cardiac allografts and mitigate the persistent shortage of hearts for transplantation.

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The implementation of a new heart allocation system by UNOS in October 2018 was primarily intended to increase donor access for patients with advanced heart failure awaiting heart transplantation and reduce mortality on the waiting list. Additional efforts in this regard include the utilization of marginal donors on patients with extended criteria for listing, transplanting hearts from donors with hepatitis C, and more recently the progressive adoption of techniques to facilitate donation after circulatory death including normothermic regional perfusion and ex-vivo normothermic perfusion (Transmedics OCS) for further assessment of donor allograft function. [1-4]

The opioid epidemic in the United States has resulted in an exponential increase in the number of people who die from drug overdose in the past decade to an alarming 92,000 deaths in 2020. This cause of death affects disproportionately younger people, most frequently otherwise healthy, with those age 15 to 45 years of age accounting for 57% of the cases.[5] (figure 1)

The most common cause of death related to chemical overdose is respiratory failure, eventually leading to cardiac arrest related to profound hypoxemia, in patients with normal cardiac anatomy and function, which could potentially recover normal function and be suitable for cardiac donation. While the reality of the opioid epidemic is a public health problem of utmost importance further exceeding the scope of this manuscript, we can speculate that further management and assessment of cardiac donors with cardiovascular mechanism of death, particularly related to drug overdose, could potentially provide suitable organs for transplantation in a number that would further surpass all other alternative strategies combined.

Jensen et al present an extensive analysis of the UNOS database including nearly 36,000 adult heart transplant recipients between 2005 and 2021, reporting that only 7.5% of patients received cardiac allografts from donors with cardiovascular mechanism of donor brain death (CV-DBD). While the unadjusted survival analysis revealed a discrete lower long-term survival for CV-DBD recipients (12.0 vs 13.1 years, p =0.04), this difference did not persist after adjusting the analysis for donor / recipient age, recipient comorbidities, annualized center volume, and transplantation era. This report highlights the importance to further evaluate CV-DBD as we strive to provide advanced heart failure patients access to heart transplantation.[6]

Recent work has examined the impact of donor toxicology and showed that even donors with multiple positive findings on drug screen have equivalent survival to those without such drug use.[7] A follow-up analysis further showed that the utilization of donors is associated with most drug use in a negative fashion (more drugs are associated with less utilization).[8] This even held true with younger donors.

In the end, each program needs to balance the needs and acuity of individual patients when making specific decisions on a particular donor offered. The temptation to wait for "a better donor" is significant, but waitlist mortality is an ever-present hazard, and the patient may not survive until the next donor offer is available. We can and must strive to do our best to maximize the donors we are offered even when we are sometimes out of our comfort zone.

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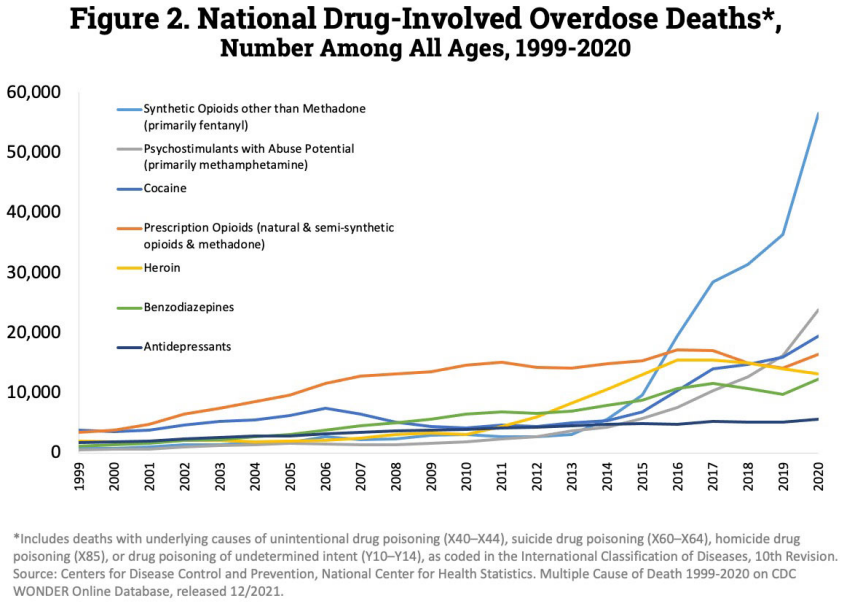
Disclosures:

NB has spoken for Fresenius, and Abiomed.

DB has consulted for Abiomed, Abbott, Getinge and Livanova. He serves on the Steering Committees for Natera, CareDx and Procyrion. He has spoken for Pfizer

Figure 1: Drug overdose related deaths in the United States.



Source: Centers for Disease Control and Prevention, National Center for Health Statistics.