

Computer Algorithm to Rescue Donation After Circulatory Death (DCD) Organs

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Background

Organ transplantation is an impactful use-case for advances in artificial intelligence and computer algorithms as a single successful organ donation is an entire life saved. We hypothesize that organs are being missed by donation after circulatory death (DCD) workflows due to process inefficiencies and underutilization of relatively novel ex-vivo organ perfusion systems. This study quantifies how many potential thoracic organ donors are being missed at a large academic medical center, identifies barriers to donor referral, and describes the feasibility of a novel computer algorithm design to rescue organs missed by current DCD workflows.

Methods

This study analyzed all deaths at a central medical center between June 2020 and June 2022 (n=2233). Specific exclusion criteria were used to calculate potential heart and/or lung donors. Data from the local organ procurement organization was cross-referenced to calculate the number of missed donor organ evaluations during the study period. Then a qualitative analysis using structured interviews with intensive care unit nursing teams identified barriers to donor referral. Findings from the completed data analyses and engagement with end-user ICU staff, surgeons, and organ procurement organizations informed the design of an algorithm software which can automate and streamline the organ donor evaluation and referral process [Figure 1].

Results

The procurement outcomes analysis identified 265 qualified cardiac and 280 qualified lung donors, though only 18 patients were approached for thoracic organ transplantation during the study period [Figure 2]. The workflow analysis revealed that donor approaches were often missed or delayed due to other critical care priorities, human error, lack of awareness, and frustration with procurement organization follow-up [Table 1].

Conclusions

Optimizing organ referral workflow could exponentially increase lives saved by transplantation. Only 6-7% of patients who qualified to donate organs were approached for donation at this quaternary care center. Potentially contributory are inefficiencies in having occupied intensive care unit staff make phone calls to the organ procurement organization to initiate donor approach. Our findings endorse an algorithm for automated donor evaluation and referral as a feasible solution. We plan for future studies that will implement and clinically validate the algorithm design described.