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Expanding the DCD donor pool: prediction of time to death after removal of life-sustaining treatments

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Electronic supplementary material

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Dear Editor,
The growing need for transplantable organs from deceased donors along

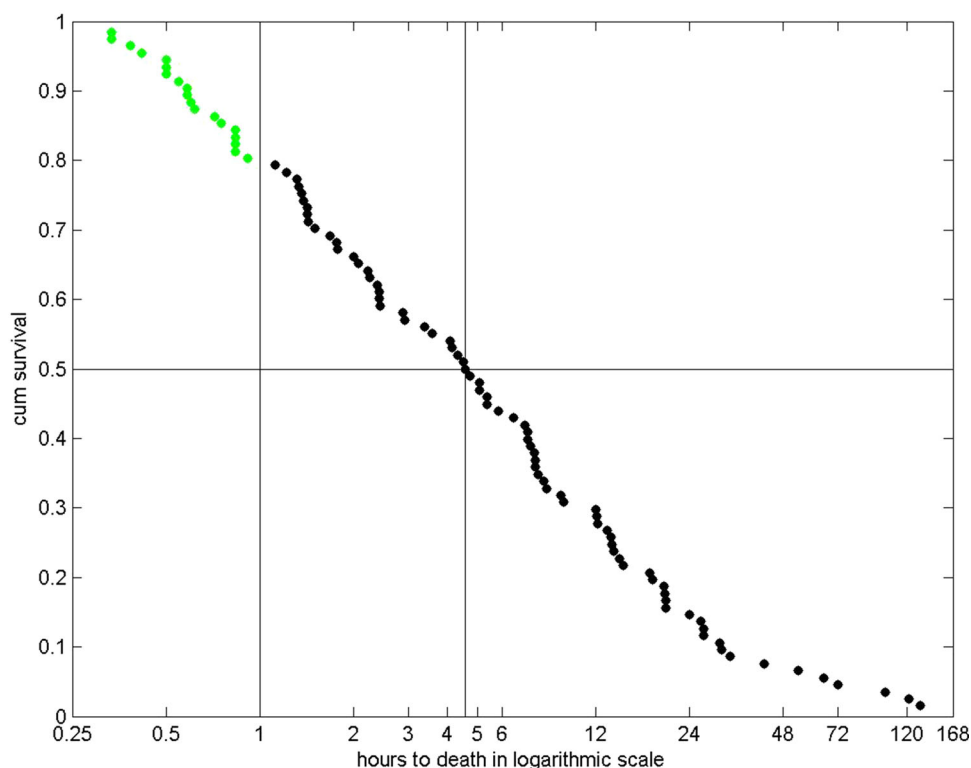
with convincing outcomes of recipients drives the quest for expanding the donor pool [1–3]. Since the revision of the Law for Organ Transplantation enacted in April 2013 in the Czech Republic, a controlled donation after circulatory death (DCD) may address the shortage of deceased donor organs for transplantation. A recommendation for withdrawing life-sustaining treatments (WLST) has existed in the Czech Republic since 2010 and a national protocol for donation after circulatory death has been available since November 2013.

As there is important variability in the practical aspects of WLST in the intensive care unit in different countries [3] and because death after WLST must occur within a certain time frame (1–2 h) for DCD to proceed successfully [4, 5], we aimed to determine specific predictors of time to death after WLST in adult patients with a hopeless prognosis. The study was approved by the ethics committee.

We conducted a two-center prospective longitudinal cohort study between April 2013 and January 2014. In 107 consecutive adult patients in whom a decision for WLST was made, we prospectively recorded demographics (age, gender, reason for admission, reason for WLST, comorbidities), days in ICU, days on mechanical ventilation, the last measures in the clinical record before WLST: GCS, ventilator parameters (PEEP, FiO₂, PaO₂, and spontaneous respiratory rate), circulatory variables (heart rate, MAP, dose of vasopressors), lab results (pH, lactate, creatinine, liver function tests, and current sedation or analgesia dose). The opinion of the ICU clinician and nurse was also used as a predictor variable. The primary outcome variable was death within 60 min of WLST.

Wilcoxon–Mann–Whitney two-sample two-sided test of median equality was used at a significance level of 0.05 for evaluation of

Fig. 1 Survival curve following WLST ($n = 107$). The median time to death was 275 min, 95 % CI [145; 435]



significant differences between the two groups. Stringent Bonferroni correction via the false discovery rate technique was used for detection of significant differences.

In the cohort of 44 women and 63 men of mean age 68 years, the mean length of hospitalization was 8.9 days, the decision to WLST was taken after a mean of 8.5 days. Patients spent 5.9 days on mechanical ventilation on average with terminal extubation noted in four cases. Patients were admitted to hospital mostly after a cardiac arrest and for acute respiratory failure in 28 % and 36.4 %, respectively (see Table 1 in the Electronic Supplementary Material, ESM). Death within 60 min occurred in 20 out of 107 patients (18.7 %) (Fig. 1).

We found the following clinically relevant predictors of death occurring within 60 min of WLST: vasopressors dose, oxygenation index (PaO₂ and FiO₂), and terminal extubation (Table 2, ESM). The clinician prediction accuracy was 83.8 % (with 90.0 % sensitivity and 82.3 % specificity).

After reviewing the cohort for contraindications of organ donation, there is a potential to increase the donor pool for 3–6 controlled DCD donors/100 patients who died in the ICU. Since legal and organizational progress in 2013, eight DCD donations in 14 months in two centers were realized, a promising number for a country having 20.5 dead donors per million inhabitants per year. This study adds to the knowledge about the

potential of DCD donation in the ICU and specifies that oxygenation index, vasopressors dose, and clinician estimation accurately predicts the occurrence of death within the time frame of 60 min.

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Conflicts of interest The authors have disclosed that they do not have any potential conflicts of interest.

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