SCIENTIFIC REGISTRY OF TRANSPLANT RECIPIENTS

The effect of Acuity Circles on deceased donor transplant and offer rates across MELD and exception statuses

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Introduction

The new liver allocation policy, called acuity circles (AC), was implemented on February 4, 2020. AC implemented two significant changes to the allocation of deceased donor livers:

1. Concentric circles around the donor hospital determine appropriate candidates for allocation.
2. A series of relatively narrow bands of disease severity prioritize candidates: Status 1A and 1B, pediatric model for end-stage liver disease (PELD) or adult model for end-stage liver disease (MELD) scores ≥ 37, P/MELD 33-36, P/MELD 29-32, P/MELD 15-28, and P/MELD < 15.

AC could significantly affect the relative access to transplant across P/MELD categories. Additionally, exception candidates are a large proportion of liver transplant candidates and recipients. Thus, we investigated the effect of AC on deceased donor transplant and offer rates across P/MELD categories and types of exceptions.

Methods

Difference-in-differences (DID) analyses

DID analyses estimated the effect of AC. Essentially, the change or 'delta' before and after implementation of AC was estimated across categories of P/MELD and types of exceptions relative to a "reference" category. For example, the effect of AC on P/MELD 29-32 candidates was the change in the difference between P/MELD 29-32 and P/MELD 15-28 candidates after AC compared to before AC. In this example, P/MELD 15-28 candidates are the control group, which account for secular changes unrelated to the implementation of AC.

Methods (continued)

The models for deceased donor transplant and offer rates included several candidate factors: age, allocation P/MELD, type of exception, sex, primary payer, and rural-urban commuting area classification of the candidate's ZIP code. The models included interactions for each candidate factor, including P/MELD and type of exception, with post-AC follow-up.

Deceased donor transplant rate analyses

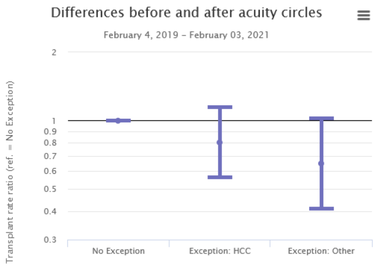
The cohort included registrations on the liver waiting list between February 4, 2019, and February 3, 2021. Specifically, registrations were included if (1) the listing date was on or before February 3, 2021, and (2) the removal date was on or after February 4, 2019. The underlying model was a piecewise exponential model with calendar time as the timescale. In other words, an effect for each month before and after implementation of AC adjusted for temporal trends in deceased donor transplant rates.

Offer rate analyses

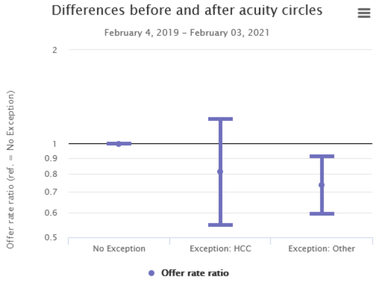
Liver match runs between February 4, 2019, and February 3, 2021 were included. Only match runs with at least one acceptance were included, and offers after the last acceptance on a match run were removed. The specific offer rate of interest was the first offer on a match run. A Poisson model estimated the number of first offers received per year on the waiting list. Each model used an offset equal to the natural log of days in a status (ie, days spent at a particular P/MELD value) and included overdispersion term. Similar to the deceased donor transplant rate model, the offer rate models included effects for the months before and after implementation of AC.

Results

Transplant rate analysis: Type of Exception

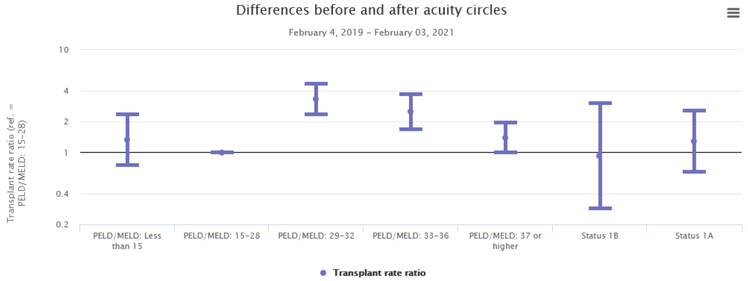


Offer rate analysis: Type of Exception

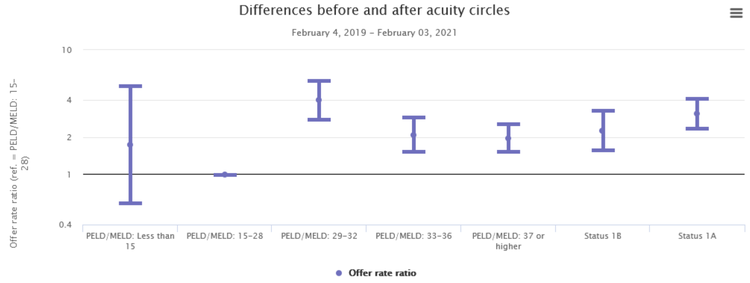


Results (continued)

Transplant rate analysis: P/MELD categories



Offer rate analysis: P/MELD categories



Discussion

Candidates with P/MELD 29-36 had significantly higher deceased donor transplant rates than candidates with P/MELD 15-28 after compared to before AC. Similarly, candidates with P/MELD 29 and higher had significantly higher offer rates for the 1st offer on a match run than candidates with P/MELD 15-28 after compared to before AC. Notably, P/MELD 29-32 candidates had the largest increase in offer rates.

Candidates with HCC and other exceptions had lower deceased donor transplant and offer rates after compared to before AC, although only the difference in offer rates for other exceptions was statistically significant.

Thus, AC significantly increased the relative access to deceased donor transplant for candidates with P/MELD 29-36, and candidates with exceptions may have somewhat lower access to transplant. Because AC had relatively narrow bands of disease severity for high MELD candidates, more narrow bands of P/MELD for candidates between 15 and 28 may better prioritize candidates by disease severity within the range.

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