Clinical and Economic Benefit of CMV Matching in Kidney Transplant: A Decision Analysis


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Disclosures

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Cytomegalovirus In Kidney Transplant

Cytomegalovirus (CMV) is a major cause of morbidity and mortality after solid organ transplant

- Despite prophylaxis with valganciclovir, CMV infection increases the risk of death and graft loss
- Highest risk is in CMV-negative recipients (CMV R-) who receive CMV donor + (CMV D+) kidneys
  - Increased graft failure (D+/R- vs. D-/R-: hazard ratio [HR] = 1.17, \( P = .01 \))
  - All-cause mortality (HR = 1.18, \( P < .001 \))
  - Infection-related mortality (HR = 1.38, \( P = .03 \))

Leaphorn et al. AJT. 2019. 2:573-584
Benefits of CMV Donor and Recipient Matching

Preferentially transplanting CMV D- organs into CMV R- recipients reduces the risk of posttransplant CMV infection and associated graft loss

- The number of CMV D- exceeds CMV R- recipients nationally
- Selective allocation reduces CMV D+/R- transplant
- Preferential allocation of CMV D- donors did not negatively impact transplant rates in a pilot study

Lockridge et al. AJT. 2020:20:3502-3508

A: US vs. OPO Deceased Donor CMV Serology Pre-Pilot
B: OPO Pre vs. Post Pilot Deceased Donor CMV Serology
C: US vs. OPO Deceased Donor CMV Serology Post-Pilot
Purpose/Design of study

Purpose:
Assess the potential clinical and economic implications of a national allocation policy to preferentially allocate CMV D- kidneys to CMV R- candidates

Design:
• Markov decision analytic model
• Survival input: Leaphorn et al. *A/T* 2019, based on UNOS analysis
• Economic inputs: Linked Medicare-SRTR data to determine differential cost of D+/R- vs. D-/R- transplant
• Additional input: Pharmaceutical costs, utilities (dialysis, transplant), discount rate (3%)
Model Overview

- **Accept CMV+ organ**
  - **Wait for D-R-**
    - **Alive with graft function**
      - **CMV D- to R- transplant**
        - **Survive**
          - **Alive with graft function**
          - **Post-CF dialysis**
        - **Die at Tx**
          - **Post-CF dialysis**
          - **Dead**
    - **Post-CF dialysis**
      - **Alive on dialysis**
      - **Death**
  - **Dead**
- **CMV R+ to D- transplant**
  - **Alive with graft function**
    - **Survive**
    - **Graft fails**
    - **Die with function**
    - **Dead**
  - **Dialysis**
    - **Alive on dialysis**
    - **Death**
  - **Dead**
Results

• Expected survival increased with D-/R-transplants: **14.3 years vs 12.6 years**
• CMV D-/R- transplant increased quality of life-adjusted survival: **11.3 QALYs vs 9.8 QALYs**
• CMV D-/R- transplant less expensive than D+R-procedures: **$529,512 vs $542,963**

Thus, D-R- transplant is a dominant strategy: less expensive and more effective
How long can you wait for CMV- Donor?
Limitations

Markov model based on general survival data

- There may be differences in quality of the organ for CMV D- vs. D+
- Did not specifically model differences by race/ethnicity
- Sensitive to assumptions about the cost of prophylaxis and differential rates of posttransplant survival
Conclusions

- Prospective matching for CMV status results in *cost savings* and *longer posttransplant survival*
  - Waiting up to 30 months for a CMV D- organ was associated with equivalent long-term survival
- In 2018, 2699 D+/R- and 3890 D-/R+ deceased donor kidney transplants were performed
  - Reallocating CMV D- donors to CMV R- patients would save $36,304,249 in expenditures and increase survival by 4,048 QALYs
  - Would not impact access for CMV R+ patients, as D+ organs would be reallocated to them
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