Current State of Organ Utilization Enhancement Efforts

Martha Pavlakis, MD FAST FASN
Medical Director, Kidney and Pancreas Transplantation
Associate Professor, Harvard Medical School
Vice Chair, UNOS Kidney Transplantation Committee
Disclosures

• EBSCO Industries Inc - content writer
• Transplant Solutions LLC – consultant
• Medeor Therapeutics – site PI
• American Society of Transplantation – Chair, Education Committee
Learning Objectives

1. Define "realization rate" in regards to deceased organ donor potential
2. Summarize current organ utilization enhancement goals and efforts
“What is the potential for U.S. deceased organ donation?”

- National Center for Health Statistics (NCHS) Multiple Cause Mortality Database
  - 99% of all US deaths
  - Death certificate data
  - Lacks co-morbidity info

- Agency for Healthcare Research and Quality – Nationwide Inpatient Sample (AHRQ-NIS)
  - 95% of all hospital deaths
  - Includes disease severity and vent status

FILTERS applied to NCHC Database

Stage 0: All U.S. Deaths in 2010
- Total deaths: 2,472,542

Stage 1: Limit based on age (≤ 75 years old)
- Remaining after Stage 1: 1,130,036

Stage 2: Additionally limit to deaths occurring in-hospital
- Remaining after Stage 2: 416,246

Stage 3: Additionally limit by excluding COD within ICD-10 exclusionary codes
- Remaining after Stage 3: 205,478

Stage 4: Additionally limit by including COD in ICD-10 codes associated with donation
- Remaining after Stage 4: 49,087

Stage 5: Apply ventilated percentages
- Estimated potential donors: 37,258
FILTERS applied to AHRQ-NIS database

Estimated versus actual deceased donors

- “Realization Rate” is the *actual number of donors* divided by the potential donor estimate
- Realization rate varies by donor age
Unrealized donor potential exists mostly in the oldest donor populations, age 50–75

Table 1: Age distribution of estimated potential donors based on Agency for Healthcare Research and Quality—Nationwide Inpatient Sample (AHRQ—NIS) compared to actual donors from the Organ Procurement and Transplantation Network (OPTN) dataset

<table>
<thead>
<tr>
<th>Age</th>
<th>A. Estimated potential donors</th>
<th>B. Actual donors w/organ(s) transplanted (per OPTN)</th>
<th>C. Estimated “realization rates” (actual/potential donors)</th>
<th>D. Gap (unrealized potential donors, A–B)</th>
<th>E. % of unrealized donors</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;1</td>
<td>504</td>
<td>112</td>
<td>22.2%</td>
<td>392</td>
<td>1.3%</td>
</tr>
<tr>
<td>1–5</td>
<td>634</td>
<td>191</td>
<td>30.1%</td>
<td>443</td>
<td>1.4%</td>
</tr>
<tr>
<td>6–10</td>
<td>201</td>
<td>100</td>
<td>49.8%</td>
<td>101</td>
<td>0.3%</td>
</tr>
<tr>
<td>11–17</td>
<td>808</td>
<td>427</td>
<td>52.8%</td>
<td>381</td>
<td>1.2%</td>
</tr>
<tr>
<td>18–34</td>
<td>5052</td>
<td>2140</td>
<td>42.4%</td>
<td>2912</td>
<td>9.4%</td>
</tr>
<tr>
<td>35–49</td>
<td>6268</td>
<td>1961</td>
<td>31.3%</td>
<td>4307</td>
<td>13.9%</td>
</tr>
<tr>
<td>50–64</td>
<td>13 274</td>
<td>1965</td>
<td>14.8%</td>
<td>11 309</td>
<td>36.6%</td>
</tr>
<tr>
<td>65–75</td>
<td>11 552</td>
<td>463</td>
<td>4.0%</td>
<td>11 089</td>
<td>35.8%</td>
</tr>
<tr>
<td>All</td>
<td>38 292</td>
<td>7359</td>
<td>19.2%</td>
<td>30 934</td>
<td>100.0%</td>
</tr>
</tbody>
</table>

DCD donation drops precipitously over age 60
### OPTN actual donor numbers 2014-2019

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>ALL</td>
<td>14,416</td>
<td>15,069</td>
<td>15,946</td>
<td>16,470</td>
<td>17,571</td>
<td>19,250</td>
</tr>
<tr>
<td>DECEASED</td>
<td>8,596</td>
<td>9,079</td>
<td>9,971</td>
<td>10,286</td>
<td>10,721</td>
<td>11,870</td>
</tr>
<tr>
<td>LIVING</td>
<td>5,820</td>
<td>5,990</td>
<td>5,975</td>
<td>6,184</td>
<td>6,850</td>
<td>7,380</td>
</tr>
</tbody>
</table>

“Realization Rate,” is the actual number of donors divided by the potential donor estimate

- unrealized donor potential is greatest in oldest donor populations, particularly those age 50–75, accounting for greater than 70% of the gap between potential donors and actual donors
- 100% utilization is not a realistically obtainable or an ethically appropriate goal
Discard rates increase with higher KDPI

- 2-year graft failure rises linearly from 9% to about 29% for the highest KDPI donors
- probability of kidney discard sharply increases as the KDPI nears 60%

Important goals

• GOAL 1: increase the number of actual donors
  • Reduce delayed referrals or failures to obtain authorization

• Goal 2: increase the number of transplanted organs by increasing the realization rate
  • Reduce discard rate of older and DCD donor organs
Current efforts to increase utilization

- Dual kidney policy changes
- KAPP
- Offers filter project
- Donor image sharing pilot
- COIIN
- OPO benchmark report
- Organ Utilization tool
- CARE
- UNOS labs
- Simunet
- Improving offer and acceptance processes

More organs transplanted
Fewer organs discarded
Dual kidney transplantation

- Kidneys from donors with KDPI >85% offered out as dual
- The proportion of dual KT TX from these donors increased from
  - 56.2% (N=73) pre-policy
  - 82.4% (N=14) post-policy
Kidney Accelerated Placement Project (KAPPP)

- Accelerate extremely hard-to-place kidneys via the Organ Center
- Offer to centers with a recent established history
  - program has transplanted a kidney with similar or more marginal donor characteristics in the past 2 years
  - Updated monthly
KAPP offers for that particular match if the kidney reaches the national level and qualifies as hard-to-place.

Which Donor Matches Are Included?

Donors must meet ALL 3 triggers for KAP to be applied to a match:

- National Points Kid Offer
- Adult Donor
- KDPI ≥80%
Kidney Accelerated Placement Project (KAPP)

Match Characteristics for KAP

- KDPI
- Age
- Peak Serum Creatinine
- History of Diabetes
- History of IV Drug Use
- Donation after Circulatory Death
KAPP First 3 months

First 90 days (7/18/19 - 10/16/19)

746

Donor is age 18 or older with KDPI 80+ at match submission

3348

Donor is younger than 18 or KDPI at match submission is < 80

339

Organ Center

OPO

Match outcome for KI?

Acceptance(s)

Discard(s)

Acceptance(s)

Discard(s)

Acceptance(s)

Discard(s)

Acceptance(s)

Discard(s)

Acceptance(s)

Discard(s)

Acceptance(s)

Discard(s)

Acceptance(s)

Discard(s)

Acceptance(s)

Acceptance(s)

Acceptance(s)

Acceptance(s)

Acceptance(s)
KAPP - First 6 months

- July 18, 2019 to January 18, 2020
- A total of 6583 kidney match runs
  - Organ Center attempted placement of 735 of these donors - national level sequences
    - 104 of the 735 (14%) donors had a KAP-related acceptance
    - 123 kidneys placed during the accelerated portion of KAP
    - 12 kidneys placed after all accelerated centers refused the organ
Offers filter project - Change how offers are filtered

• Goals
  • increase the number of transplants by getting to YES faster.
  • Reduce unwanted offers
  • Decrease CIT
  • Increase organ acceptance of hard to place organs
How are filters generated?

• Filters are only generated for types of offers that the center *never* accepts.

• The center must have received that type of offer from at least 20 different donor and *never accepted any of them.*
OPTN Offer Filters Pilot Phases

Phase One
No Bypass
Center Filters

Phase Two
ByPass Option

Phase Three
Candidate Criteria

Done
Currently being programmed
Donor image sharing project

- DonorNet® accommodates certain images
  - file sizes are limited
  - process is inefficient, preventing routine use
- Existing process can be costly, involving multiple vendors and applications that don’t talk with each other.
- This pilot project currently could make a high quality universal donor image system a reality
The Collaborative Innovation and Improvement Network-COIN

- A 3-year project focused on bringing transplant centers and OPOs together to increase the use of high KDPI kidneys.

- 9-month timeframe of three 90-day improvement cycles towards key focus areas: waitlist management, organ offer and acceptance and care coordination

- Participating teams worked collaboratively with those of other centers and received on-site as well as virtual coaching from UNOS performance improvement specialists

Wey Am J Transplant. 2019
COIIN

• collaborative website with intervention guide, resources, discussion boards and data dashboards
• monthly collaborative conference calls, facilitated webinars, kick-off meetings for each cohort and site visits

Wey Am J Transplant. 2019
COIIN results differed for Cohort A versus B

• Overall, COIIN did not affect kidney yield or waitlist mortality rates
• Cohort A, but not cohort B, had significantly higher deceased donor transplant and offer acceptance rates during its intervention period than programs not in COIIN
• Further research is necessary and further monitoring of posttransplant outcomes is required.
Period 2
active intervention for cohort A

The Collaborative Innovation and Improvement Network-COIN

Wey Am J Transplant. 2019
Organ Utilization Tool (OUT)

• This is a monthly *workbook created in Tableau* that visually illustrates the characteristics and outcomes of organs local centers *turned down that were transplanted elsewhere*, including graft and patient status and survival rates at 6-months and 1-year post-transplant

• Dynamic filters to review offers of specific types of organs (DCD, HCV+, PHS increased risk, etc)

• Displays most recent 24 months of data on *offers from an OPO*

• Can be customized to include offers to specific centers outside of your local area. There is a charge for this
transplant centers can see all of the outcomes for organ offers they accept as well as all of those they refuse

- Abdominal OR Thoracic: $3,000 1\textsuperscript{st} year / $1,500 annually
- Both (purchased together): $5,500 1\textsuperscript{st} year / $3,000 annually
UNOS Labs-3 Pillars

Behavioral Research
Study the impact of human interactions with the system

Data Science
Testing new algorithms and advanced analytics to uncover actionable insights

Technology Innovations
Deploy new tools and technologies to strengthen system performance
UNOS Labs Active Projects

**Horizon 1**
- Natural Language Processing: Organ Utilization Predictor & Yield Models
- Understanding Cold Ischemic Time
- Projecting Travel Time (feasibility phase III)

**Horizon 2**
- Predictive Analytics: Impact on Transplant Qualitative Assessment
- Predictive Analytics: Cognitive Interviewing
- SimUNet: The Impact of Clinical Decision Support on Decision Making in Kidney Offer Evaluation

**Horizon 3**
- GPS tracking (feasibility)
**Cohort**
68 kidney transplant surgeons and nephrologists
80% "routinely involved" in offer acceptance decisions
18 different kidney programs represented

**Intervention**
Each received the same 20 hypothetical kidney offers

**Analysis of 1300 offer responses revealed...**

- Low serum creatinine (<1.5 mg/dL) donors
  - Experimental variants: "Good biopsy", No biopsy, "Poor biopsy"
  - Acceptance odds ratio: 3.07 (CI 1.88-5.02)

- Acute Kidney Injury (AKI) donors
  - Experimental variants: "Good biopsy", No biopsy
  - Acceptance odds ratio: 3.67 (CI 2.47-5.4)

**Conclusion**
- Low serum creatinine donors have higher acceptance odds compared to AKI donors.
- Biopsy status significantly affects acceptance rates.
Summary

• Donor realization rate is an actual number divided by an estimate; improving this rate will likely depend on increasing use of organs from older donors

• Multiple utilization enhancement efforts are underway, reviewed here. The metrics of organ utilization are subject to multiple variables and regulations