I have no relevant financial conflicts of interests

The data reported here have been supplied by the Hennepin Healthcare Research Institute (HHRI) as the contractor for the Scientific Registry of Transplant Recipients (SRTR). The interpretation and reporting of these data are the responsibility of the author(s) and in no way should be seen as an official policy of or interpretation by the SRTR or the U.S. Government.
Since we can cure HepC...

How has the practice of utilizing hepC+ donor organs evolved?
HCV and Drug Overdose Donors

- In 2018 there were > 49,000 narcotic overdose deaths.
- 25% of drug overdose victims are HCV+
- The number of HCV+ donor kidneys exceeds number of HCV+ transplant candidates
- > 50% of recovered HCV+ kidneys discarded (2016)
Direct Acting Antivirals (DAA: NS3A protease inhibitors) were first tested clinically in 2011

- EXPNDER Trial explored the use of HCV+ kidneys for transplant for HCV- recipients (HCV D+/R-)

- Safety: No adverse events related to treatment
- Efficacy: 10/10 had undetectable HCV RNA by 2 weeks post-transplant
HepC POS to NEG KIDNEYS

2016

Map showing the distribution of HepC POS to NEG KIDNEYS in 2016 across the United States, with states colored to indicate the number of cases: Over 100, 51-100, 11-50, 1-10, 0, No data.
The Transplant Surgeon Needed a New Heart—Even if It Had Hepatitis C

A doctor advocating for his patients to have organ transplants infected by the liver disease now uses himself as a living example.

Why Do It

2018

- Comfortable with risk
- Moral alignment
- Dedicated to the cause
- Leaders lead
- Survivor’s guilt
HCV positive to negative transplants at NYU Langone (Jan 2018 – Sept 2019)

- 91 patients
- 102 organs

Viremia
- Median 4 days (IQR 3-7)

Clearance
- Median 32 days (IQR 19-43)

How do waiting times compare?
- HCV+ median 16 days (range 1-187d)
- HCV- median 183 days (range 2-3343d)

Bonnie Lonze, MD, PhD
Percentage of listed patients waiting over 5 years

HepC POS to NEG KIDNEYS in 2019

Does this reflect locations where waiting times are the longest?
STATE OF NEW YORK

Wait time for HCV+ donors: NY

2016 Wait time advantage: 433 DAYS

2019 Wait time advantage: 160 DAYS
STATE OF TENNESSEE

Wait time for HCV+ donors: VA
2016

2016 Wait time advantage: 327 DAYS

2019 Wait time advantage: NONE!
WHAT ABOUT DONOR SELECTION?
WHAT ABOUT DONOR SELECTION?

The diagram shows the distribution of donor age over the years 2016 to 2019. It compares two groups: "All others" and "HCV+ to -". The box plots indicate the median, interquartile range, and outliers for each group. The age range for both groups appears to be similar across the years.
WHAT ABOUT DONOR SELECTION?

The diagram shows the distribution of donor terminal creatinine (mg/dl) from 2016 to 2019. The data is separated into two categories: "All others" and "HCV+ to -". The box plots indicate the interquartile range, median, and outliers for each year.

- **2016**: The distribution for "All others" is spread out with a median around 2 mg/dl, while "HCV+ to -" shows a tighter distribution with a median close to 1 mg/dl.
- **2017**: The median for "All others" increases slightly, indicating a higher terminal creatinine level compared to 2016. "HCV+ to -" remains consistent with a median close to 1 mg/dl.
- **2018**: The median for "All others" continues to rise, while "HCV+ to -" remains stable.
- **2019**: Both categories have a similar trend, with "All others" showing a slight increase in the median.

Overall, the data suggests a trend of increasing terminal creatinine levels in "All others" compared to "HCV+ to -" over the years.
WHAT ABOUT DONOR SELECTION?
WHAT ABOUT DONOR SELECTION?

![Bar chart showing percent DCD donors from 2016 to 2019. The bars are divided into two categories: 'All others' and 'HCV+ to -'.](image)
WHAT ABOUT DONOR SELECTION?

![Bar chart showing the percentage of donors with diabetes or HCV+ from 2016 to 2019. The chart indicates a decrease in the percentage of donors with diabetes as years progress.](chart_image)

- **2016**: 8% for All others, 2% for HCV+ to -
- **2017**: 6% for All others, 3% for HCV+ to -
- **2018**: 4% for All others, 2% for HCV+ to -
- **2019**: 4% for All others, 2% for HCV+ to -

Legend:
- **Blue**: All others
- **Green**: HCV+ to -
WHAT ABOUT DONOR SELECTION?

Percent donors with HTN

- **All others**
- **HCV+ to -**

<table>
<thead>
<tr>
<th>Year</th>
<th>All others</th>
<th>HCV+ to -</th>
</tr>
</thead>
<tbody>
<tr>
<td>2016</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2017</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2018</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2019</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
WHAT ABOUT DONOR SELECTION?

DM+HTN

<table>
<thead>
<tr>
<th>Year</th>
<th>Percent donors with DM+HTN</th>
</tr>
</thead>
<tbody>
<tr>
<td>2016</td>
<td>4%</td>
</tr>
<tr>
<td>2017</td>
<td>6%</td>
</tr>
<tr>
<td>2018</td>
<td>6%</td>
</tr>
<tr>
<td>2019</td>
<td>4%</td>
</tr>
</tbody>
</table>

- Blue: All others
- Green: HCV+ to -
WHAT ABOUT DONOR SELECTION?

![Graph showing percent with delayed graft function from 2016 to 2019. The graph compares 'All others' and 'HCV+ to -.' The percentage trends are consistent over the years.](image)
How many patients are considering (or being considered for) this option?
WHAT ABOUT LISTING PRACTICES?

<table>
<thead>
<tr>
<th>Year</th>
<th>Does not accept HCV+</th>
<th>Accepts HCV+</th>
</tr>
</thead>
<tbody>
<tr>
<td>2016</td>
<td>25682</td>
<td>4454</td>
</tr>
<tr>
<td>2017</td>
<td>24836</td>
<td>5621</td>
</tr>
<tr>
<td>2018</td>
<td>25890</td>
<td>8156</td>
</tr>
<tr>
<td>2019</td>
<td>25288</td>
<td>10771</td>
</tr>
</tbody>
</table>
LISTING VERSUS ORGAN UTILIZATION

All centers: 2019

- Accepts HCV+: 10771
- Will not accept HCV+: 25288
LISTING VERSUS ORGAN UTILIZATION

All centers: 2019

The diagram shows the number of patients listed at different centers in 2019.

- **Accepts HCV+**
  - Will not accept HCV+ (10771 patients)
  - Accepts HCV+ (25288 patients)

- **HCV+ (any) to -**
  - All others (1343 patients)
  - HCV+ (any) to - (12742 patients)
LISTING VERSUS ORGAN UTILIZATION

All centers: 2019

- Accepts HCV+: 10,771
- Will not accept HCV+: 25,288
- HCV+ (any) to All others: 1,343
- HCV NAT+ to All others: 813
LISTING VERSUS ORGAN UTILIZATION

All centers: 2019

- Accepts HCV+
- Will not accept HCV+

- HCV+ (any) to +
- HCV+ (any) to -
- HCV- donor

- HCV NAT+ to -
- All others

193
LISTING VERSUS ORGAN UTILIZATION

An R9 ctr: 2019

- Accepts HCV+:
  - 320 patients (83%)
  - 67 patients will not accept HCV+

- HCV+ (any) to All others:
  - 57 patients (53%)
  - 52 patients

- HCV NAT+ to All others:
  - 38 patients
  - 71 patients
LISTING VERSUS ORGAN UTILIZATION

An R9 ctr: 2019
LISTING VERSUS ORGAN UTILIZATION: phenotypes

(1) High lister, low user

(2) High lister, high user
LISTING vs UTILIZATION

High lister, low user

- Accepts HCV+: 326 (85%)
- Will not accept HCV+: 55
- HCV+ (any): 154
- HCV+ NAT+: 155
- All others: 2

Total patients: 558
LISTING vs UTILIZATION

High lister, low user
LISTING vs UTILIZATION

High lister, high user

- Accepts HCV+
  - Will not accept HCV+ (180)
- HCV+ (any) to -
  - All others (46)
- HCV NAT+ to -
  - All others (36)
LISTING vs UTILIZATION

High lister, high user
Selected center data suggest that few hepatitis C POS to POS are being done in 2019.

How has this practice evolved from 2016-2019?
HepC POS RECIPIENTS getting transplants

2016

2019
Where are the HepC kidneys going over time?

Into NEGATIVE recipients
TN: 2016 vs 2019

Distribution of cases in 2016: TN

Distribution of cases in 2019: TN
WHAT ABOUT RECIPIENT SELECTION?

Who exactly are we offering these organs to?
WHAT ABOUT RECIPIENT SELECTION?

Recipient age

- **2016**
  - Received HCV+ to kidney
  - Did not receive HCV+ to kidney

- **2019**
  - Received HCV+ to kidney
  - Did not receive HCV+ to kidney
WHAT ABOUT RECIPIENT SELECTION?

Recipient sex distribution

<table>
<thead>
<tr>
<th>Year</th>
<th>Group</th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>2016</td>
<td>All others</td>
<td>70%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>HCV+ to- recip</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2019</td>
<td>All others</td>
<td>68%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>HCV+ to- recip</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Legend:
- Male
- Female
WHAT ABOUT RECIPIENT SELECTION?

Recipient race distribution

- **All others**
  - 2016: 46%
  - 2019: 35%

- **HCV+ to- recip**
  - 2016: 35%
  - 2019: 35%

Legend:
- White
- Black
- Non white/black
WHAT ABOUT RECIPIENT SELECTION?

Recipient education distribution

<table>
<thead>
<tr>
<th></th>
<th>2016</th>
<th></th>
<th>2019</th>
</tr>
</thead>
<tbody>
<tr>
<td>All others</td>
<td>49%</td>
<td>HCV+ to- recip</td>
<td>43%</td>
</tr>
<tr>
<td>College/grad</td>
<td>61%</td>
<td>College/grad</td>
<td>57%</td>
</tr>
</tbody>
</table>

Legend:
- College/grad
- Up to HS
- None
Waiting times (at transplant) have increased
Wait times (at tx) stable for the rest

Qualifying time at listing
Transplanted patients by year

- Does not accept HCV+
- Accepts HCV+
It feels like we are doing fewer cases. Is that true?
It feels like we are doing fewer cases. Is that true?
What about other solid organ groups?
HepC POS to NEG HEARTS

[Map of the United States with states shaded in different colors to indicate the number of cases of HepC POS to NEG HEARTS, with legend showing categories from Over 30 to No data.]
LISTING VS UTILIZATION: HEART

2019

- Accepts HCV+
  - Will not accept HCV+: 2251
  - All others: 2703

- HCV+ (any) to -
  - All others: 2469

- HCV NAT+ to -
  - All others: 2584
HepC POS to NEG LIVERS

2016
HepC POS to NEG LIVERS

2017

- Over 30
- 21-30
- 2-10
- 1
- 0
- No data
HepC POS to NEG LIVERS

2018

- Over 30
- 21-30
- 2-10
- 1
- 0
- No data
LISTING PRACTICES: LIVER

<table>
<thead>
<tr>
<th>Year</th>
<th>Does not accept HCV+</th>
<th>Accepts HCV+</th>
</tr>
</thead>
<tbody>
<tr>
<td>2016</td>
<td>9,270</td>
<td>2,418</td>
</tr>
<tr>
<td>2017</td>
<td>8,868</td>
<td>3,043</td>
</tr>
<tr>
<td>2018</td>
<td>7,481</td>
<td>4,572</td>
</tr>
<tr>
<td>2019</td>
<td>5,832</td>
<td>5,652</td>
</tr>
</tbody>
</table>
UTILIZATION PRACTICES: LIVER

![Bar chart showing utilization practices for HCV+ to + and HCV+ to - from 2016 to 2019.]

- 2016: 479 (HCV+ to +), 49 (HCV+ to -)
- 2017: 479 (HCV+ to +), 115 (HCV+ to -)
- 2018: 349 (HCV+ to +), 306 (HCV+ to -)
- 2019: 212 (HCV+ to +), 536 (HCV+ to -)
From the waitlist perspective...

Have HepC organs become “just like any other organ?”
Thank you!