**SUPPORTING INFORMATION**

**Supporting Materials and Methods**

1. **Definitions of the multidrug-resistant organisms (MDROs) evaluated.**
2. Methicillin-resistant *Staphylococcus aureus* (MRSA): *S. aureus* that has tested resistant to at least one of the following: methicillin, oxacillin, or cefoxitin.
3. Vancomycin-resistant enterococci (VRE): *E. faecalis* or *E. faecium* that has tested resistant to vancomycin.
4. Extended-spectrum cephalosporin-resistant (ESC-R) Enterobacterales: Enterobacterales species that has tested resistant to one of the following: ceftazidime, cefotaxime, ceftriaxone, or cefepime.
5. Carbapenem-resistant Enterobacterales (CRE): Enterobacterales species that has tested resistant to at least one of the following: imipenem, meropenem, doripenem, or ertapenem.
6. MDR-*Pseudomonas*: *Pseudomonas* species that has tested either intermediate or resistant to at least one drug in at least three of the following five categories: extended-spectrum cephalosporins (cefepime, ceftazidime); fluoroquinolones (ciprofloxacin, levofloxacin); aminoglycosides (amikacin, gentamicin, tobramycin); carbapenems (imipenem, meropenem, doripenem); piperacillin/piperacillin-tazobactam.
7. MDR-*Acinetobacter*: *Acinetobacter* species that has tested either intermediate or resistant to at least one drug in at least three of the following six categories: extended-spectrum cephalosporins (cefepime, ceftazidime, ceftriaxone, cefotaxime); fluoroquinolones (ciprofloxacin, levofloxacin); aminoglycosides (amikacin, gentamicin, tobramycin); carbapenems (imipenem, meropenem, doripenem); piperacillin/piperacillin-tazobactam; ampicillin-sulbactam.
8. **Clinical data collection**

For each donor, information was collected on: donor demographics (e.g., age, gender, race), comorbidities (e.g., diabetes, asthma, hemodialysis, substance use disorder), outpatient medications, injection drug use (IDU), procedures performed during the terminal hospitalization, medications administered during the terminal hospitalization (including all antibiotics, the T4 protocol), death mechanism, donor type (donation after circulatory death versus donation after brain death), expanded criteria donor status, Public Health Service (PHS)-increased risk status25,26, viral serologies (e.g. for cytomegalovirus [CMV] and hepatitis C virus [HCV]), donor infections (as defined by the Centers for Disease Control and Prevention [CDC]/National Healthcare Safety Network [NHSN] criteria27), and donor cultures (including the date of culture, anatomic site of culture, organism(s) that grew on culture, and the organism’s *in vitro* susceptibilities).

For each recipient, information was collected on: recipient demographics (e.g., age, gender, race), comorbidities (e.g., diabetes, hypertension, chronic kidney disease), outpatient medications, indication for transplantation, date of transplantation, post-transplant procedures, medications administered prior to and following transplantation (including all antimicrobial and immunosuppressive agents), viral serologies (e.g. for CMV and HCV), recipient infections (as defined by CDC/NHSN criteria17), and recipient cultures (including the date of culture, anatomic site of culture, organism(s) that grew on culture, and the organism’s *in vitro* susceptibilities).

1. **Standard antibiotic protocols**
   1. **Standard perioperative antimicrobial prophylaxis.** The standard antibiotic regimens for peri-transplant prophylaxis are listed below for the three study sites (sites #1, 2, 3). If one of the study sites does not perform a significant volume of a certain transplant type, then no prophylaxis regimen for that organ/site is listed.
      1. Kidney transplantation: Cefazolin (sites #1, 2, 3).
      2. Liver transplantation: Ampicillin-sulbactam (site #1); piperacillin-tazobactam (site #2); vancomycin plus piperacillin-tazobactam (site #3).
      3. Heart transplantation: Vancomycin plus cefazolin (or vancomycin plus cefepime, if history of ventricular assist device) (sites #1, 3); cefazolin (site #2).
      4. Lung transplantation: Vancomycin plus cefepime (site #1); vancomycin plus piperacillin-tazobactam (site #3).
      5. Pancreas transplantation: cefazolin (site #1).
   2. **Standard approach to positive donor cultures:** At each of the three included study sites, it is standard to administer antimicrobials to the recipient that are targeted against the donor organism(s) identified on hospital or organ procurement organization cultures, for approximately 7-14 days, when:
      1. An organism grows on donor blood cultures, *or*
      2. An organism grows on a donor culture taken from the allograft (e.g. urine culture for the kidney recipient, sputum culture for the lung recipient), *and*
      3. The organism is not considered a contaminant (e.g. mixed flora on urine culture)
2. **Definition of probable donor-derived infection (DDI).** A probable DDI was defined using criteria from the Organ Procurement and Transplantation Network (OPTN) Ad Hoc Disease Transmission Advisory Committee (DTAC)18 as: (1) a bacterial or candidal infection in the recipient, per CDC/NHSN criteria17, within three months post-transplant, where (2) the infection was caused by an organism with the same species identification and susceptibility pattern as was identified on one of the donor’s hospital or OPO cultures. Probable DDIs were determined independently by two transplant infectious diseases trained physicians (JAA and EAB), and discrepancies were resolved by a third transplant infectious diseases trained physician (DHL).

**Supporting Results**

1. **Supporting Figure**

**Figure S1.** Kaplan Meier curve of time to post-transplant bacterial or invasive candidal infection stratified by donor multidrug-resistant organism status (unadjusted) among those recipients whose donors had negative hospital cultures (log rank *P*=0.23).

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1. **Supporting Tables**

**Table S1.** Mixed effect multivariable frailty model of time to first bacterial or invasive candidal infection post-transplant

|  |  |  |  |
| --- | --- | --- | --- |
| **Variable** | **aHR** | **95% CI** | ***P* value** |
| Negative donor cultures | *ref* | | |
| Non-MDRO bacteria or *Candida* on donor cultures | 1.50 | 1.02-2.23 | 0.04 |
| MDRO on donor cultures | 1.63 | 1.01-2.62 | 0.04 |
| Organ type |  |  |  |
| Kidney | *ref* | | |
| Liver | 1.06 | 0.62-1.80 | 0.84 |
| Pancreas | 1.27 | 0.31-5.27 | 0.74 |
| Heart | 2.29 | 1.24-4.24 | 0.01 |
| Lung | 3.15 | 1.73-5.72 | <0.01 |
|  |  |  |  |
| Recipient Charlson Comorbidity Index | 1.13 | 1.26-3.25 | <0.01 |
| Recipient intensive care unit admission pre-transplantationa | 1.61 | 1.09-2.37 | 0.02 |
| Recipient lower respiratory tract infection pre-transplantationb | 1.64 | 1.12-2.38 | 0.01 |
| Recipient renal replacement therapy pre-transplantationa | 2.03 | 1.26-3.25 | <0.01 |
| *Confounders* |  |  |  |
| Recipient history of obesitya | 1.23 | 0.74-2.03 | 0.42 |
| Recipient days on waitlist prior to transplantation | 1.00 | 0.99-1.00 | 0.27 |
| Donor death due to drug overdose | 0.77 | 0.57-1.04 | 0.09 |

**Table S1 Footnote.**

aAssessed in the 24 hours prior to transplantation.

bAssessed in the seven days prior to transplantation. In order to be categorized as having a lower respiratory tract infection pre-transplantation, the transplant recipient had to be on ongoing antimicrobial therapy for the designated infection within seven days of transplantation.

**Abbreviations**: aHR, adjust hazard ratio; CI, confidence interval; MDRO, multidrug-resistant organism

**Table S2.** Mixed effect multivariable frailty model of time to graft failure or mortality post-transplant

|  |  |  |  |
| --- | --- | --- | --- |
| **Variable** | **aHR** | **95% CI** | ***P* value** |
| Negative donor cultures | *ref* | | |
| Non-MDRO bacteria or *Candida* on donor cultures | 0.60 | 0.30-1.23 | 0.16 |
| MDRO on donor cultures | 0.45 | 0.15-1.36 | 0.16 |
| Organ type |  |  |  |
| Kidney | *ref* | | |
| Liver | 3.60 | 1.37-9.49 | 0.01 |
| Pancreas | 5.31 | 0.61-46.23 | 0.13 |
| Heart | 6.08 | 1.80-20.54 | <0.01 |
| Lung | 7.55 | 2.25-25.31 | <0.01 |
|  |  |  |  |
| Recipient renal replacement therapy pre-transplantationa | 3.43 | 1.29-9.11 | 0.01 |
| Donor length of stay during terminal hospitalization (per additional day) | 1.02 | 0.99-1.05 | 0.05 |
| Donor death due to blunt injury | 2.28 | 1.20-4.31 | 0.01 |

**Table S2 Footnote.**

aAssessed in the 24 hours prior to transplantation.

**Abbreviations**:aHR, adjust hazard ratio; CI, confidence interval; MDRO, multidrug-resistant organism

**Table S3.** Mixed effect multivariable frailty model of time to first bacterial or invasive candidal infection post-transplant among those recipients whose donors had negative hospital cultures.

|  |  |  |  |
| --- | --- | --- | --- |
| **Variable** | **aHR** | **95% CI** | ***P* value** |
| Negative donor OPO cultures | *ref* | | |
| Non-MDRO bacteria or *Candida* on donor OPO cultures | 1.38 | 0.76-2.52 | 0.29 |
| MDRO on donor OPO cultures | 5.59 | 1.44-21.67 | 0.01 |
| Organ type |  |  |  |
| Kidney | *ref* | | |
| Liver | 1.08 | 0.35-3.29 | 0.89 |
| Pancreas | 4.26 | 0.30-61.03 | 0.29 |
| Heart | 3.88 | 0.93-16.13 | 0.06 |
| Lung | 6.62 | 1.83-24.03 | <0.01 |
|  |  |  |  |
| Recipient Charlson Comorbidity Index | 1.20 | 1.06-1.36 | <0.01 |
| Recipient renal replacement therapy pre-transplantationa | 3.03 | 1.01-9.07 | 0.05 |

**Table S3 Footnote.**

aAssessed in the 24 hours prior to transplantation.

**Abbreviations**: aHR, adjust hazard ratio; CI, confidence interval; MDRO, multidrug-resistant organism; OPO, organ procurement organization

**Table S4.** Mixed effect multivariable frailty model of time to graft failure or mortality post-transplant among those recipients whose donors had negative hospital cultures.

|  |  |  |  |
| --- | --- | --- | --- |
| **Variable** | **aHR** | **95% CI** | ***P* value** |
| Negative donor OPO cultures | *ref* | | |
| Non-MDRO bacteria or *Candida* on donor OPO cultures | 0.61 | 0.25-1.51 | 0.29 |
| MDRO on donor OPO cultures | 0.42 | 0.05-3.76 | 0.44 |
| Organ type |  |  |  |
| Kidney | *ref* | | |
| Liver | 1.65 | 0.49-5.55 | 0.42 |
| Pancreas | 7.43 | 0.72-77.09 | 0.09 |
| Heart | 2.21 | 0.51-9.52 | 0.29 |
| Lung | 1.72 | 0.46-6.46 | 0.42 |
|  |  |  |  |
| Recipient albumin (per 1 g/dL increase)a | 0.87 | 0.50-1.53 | 0.64 |
| Donor injection drug use | 0.68 | 0.15-3.02 | 0.61 |
| Donor death due to blunt injury | 3.25 | 1.23-8.54 | 0.02 |

**Table S4 Footnote.**

aMost recent value prior to transplantation was included.

**Abbreviations**: aHR, adjust hazard ratio; CI, confidence interval; MDRO, multidrug-resistant organism; OPO, organ procurement organization

**Table S5.** Mixed effect multivariable frailty model of time to first bacterial or invasive candidal infection post-transplant among recipients whose donors had a positive blood or allograft culture.

|  |  |  |  |
| --- | --- | --- | --- |
| **Variable** | **aHR** | **95% CI** | ***P* value** |
| Negative donor blood and allograft cultures | *ref* | | |
| Non-MDRO bacteria or *Candida* on donor blood or allograft cultures | 1.11 | 0.79-1.57 | 0.53 |
| MDRO on donor blood or allograft cultures | 1.21 | 0.74-1.98 | 0.46 |
| Organ type |  |  |  |
| Kidney | *ref* | | |
| Liver | 1.00 | 0.58-1.70 | 0.99 |
| Pancreas | 1.29 | 0.31-5.36 | 0.73 |
| Heart | 2.34 | 1.28-4.27 | 0.01 |
| Lung | 2.80 | 1.50-5.23 | <0.01 |
|  |  |  |  |
| Recipient Charlson Comorbidity Index | 1.13 | 1.07-1.20 | <0.01 |
| Recipient intensive care unit admission pre-transplantationa | 1.57 | 1.07-2.31 | 0.02 |
| Recipient renal replacement therapy pre-transplantationa | 1.77 | 1.09-2.87 | 0.02 |
| Recipient lower respiratory tract infection pre-transplantationb | 1.70 | 1.50-6.52 | 0.01 |
| Recipient skin or soft tissue infection pre-transplantationb | 3.13 | 1.50-6.52 | <0.01 |

**Table S5 Footnote.**

aAssessed in the 24 hours prior to transplantation.

bAssessed in the seven days prior to transplantation. In order to be categorized as having an infection pre-transplantation, the transplant recipient had to be on ongoing antimicrobial therapy for the designated infection within seven days of transplantation.

**Abbreviations**: aHR, adjust hazard ratio; CI, confidence interval; MDRO, multidrug-resistant organism

**Table S6.** Mixed effect multivariable frailty model of time to graft failure or mortality post-transplant among recipients whose donors had positive blood or allograft cultures.

|  |  |  |  |
| --- | --- | --- | --- |
| **Variable** | **aHR** | **95% CI** | ***P* value** |
| Negative donor blood and allograft cultures | *ref* | | |
| Non-MDRO bacteria or *Candida* on donor blood or allograft cultures | 1.16 | 0.52-2.55 | 0.72 |
| MDRO on donor blood or allograft cultures | 1.05 | 0.29-3.81 | 0.95 |
| Organ type |  |  |  |
| Kidney | *ref* | | |
| Liver | 2.83 | 1.04-7.69 | 0.04 |
| Pancreas | 3.15 | 0.35-28.57 | 0.31 |
| Heart | 5.21 | 1.58-17.11 | 0.01 |
| Lung | 5.44 | 1.50-19.68 | 0.01 |
|  |  |  |  |
| Recipient renal replacement therapy pre-transplantationa | 3.49 | 1.36-8.97 | 0.01 |
| Recipient albumin (per 1 g/dL increase)b | 0.69 | 0.50-0.96 | 0.03 |
| Donor death due to blunt injury | 2.69 | 1.44-5.03 | <0.01 |

**Table S6 Footnote.**

aAssessed in the 24 hours prior to transplantation.

bMost recent value prior to transplantation was included.

**Abbreviations**: aHR, adjust hazard ratio; CI, confidence interval; MDRO, multidrug-resistant organism