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| liver | | | | | |
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|  | waiting list ...................... 4 deceased donation ......... 8 living donation ................ 9 transplant ....................... 11 donor-recipient matching 14 outcomes ........................ 15 pediatric transplant ......... 19 transplant center maps.... 25  W. R. Kim1,2, J. R. Lake1,3, J.  M.Smith1,4,M.A.Skeans1,D.  P. Schladt1, E. B. Edwards5,6,  A.M.Harper5,6,J.L.Wainright5,6,  J.J.Snyder1,7, A.K.Israni1,7,8, B. L. Kasiske1,8  1 Scientific Registry of Transplant Recipients, Minneapolis Medical Research Foundation, Minneapolis, MN  2 Division of Gastroenterology and Hepatology, Stanford University, Stanford, CA  3 Liver Transplant Program, University of Min- nesota, Minneapolis, MN  4 Department of Pediatrics, University of Wash- ington, Seattle, WA  5 Organ Procurement and Transplantation Net- work, Richmond, VA  6 United Network for Organ Sharing, Rich- mond, VA  7 Department of Epidemiology and Com- munity Health, University of Minnesota, Minneapolis, MN  8 Department of Medicine, Hennepin County Medical Center, University of Minnesota, Minneapolis, MN | ABSTRACT During 2013, 10,479 adult candidates were added to the liver trans- plant waiting list, compared with 10,185 in 2012; 5921 liver transplants were per- formed, and 211 of the transplanted organs were from living donors. As of Decem- ber 31, 2013, 15,027 candidates were registered on the waiting list, including 12,407 in active status. The most significant change in allocation policy affecting liver wait- list trends in 2013 was the Share 35 policy, whereby organs from an entire region are available to candidates with model for end-stage liver disease scores of 35 or higher. Median waiting time for such candidates decreased dramatically, from 14.0 months in 2012 to 1.4 months in 2013, but the effect on waitlist mortality is unknown. The number of new active pediatric candidates added to the liver transplant waiting list increased to 693 in 2013. Transplant rates were highest for candidates aged younger than 1 year (275.6 per 100 waitlist years) and lowest for candidates aged 11 to 17 years (97.0 per 100 waitlist years). Five-year graft survival was 71.7% for recipients aged younger than 1 year, 74.9% for ages 1 to 5 years, 78.9% ages 6 to 10 years, and 77.4% for ages 11 to 17 years.  KEY WORDS Liver transplant, model for end-stage liver disease, waiting list.  We are still waiting for the call that they have a liver for our 9 year olddaughter. We jump every time the phone rings.  Robin, mother |
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| 2 OPTN/SRTR 2013 Annual Data Report | |
| Adult Liver Transplant  Introduction  In 2013, 5921 liver transplants were performed in adults; 5710 organs were from deceased donors and 211 were from living donors (Figure LI 4.5). In the US, 139 centers per- formed at least one adult liver transplant. As of December 31, 2013, 15,027 candidates were registered on the waiting list, including 12,407 in active status (Figure LI 1.3). Wait- list mortality remained a concern; 1767 patients died while waiting for a liver transplant and another 1223 were removed from the list due to being too sick to undergo transplant (Fig- ure LI 1.7). Early data after implementation of the so-called Share 35 policy suggest that waiting time for patients with highmodelforend-stageliverdisease(MELD)scoreswasre- duced dramatically (Figure LI 1.9), although waitlist mortal- itydidnotchangeappreciably(FigureLI1.10). AsofJune30, 2013, more than 59,000 adults were living with a functioning liver graft (Figure LI 6.6).  Waiting List  During2013,10,479candidateswereaddedtothelivertrans- plant waiting list (Figure LI 1.7), compared with 10,185 in 2012. The number of active waitlist candidates on December 31, 2013, was 12,407, compared with 12,442 one year before (Figure LI 1.3). The number of candidates on the active list has remained stable over time (Figure LI 1.1).  The most significant change in allocation policy affecting liver waitlist trends in 2013 was the Share 35 policy, whereby organs from an entire region are available to candidates with MELD scores of 35 or higher. Median waiting time for can- didates with MELD scores of 35 or higher decreased dramat- ically, from 14.0 months in 2012 to 1.4 months in 2013 (Fig- ure LI 1.9). Waiting times for status 1A/1B candidates did not change appreciably. The extent to which the shortened waitingtimeforcandidateswithhighMELDscoreswilltrans- late to reduced waitlist mortality remains to be determined.  Donation/Transplant  Over the past several years, deceased donation rates, rates of livers recovered for transplant and not transplanted, and use of donation after circulatory death (DCD) livers have not changed dramatically (Figures LI 2.1 to LI 2.5). Sim- ilarly, numbers of living donor transplants and donor out- comes after the procedure have remained stable (Figures LI 3.1 to LI 3.10).  Data on recipients show a continued trend toward older ages; 15.0% of all adult recipients in 2013 were aged 65 years or older (Figure LI 4.2). Hepatitis C virus (HCV) remained the most common single diagnosis, followed by malignan- cies,someofwhichlikelyalsorepresentHCV(FigureLI4.2). | Geographic disparity in the median MELD score and the gap between laboratory and allocation MELD scores at the time of transplant continued (Figures LI 4.8 and LI 4.9).  The proportion of multi-organ transplants, particularly simultaneous liver and kidney transplants, continued to in- crease;theproportionofsimultaneousliverandkidneytrans- plants rose from 6.7% in 2010 to 7.8% in 2012 and 8.1% in 2013 (Figure LI 4.5). Shorter waiting times for high MELD candidates may potentially reduce the need for these trans- plants by decreasing the frequency of prolonged hepatorenal syndrome and acute kidney injury; however, the observation period under the Share 35 rule in 2013 was not long enough to show an impact on the national trend.  Outcomes  Despite progressive escalation in the severity of end-stage liver disease, graft survival trends are encouraging (Figures LI 6.1 and LI 6.2). Pretransplant disease severity affects im- mediate postoperative survival, but both 30- and 90-day graft survival for all deceased donor livers remained robust. Sur- vival after living donor and DCD transplant also remained fa- vorable (Figures LI 6.1 and LI 6.3). Regarding primary diag- nosis, HCV recipients continued to experience the poorest graftsurvival,oftenrelatedtorecurrenthepatitisC(FigureLI 6.4). Hopefully, new antiviral agents introduced in late 2013 will reduce late graft failure, a trend that will be monitored closely. Overall, as of June 30, 2013, 59,500 liver transplant recipientswerealivewithafunctioninggraft,withmanymore pediatric recipients reaching adulthood each year (Figure LI 6.6).  Pediatric Transplant  Waiting List  In 2013, the number of new active candidates added to the pediatric liver transplant waiting list increased to 693; very few candidates were added as inactive (Figure LI 7.1). The number of prevalent candidates (on the list on December 31 of the given year) continued to decline, and most (66.9%) were listed as active. The age distribution of waitlist candid- ates has remained remarkably similar over the past decade. In 2013, 19.8% of candidates were aged younger than 1 year, 31.3% were aged 1 to 5 years, 14.1% were aged 6 to 10 years, and 34.8% were aged 11 to 17 years (Figure LI 7.2). White candidates represented the largest racial/ethnic group on the waiting list in 2013 (53.8%) followed by Hispanic (24.2%), black (13.7%), and Asian candidates (5.7%). Most (63.8%) candidates had been waiting for less than 1 year, 9.6% for 1 to less than 2 years, 9.2% for 2 to less than 4 years, and 17.4% for 4 or more years. In 2013, 25.1% of candidates were at status 1A/1B, 11.0% had MELD/pediatric end-stage liver disease |

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| (PELD) scores of less than 15, 22.3% had MELD/PELD scores of 15 to 29, and 19.0% had MELD/PELD score of 30 or higher.  Comparing waitlist candidates from 2003 to 2013, a higher proportion were Hispanic in 2013 (17.0% vs. 22.3%), and a higher proportion waited for less than 1 year (31.1% vs. 42.4%) (Figure LI 7.3). Interestingly, the proportion of candidates awaiting retransplant decreased from 17.5% in 2003 to 7.7% in 2013. Among candidates removed from the waiting list in 2013, 70.4% received a deceased donor liver, 5.9% received a living donor liver, 4.8% died, 12.1% were re- moved from the list because their condition improved, and 2.1% were considered too sick to undergo transplant (Fig- ure LI 7.4). Approximately 67% of candidates newly listed in 2010 underwent deceased donor transplant within 3 years, 9.0% underwent living donor transplant, 5.4% died, 11.9% were removed from the list, and 7.1% were still waiting (Fig- ure LI 7.5). In 2013, the rate of deceased donor transplant among active pediatric candidates was 140.2 per 100 active waitlist years (Figure LI 7.6). Rates were highest for candid- ates aged younger than 1 year (275.6 per 100 active waitlist years) and lowest for candidates aged 11 years or older (97.0 per 100 active waitlist years). Of note, transplant rates have been steadily increasing for candidates aged younger than 1 year. Pretransplantmortality has decreasedforall agegroups, to 6.0 deaths per 100 waitlist years in 2012-2013 (Figure LI 7.7). Thepretransplantmortalityratewashighestforcandid- ates aged younger than 1 year, at 26.4 deaths per 100 waitlist years in 2012-2013 (Figure LI 7.7).  Transplant  The number of deceased donor liver transplants peaked at 542in2008andwas493in2013(FigureLI7.8). Thenumber of living donor liver transplants decreased from a peak of 120 in 2000 to 41 in 2013 with most (70.7%) from closely related donors(FigureLI7.9). Overthepastdecadeofpediatricliver transplant, recipient age, sex, and racial/ethnic distributions have changed little (Figure LI 7.10). Cholestatic disease re- mained the leading cause of liver failure (45.6%). In 2011- 2013, 9.2% of liver transplant recipients had undergone pre- vioustransplant, adecreasefromalmost14%adecadeearlier. Insurance coverage appears to be changing; the percentage of recipients with private insurance decreased from 53.3% to 44.3%, and Medicaid coverage increased. In 2011-2013, 38.5% of recipients waited less than 31 days for transplant, and14.9%waited31to60days,similarto2001-2003. Almost 60% of liver transplant recipients were not hospitalized be- fore transplant. Regarding medical urgency status, 34.3% of recipients underwent transplant as status 1A/1B, and 15.2% hadMELD/PELDscoresof35orhigher. Themostcommon | scores at the time of transplant were 15 to 29 (25.0%). Types of liver transplant procedures in pediatric recipients changed little over the past decade; 64.0% of patients received a whole liver in 2011-2013, 19.7% received a partial liver, and 16.2% received a split liver. The proportion of living donors de- clinedfrom14.9%in2001-2003to9.5%in2011-2013. ABO- incompatiblelivertransplantoccurredin2.9%ofrecipientsin 2011-2013, similar to the earlier era.  Immunosuppression and Outcomes  In 2013, 22.7% of pediatric liver recipients received interleukin-2 receptor antagonists for induction therapy, 12.3% received a T-cell depleting agent, and 66.0% reported noinduction(FigureLI7.12). Themostcommonlyusedini- tialimmunosuppressionagentsincludedtacrolimus(96.2%), steroids (84.5%), and mycophenolate mofetil (38.0%). Use of mammalian target of rapamycin inhibitors at the time of transplant was minimal (1.6%), but increased to 5.1% at 1 year posttransplant. At 1 year posttransplant, 52.9% of re- cipients were receiving steroids. Graft survival continued to improve over the past decade among recipients of deceased donor and living donor livers. Graft survival was 92.3% at 30 days for deceased donor transplants performed in 2013, 89.3% at 1 year for transplants performed in 2012, 84.6% at 3 years for transplants performed in 2010, 78.1% at 5 years for transplants performed in 2008, and 68.4% at 10 years for transplants performed in 2003 (Figure LI 7.13). Graft survival was 98.5% at 30 days for living donor transplants performed in 2013, 93.1% at 1 year for transplants performed in 2011-2012, 85.4% at 3 years for transplants performed in 2009-2010, 85.7% at 5 years for transplants performed in 2007-2008, and 67.5% at 10 years for transplants performed in 2001-2002 (Figure LI 7.14). By age, 5-year graft survival was 71.7% for recipients aged younger than 1 year, 74.9% for ages 1 to 5 years, 78.9% ages 6 to 10 years, and 77.4% for ages 11 to 17 years (Figure LI 7.16). Five-year graft survival was lowest, 60.0%, for recipients with HCV as cause of disease. Five-year graft survival was 76.4% for recipients of a first liver transplant, compared with 64.5% for retransplant recipients. The incidence of acute rejection was remarkably similar for all age groups and lowest for recipients aged younger than 1 year. Of recipients in 2007 to 2011, approximately 18% ex- perienced acute rejection by 6 months posttransplant, 27% to 31% by 12 months, and 29% to 39% by 24 months (Figure LI 7.15); 13.5% died within 5 years of transplant (Figure LI 7.17), and the leading cause of death was infection at 1 year and 5 years posttransplant. The incidence of posttransplant lymphoproliferative disorder was 4.6% at 5 years posttrans- plant for recipients who were negative for Epstein-Barr virus and 3.4% for those who were positive (Figure LI 7.11). | |

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| 4 OPTN/SRTR 2013 Annual Data Report | | | | | | |
| waitinglist | 20  15  10  5  0 | New patients | Active Inactive  All | 20  15  10  5  0 | | Patients on list on Dec 31 each year  Active Inactive  All |
| 03 05 07 09 11 13 | | | | | 03 05 07 09 11 13 | |
| LI 1.1 Adults waiting for liver transplant  A new patient is one who first joined the list during the given year, without having been listed in a previous year. Previously listed candidates who underwent transplant and subsequently relisted are considered new. Candidates concurrently listed at multiple centers are counted once. Concurrently listed candidates who are active at any program are considered active; those who are inactive at all programs are considered inactive.  LI 1.2 Distribution of adults waiting for liver transplant  Candidates waiting for transplant any time in the given year. Candidates listed concurrently at multiple cen- ters are counted once. Age is determined at the later of listing date or January 1 of the given year. Time on the waiting list is determined at the earlier of December 31 or removal from the waiting list. Medical urgency status is the most severe during the year. Active and inactive patients are included. HBV, hepatitis B virus; HCV, hepatitis C virus. | | | | | | |

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| liver | | | | | 5 |
| waitinglist | | | | | |
|  | | 2003 | 2013 |  | |
|  |  | N % | N% |
| Age 18-34 35-49 50-64 65+ | 6714.3 4,43428.2 8,94957.0 1,65910.6 | 6164.1 2,18914.6 9,36162.3 2,86119.0 |
| Sex Female Male | 6,51241.4 9,20158.6 | 5,59837.3 9,42962.7 |
| Race White Black  Hispanic  Asian  Other/unknown | 11,56173.6 1,0456.7 2,28014.5 7394.7 880.6 | 10,49869.9 1,0847.2  2,51716.7  7795.2  1491.0 |
| Citizenship US citizen Non-citizen resident  Non-citizen non-resident  Other/unknown | 15,21196.8 3362.1 1430.9 230.1 | 14,26494.9 3052.0  320.2  4262.8 |
| Primary diagnosis Acute hepatic necrosis HCV  Alcoholic liver disease  Cholestatic disease  Malignancy  Other/unk. | 7134.5 4,87931.1 3,54122.5 1,79211.4 3212.0 4,46728.4 | 2771.8  4,41829.4  3,61724.1  1,2458.3  1,1657.8  4,30528.6 |
| Liver tx history First transplant Retransplant | 14,72393.7 9906.3 | 14,63697.4 3912.6 |
| Blood type A B  AB  O | 5,63635.9 1,77011.3 4122.6 7,89550.2 | 5,81338.7  1,63410.9  3922.6  7,18847.8 |
| Waiting time < 1 year 1-< 2 years  2-< 3 years  3-< 4 years  4-< 5 years  5+ years | 4,81730.7 2,79617.8 2,50015.9 1,89612.1 1,3428.5 2,36215.0 | 5,78538.5 2,69617.9 1,72611.5  1,2028.0 7955.3  2,82318.8 |
| Medical urgency Status 1/1A/1B MELD 35+  MELD 30-34  MELD 15-29  MELD < 15  Inactive | 60.0 300.2 660.4 2,83818.1 9,11258.0 3,66123.3 | 10.0  520.3  2571.7  5,24234.9 6,85545.6 2,62017.4 |
| HCC exception Yes No | 2281.5 15,48598.5 | 9556.4  14,07293.6 |
| Multi-organ Liver alone Liver-kidney  Liver-pancreas-intestine  Liver-heart  Other | 15,43598.2 2441.6 140.1 60.0 140.1 | 14,13894.1 8115.4  330.2  320.2  130.1 |
| All candidates | 15,713100.0 | 15,027100.0 |
| LI 1.3 Characteristics of adults on the liver transplant waiting list on December 31, 2003, and December 31, 2013  Patients waiting for transplant on December 31, 2003, and December 31, 2013, regardless of first listing date; active/inactive status is on this date, and multiple listings are not counted. | | | | | |

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| 6 OPTN/SRTR 2013 Annual Data Report | | | | | | | | |
| waitinglist | 100  80  60  40  20 | Age | | 18-34 35-49 50-64 65+  All | 800  600  400  200  0 | Sex and HCC exception status  Male, HCC  Female, HCC  Male, Not HCC Female, Not HCC | | |
| 03 05 07 09 11 13  LI 1.4 Deceased donor liver transplant ra  Transplant rates are computed as the number of d waiting in a given year. Hepatocellular carcinoma (per OPTN policy 9.3.G) in the given year.  24.9 235.2 | | | | | 03 05 | 07 091113  aitlist candidates  100 patient-years of active e Stage 2 exception points | |
| tes among active adult w  eceased donor transplants per (HCC) candidates have activ  40  35  30  25  20 | |
| No data | | | 30.5 49.2 66.6 129.5 | | 0100200300400500600700  ates per 100 waitlist years among active adult  nter, limited to candidates with active time on the waiting nly. Maximumtimeperlistingis2years. Candidateslisted ely. Right panel: Adult deceased donor liver transplants | | | |
| LI 1.5 Deceased donor liver transplant r candidates, by DSA, 2012-2013  Left panel: Transplant rates by DSA of the listing ce listin2012and2013; deceaseddonortransplantso concurrently in a single DSA are counted separat performed in 2012 and 2013. | | | | |
|  | | 2011 2012 2013 |  |
| No data | | 38.7 79.8 46.5 55.8 63.1 73.1 | | | Patients at start of year Patients added during year Patients removed during year Patients at end of year  Removal reason  Deceased donor transplant  Living donor transplant Patient died Patient refused transplant Improved, tx not needed Too sick for transplant Other | | 15,28315,32915,116 10,36910,18510,479 10,30410,38910,594 15,34815,12515,001  5,5375,4635,654  187192209 1,7451,7601,767 738680 560663589 1,0811,1781,223 1,1211,0471,072 |
| LI 1.7 Liver transplant waitlist activity among adults  Candidates concurrently listed at more than one center are counted once, from the time of earliest listing to the time of latest removal. Candidates who are listed, un- dergo transplant, and are relisted are counted more than once. Candidates are not considered to be on the list on the day they are removed; counts on January 1 may differ from counts on December 31 of the prior year. Candid- ates listed for multi-organ transplants are included. | | | | | | | | |

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| liver | | | | | | | | | | | | 7 |
| 25  20  15  10  5  0 | | | | | | | MELD 15-34 MELD 35+ Status 1A/1B  All  05 07 09 11 13 | | | | waitinglist | |
| LI 1.8 Three-year outcomes for adults waitingforlivertransplant, newlistings in 2010  Adults waiting for any liver transplant and first listed in 2010. Candidates concurrently listed at more than one center are counted once, from the timeofearliestlistingtothetimeoflatestremoval. DD, deceased donor; LD, living donor.  Age | | | | LI 1.9 Median months to liver trans- plant for waitlisted adults, by medical urgency at listing  Observations censored at earliest of December 31, 2013, transfer to another center, or removal from waiting list due to improved condition; oth- erwise, candidates contribute waiting time until deceased donor transplant. Kaplan-Meier com- peting risks methods used to estimate time to transplant. Analysis performed per candidate not per listing. If an estimate is not plotted, 50% of the cohort listed in that year had not undergone transplant by the censoring date. Only the first transplant is counted.  Race | | | | | | | | |
| 50  40  30  20  10  0 |  | 18-34 35-49 50-64 65+  All | 50  40  30  20  10  0 | | | |  | | White Black  Hispanic  Asian  Other/unknown | | | |
| 50  40  30  20 | 03 05 07 09 11 13  Primary diagnosis  Acute hepatic necrosis HCV  Alcoholic liver disease Cholestatic disease Malignancy  Other/unknown | | | | 1000  800  600  400 | | 03 05 07 09 11 13  First medical urgency in given year | | | | | |
| 10  0 |  | | | | 200  0 | | | Status 1A MELD< 15 MELD 15-34 | | MELD 35+ Inactive | | |
| 03 05 07 09 11 13 | | | | | | 03 05 07 09 11 13 | | | | | | |
| LI 1.10 Pretransplant mortality rates among adults waitlisted for liver transplant  Mortality rates are computed as the number of deaths per 100 patient-years of waiting in the given year. Pa- tients concurrently listed at multiple centers are counted once. Deaths after removal from the waiting list are not counted. Rates by status are calculated as the number of transplants for a given status divided by total waiting time in the year at that status. Age is determined at the later of listing date or January 1 of the given year. | | | | | | | | | | | | |

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| 8 OPTN/SRTR 2013 Annual Data Report | | | | | | | | | | | | | | | | | | | | | | | | | |
| deceaseddonation  Age | | | | | | | | | | Race | | | | | | | | | | | | | | | |
| 40  30  20  10 |  | | | < 15 15-34 35-44 45-54 | | 55-64 65-74  All | | | 40  30  20  10 | |  | | | White Black  Hispanic  Asian  Other/unknown | | | | No data | | | | | 1.79 3.73 2.13 2.45 2.83 3.34 | | |
| 0 | | 03 05 07 09 11 | | | | | | | 0 | | | 03 05 07 09 11 | | | | | | | LI 2.2 Deceased donor liver donation rates (per 1000 deaths), by state, 2009- 2011  Numerator: Deceased donors residing in the | | | | | | |
| LI 2.1 Deceased donor liver donation rates  Numerator: Deceased donors aged younger than 75 years with livers recovered for transplant. Denominator: US deaths per year, age younger than 75 years. Death data available only through 2011. (Death data available at <http://www.cdc.gov/nchs/products/nvsr.htm>.) | | | | | | | | | | | | | | | | | | | 50 states whose livers were recovered for trans- plant from 2009 through 2011. Denominator: US deaths, all ages, by state from 2009 through 2011 (death data available at [http://www.](http://www.cdc.gov/nchs/products/nvsr.htm) [cdc.gov/nchs/products/nvsr.htm](http://www.cdc.gov/nchs/products/nvsr.htm)). | | | | | | |
| 40  30  20  10  0 | Age | | < 18 18-34 35-49 50-64 65+ | | 40  30  20  10  0 | | Sex | Male Female  All | | |  | 40  30  20  10  0 | Race | | White  Black  Other/unknown | 40  30  20  10  0 | DCD status | | | | DCD DBD | | 40  30  20  10  0 | HCV | HCV positive  HCV negative  HCV status unknown |
| 03 05 07 09 11 13 | | | | | | | 03 05 07 09 11 13 | | | | | | 03 05 07 09 11 13 | | | | 03 05 07 09 11 13 | | | | | | | 03 05 07 09 11 13 | |
| LI 2.3 Rates of organs recovered for transplant and not transplanted  Percentages of livers not transplanted out of all livers recovered for transplant. HCV, hepatitis C virus.  7  6  5  4  3  2  1  03 05 07 09 11 13 | | | | | | | | | | | | | | | | | | | | 100  80  60  40  20  0 | | Anoxia  Cerebrovascular/stroke Head trauma  CNS tumor  Other  03 05 07 09 11 13 | | | |
| LI 2.4 DCD liver donors  Deceased donors whose livers were recovered for transplant. | | | | | | | | | | | | | | | | | | | LI 2.5 Cause of death among deceased liver donors  Deceased donors whose livers were transplanted. CNS, central nervous system. | | | | | | |

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| liver | | | | | | | | | | | | | | | | | 9 |
| 400 | |  |  | | | | Age | |  | | Sex | | livingdonation  Race | | | | |
| 300  200  100  0 | Related  Distantly related Spouse/partner  Unrelated directed Other unrelated  03 05 07 09 11 13 | | | | 3  2.5  2  1.5  1  0.5  0 | |  | 18-34 35-49 50-64 65-70 | | 3  2.5  2  1.5  1  0.5  0 |  | Male Female  All | | 3  2.5  2  1.5  1  0.5  0 |  | White Black  Hispanic  Asian  Other/unknown | |
| LI 3.1 Liver transplants from living | | | | | | 03 05 07 09 11 13 | | | | | 03 05 07 09 11 13 | | | | 03 05 07 09 11 13 | | |
| donors, by donor relation  Numbers of living donor donations, excluding domino livers; characteristics recorded on the OPTN Living Donor Registration Form.  LI 3.3 Living donor liver transplant graft type  As reported on the OPTN Living Donor Regis- tration Form. | | | | LI 3.2 Living donor liver donation rates  Numberoflivingdonorswhoseliverswererecoveredfortransplanteachyear, excludingdominoliverdonors. Denominator: US population aged 70 years or younger (population data downloaded from [http://www.](http://www.cdc.gov/nchs/nvss/bridged_race.htm) [cdc.gov/nchs/nvss/bridged\_race.htm](http://www.cdc.gov/nchs/nvss/bridged_race.htm))  LI 3.4 Rehospitalization in the first 6 weeks, 6 months, and 1 year among liv- ing liver donors, 2008-2012  Cumulative hospital readmission. The 6-week time point is recorded at the earliest of discharge or 6 weeks after donation. Domino liver donors excluded. | | | | | | | | | | | | | |

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| 10 OPTN/SRTR 2013 Annual Data Report | | | | | | | |
| livingdonation  LI3.6Vascularcomplicationsrequiring intervention among living liver donors, 2009-2013  Complications reported on the OPTN Living Donor Registration Form. Domino liver donors excluded. | LI 3.5 Biliary complications among living liver  Complications reported on the OPTN Living Donor Regi all living donors, 2009-2013. Clavien Grade 1, bilious Jac Grade 2, interventional procedure (endoscopic retrograd shepaticcholangiography, percutaneousdrainage, etc.); Cla donors excluded.  LI 3.7 Other complications requiring intervention among living liver donors, 2009-2013  Complications reported on the OPTN Living Donor Registration Form. Domino liver donors excluded. | | | 20  15  10  5  0 | Type of biliary  1 | complication  23  Clavien Grade  013  e of complication is shown for e more than 10 days; Clavien tography, percutaneous tran- calintervention. Dominoliver  tion among living liver 013  orted on the OPTN Living Form. Domino liver donors | |
| donors, 2009-2  stration Form. Typ kson Pratt drainag e cholangiopancrea vienGrade3, surgi  LI 3.8 Re-opera donors, 2009-2  Complications rep Donor Registration excluded.  Cause | |
| 80  60  40 | | | < 25 kg/m2 25-< 30  30-< 35  ³ 35  Unknown | Days after donation 0-30 31-9091-365 |  |
| Suicide  Accident/homicide Medical  Cancer  Unknown | | 0 10  000  2 00  0 00  0 00 |
| 20  0 | | 03 05 07 09 11 13 | | LI3.10Livingliverdonordeaths,2009- 2013  Living liver donors, excluding domino livers. Deaths as reported to OPTN or the Social Secur- ity Administration. Donation-related deaths are included in the Medical category. | | | |
| LI 3.9 BMI among living liver donors  Donor height and weight reported on the OPTN Living Donor Registration Form. Domino liver donors excluded. | | | |

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| liver | | | | | | | | | | | | | | 11 |
| 5000  4000  3000  2000  1000  0 | | | | | | | Age | | <18 18-34 35-49 50-64 65+ | 5000  4000  3000  2000  1000  0 | | Sex | transplant  Male Female | |
| 8000  6000  4000  2000  0 | Deceased donor Living donor  All  03 05 07 09 11 13 | | | | 5000  4000  3000  2000  1000  0 | | 03 05 07 09 11 13  Race  White Black  Hispanic  Asian  Other/unknown  03 05 07 09 11 13 | | | | 5000  4000  3000  2000  1000  0 | 03 05 07 09 11 13  Primary diagnosis  Acute hepatic necrosis HCV  Alcoholic liver disease Cholestatic disease Malignancy  Other/unknown  03 05 07 09 11 13 | | |
| LI 4.1 Total liver transplants  All liver transplant recipients, including adult and pediatric, retransplant, and multi-organ recipi- ents.  8 | | | | | LI 4.2 Liver transplants  All liver transplant recipients, including adult and pediatric, retransplant, and multi-organ recipients. HCV, hepatitis C virus. | | | | | | | | | |
| 6  4  2  0 | | 18-34 35-49 50-64 | 65+  All |  | | | | 0.15 10.48 | | | | | | |
| 03 05 07 09 11 13 | | | | | | No data | | 0.79 2.78 4.26 7.88 | | | | | | |
| LI 4.3 Use of DCD livers among adult recipients, by recipient age  Percentages of deceased donor liver transplants from DCD donors. | | | | | LI 4.4 Percentage of adult DCD liver transplants by DSA, 2011-2013  Percentage of deceased donor liver transplants from DCD donors, by DSA of the transplanting center. | | | | | | | | | |

data behind the figures can be downloaded from our website, at [srtr.transplant.hrsa.gov](http://srtr.transplant.hrsa.gov)

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| 12 OPTN/SRTR 2013 Annual Data Report | | | | |
| transplant | | | | |
|  | | 2003 | 2013 |  |
|  |  | N % | N% |
| Age 18-34 35-49 50-64 65+ | 3376.6 1,57930.8 2,73953.4 4729.2 | 3355.7 97616.5 3,64461.5 96616.3 |
| Sex Female Male | 1,74934.1 3,37865.9 | 2,02034.1 3,90165.9 |
| Race White Black  Hispanic  Asian  Other/unknown | 3,80674.2 4398.6 62212.1 2124.1 480.9 | 4,18770.7 60410.2  80913.7  2674.5  540.9 |
| Primary diagnosis Acute hepatic necrosis HCV  Alcoholic liver disease  Cholestatic disease  Malignancy  Other/unknown | 3035.9 1,53129.9 90117.6 56811.1 4088.0 1,41627.6 | 2333.9  1,48225.0 1,08818.4 4948.3  1,15019.4 1,47424.9 |
| Blood type A B  AB  O | 1,91737.4 70613.8 2635.1 2,24143.7 | 2,14036.1 80113.5  2874.8  2,69345.5 |
| Waiting time < 31 days 31-60 days  61-90 days  3-< 6 months  6-< 12 months  1-< 2 years  2-< 3 years  3+ years  Unknown | 1,75734.3 61612.0 3687.2 67513.2 58411.4 53910.5 2795.4 3035.9 60.1 | 1,77730.0 59510.0  3966.7  96916.4  93015.7  77113.0  2083.5  2734.6  20.0 |
| BMI (kg/m2) < 18.5 18.5-< 25  25-< 28  28-< 30  30-< 35  35+  Unknown | 1112.2 1,61931.6 1,21623.7 62612.2 1,00019.5 53610.5 190.4 | 1262.1  1,67828.3 1,33522.5 73312.4  1,27921.6 77013.0  00.0 |
| Medical condition Hospitalized: ICU Hospitalized: not ICU  Not hospitalized  Unknown | 61312.0 74814.6 3,76673.5 00.0 | 85114.4  1,20420.3 3,81964.5 470.8 |
| Medical urgency Status 1/1A MELD 35+  MELD 30-34  MELD 15-29  MELD < 15  Other/unknown | 3066.0 4769.3 52710.3 3,02659.0 78015.2 120.2 | 1963.3  1,35722.9 89415.1  3,30355.8 1682.8  30.1 |
| Insurance Private Medicare  Medicaid  Other/unknown | 3,29764.3 89317.4 67913.2 2585.0 | 3,19654.0 1,65528.0 76713.0  3035.1 |
| Procedure type Whole liver Partial liver  Split liver | 4,78893.4 2514.9 881.7 | 5,64595.3 2043.4  721.2 |
| Multi-organ transplant Liver only Liver-kidney  Other | 4,87195.0 2354.6 210.4 | 5,39091.0 4778.1  540.9 |
| Donor type Deceased Living | 4,87395.0 2545.0 | 5,71096.4 2113.6 |
| On life support | 3907.6 | 4407.4 |
| Diabetes | 1,01319.8 | 1,49425.2 |
| Portal vein thrombosis | 1813.5 | 59210.0 |
| Incident tumor found at tx | 1973.8 | 1642.8 |
| All recipients | 5,127100.0 | 5,921100.0 |
| LI4.5Characteristicsofadultlivertransplantrecipients, 2003and 2013  Adult liver transplant recipients, including retransplants. | | | | |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
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| liver | | | | | | | | | | | | | | | 13 |
|  | 100  80  60  40  20  0 | Induction agents  IL2-RA  T-cell depleting None | | Calcineurin inhibitor  100  80  60  Cyclosporine Tacrolimus  20  0 | | | | 100  80  60  40  20  0 | Anti-metabolite  Azathioprine Mycophenolate | | 100  80  60  40  20  0 | mTOR inhibitors  At transplant  1 year posttransplant | 100  80  60  40  20  0 | transplant  Steroids  At transplant  1 year posttransplant | |
| 03 05 07 09 11 13 | | | | 03 05 07 09 11 13 | | | | 03 05 07 09 11 13 | | | 03 05 07 09 11 13 | | 03 05 07 09 11 13 | |
| LI 4.6 Immunosuppression in ad  One-yearposttransplantdataarelimitedt sodium. IL2-RA, interleukin-2 receptor a | | | | | ult liver transplant recipients  opatientsalivewithgraftfunctionat1yearposttransplant. Mycophenolateincludesmycophenolatemofetilandmycophenolate ntagonist; mTOR, mammalian target of rapamycin. | | | | | | | | | | |
|  | % 1yr Medication post-tx | | | | % 2-3yr Medicationpost-tx | | | | | 6.25 2.00 2.30 4.00  in lab MELD and scores among liver ts, 2013  ansplants. DSA of trans- tatus 1A and 1B and inac- | | | | | |
| Sulfamethoxazole-Trimethoprim 45.7 Mycophenolate 43.5 Oxycodone 39.2 Prednisone 36.7 Valganciclovir 31.8 Hydrocodone 29.2 Furosemide 28.3 Ursodiol 24.2 Metoprolol Tartrate 21.9 Omeprazole 20.8 Amlodipine Besylate 20.7 Magnesium Oxide 19.4 Nystatin 19.0 Amoxicillin 17.1 | | | | Oxycodone53.8 Hydrocodone41.6 Mycophenolate35.9 Prednisone32.8 Amlodipine Besylate30.2 Amoxicillin25.3 Omeprazole25.3 Metoprolol Tartrate22.4 Sulfamethoxazole-Trimethoprim20.8 Furosemide20.5 Ursodiol18.4 Zolpidem Tartrate17.8 Azithromycin17.6 Ciprofloxacin17.5  by adult liver transplant recipi-  ho were matched to the IMS Health phar- e medication filled during year 1 or year 2 | | | | |
| LI 4.7 Top 15 medications filled ents, 2009  Adult liver transplant recipients, 2009, w macy claims database and had at least on or 3 posttransplant. | | | | |
|  | 21.7 | | | | 32.3 8 | | No data | | 0.00 1.00 |
| No data | | 23.2 25.0 28.0 30. | |
| LI 4.8 Median MELD scores for adult deceased donor liver recipients, by DSA, 2013  Deceased donor liver transplants. DSA of trans- plant center location. Status 1A and 1B and inac- tivestatusexcluded;allocationMELDscoreused. | | | | | LI 4.9 Differences allocation MELD transplant recipien  Deceased donor liver tr plant center location. S tive status excluded. | | | |

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| 14 OPTN/SRTR 2013 Annual Data Report | | | | | | |
| donor-recipientmatching  LI ma live  Don on poli liver | | | 40  30  20  10  0 | 0 1 2 3  HLA m | 456Unk.  ismatches  , B, and DR mis- t deceased donor nt recipients  en matching is based and split equivalences ed to deceased donor ly. | |
| 5.1 Total HLA A tches among adul r-kidney transpla  or and recipient antig OPTN antigen values cy as of 2013. Limit -kidney transplants on  Recipient + | |
|  | | Recipient ´ | Recipient unk. |  |
|  | Donor | D´D+D unk. | D´D+D unk. | | D´D+D unk. |
| CMV Deceased Living | 11.519.50.1 29.0 12.64.0 | 22.543.60.2 24.324.33.2 | | 0.81.70.0 1.31.10.2 |
| EBV Deceased Living | 0.611.00.1 1.4 9.41.0 | 2.959.50.1 4.951.89.8 | | 1.124.70.1  2.38.510.8 |
| HB core Deceased Living | 69.52.90.0 70.3 1.27.1 | 18.71.90.0 11.60.71.4 | | 6.70.20.0 4.50.03.2 |
| HB surface antigen Deceased Living | 91.20.00.1 82.5 0.07.3 | 4.80.00.0 2.40.00.3 | | 3.90.00.0 6.20.01.3 |
| HCV Deceased Living | 53.60.10.0 59.3 0.35.2 | 39.23.30.0 27.50.12.2 | | 3.60.10.0 3.80.01.6 |
| HIV Deceased Living | 91.70.00.0 78.0 0.07.7 | 0.50.00.0 0.30.00.1 | | 7.80.00.0  6.40.07.6 |
| LI 5.2 Adult liver donor-recipient serology matching, 2009-2013  Donor serology is reported on the OPTN Donor Registration Form and recipient serology on the OPTN Transplant Recipient Registration Form. Any evidence for a positive serology indicates posi- tive for that serology. If all fields are unknown, incomplete, or pending, the person is categorized as "unknown'' for that serology; otherwise, serology is assumed negative. CMV, cytomegalovirus; EBV, Epstein-Barr virus; HB, hepatitis B; HCV, hepatitis C virus; HIV, human immunodeficiency virus. | | | | | | |

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| liver | | | | | | | | | | | | 15 |
| 25  20  15  10  5 | | All deceased donors Living donors  DCD | | 100  80  60  40  20 | | | | | | 30-day 1-year 3-year 5-year 10-year | outcomes | |
| 02-03 04-05 06-07 08-09 10-11 12-13  LI 6.1 Graft failure within the first 90 days posttransplant among adult liver | | | | | | | 0 | | 91 93 95 97 99 01 03 05 07 09 11 13  Year | | | |
| transplant recipients  All-cause graft failure is identified from multiple datasources, includingtheOPTNTransplantRe- cipient Registration Form, the OPTN Transplant Recipient Follow-up Form, and death dates from the Social Security Administration. Transplants after September 30, 2013, are excluded due to in- sufficient follow-up.  All recipients | | | | | LI 6.2 Graft failure among adult liver transplant recipients: deceased donor  All adult recipients of deceased donor livers, in- cluding multi-organ transplants. Patients are fol- lowed until the earliest of retransplant, death, or December 31, 2013. Estimates computed with Cox proportional hazards models adjusted for age, sex, and race.  6-month failure by lobe | | | | | | | |
| 0.7  0.6  0.5  0.4  0.3  0.2  0.1  0 |  | | 6-month 1-year 3-year 5-year 10-year | | 0.35  0.3  0.25  0.2  0.15  0.1  0.05 | | | Right lobe Other lobe | | | | |
| 98 00 02 04 06 08 10 12  Year | | | | | | 98-00 01-03 04-06 07-09 10-12 | | | | | | |
| LI 6.3 Graft failure among adult liver transplant recipients: living donor  All adult recipients of living donor livers, including multi-organ transplants. Patients are followed until the earliest of retransplant, death, or December 31, 2013. Estimates computed with Cox proportional hazards models adjusted for age, sex, and race. | | | | | | | | | | | | |

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| 16 OPTN/SRTR 2013 Annual Data Report | | | | | | | | | | | |
| outcomes  Age | | | Primary diagnosis | | | Medical urgency | | | | | |
| 100  90  80  70  60  50  40  30 |  | 18-34 35-49 50-64 65+  All | 100  90  80  70  60  50  40  30 | | AHN  HCV  ALD  Chol. disease  Malignancy  Other/unknown | | 100  90  80  70  60  50  40  30 | | | Status 1A  MELD ³ 35 MELD 30-34 | MELD 15-29 MELD < 15 |
| 100  90  80  70  60  50  40  30 | 0 12 24 36 48 60  DCD  DBD DCD  0 12 24 36 48 60 | | | 100  90  80  70  60  50  40  30 | 0 12 24 36 48 60  HCC  HCC  non-HCC  0 12 24 36 48 60 | | | 100  90  80  70  60  50  40  30 | | 0 12 24 36 48 60  Retransplant  1st transplant Retransplant  0 12 24 36 48 60 | |
| LI 6.4 Graft survival among adult liver transplant recipients, 2008: deceased donors  Graft survival estimated using unadjusted Kaplan-Meier methods. Hepatocellular carcinoma (HCC) is stage T2. AHN, acute hepatic necrosis; ALD, alcoholic liver disease; Chol. disease, cholestatic disease. | | | | | | | | | | | |
| 100  90  80  70  60  50  40  30 | | | | | Primary diagnosis  AHN  HCV  ALD  Chol. disease  Malignancy  Other/unknown  0 12 24 36 48 60 | | | 100  90  80  70  60  50  40  30 | Medical urgency  Status 1A or MELD > 20 MELD £ 20  All  0 12 24 36 48 60 | | |
| LI 6.5 Graft survival among adult liver transplant recipients, 2008: living donors  Graft survival estimated using unadjusted Kaplan-Meier methods. AHN, acute hepatic necrosis; ALD, alco- holic liver disease; Chol. disease, cholestatic disease. | | | | | | | | | | | |

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| liver | | | | | | | | 17 |
| 80  60  40  20  0 | <18 18-49 50+  All  03 05 07 09 11 13 | | 40  30  20  10  0 | 18-34 35-49 50-64 65+  0 6 12 18 24 | | 2  1.5  1  0.5  0 | outcomes  EBV-  EBV+  EBV Unknown  All  0 12 24 36 48 60 | |
| LI 6.6 Recipients alive with a function- ing liver graft on June 30 of the year, by age at transplant  Recipients are assumed to be alive with function unless a death or graft failure is recorded. A recip- ientmayexperienceagraftfailureandberemoved from the cohort, undergo retransplant, and re- enter the cohort. | | LI 6.7 Incidence of first acute rejection among adult liver transplant recipients, by age, 2007-2011  Acute rejection is defined as a record of acute or hyperacute rejection, or a record on the OPTN Transplant Recipient Registration or Transplant Recipient Follow-up Form of an anti-rejection drug being administered. Only the first rejec- tion event is counted. Cumulative incidence is estimated using the Kaplan-Meier competing risk method. | | | LI 6.8 Incidence of PTLD among adult liver transplant recipients, by recipient EBV status at transplant, 2007-2011  Cumulative incidence is estimated using the Kaplan-Meier competing risk method. Posttrans- plant lymphoproliferative disorder (PTLD) is identified as a reported complication or cause of deathontheOPTNTransplantRecipientFollow- up Form or the Posttransplant Malignancy Form as polymorphic PTLD, monomorphic PTLD, or Hodgkin disease. Only the earliest date of PTLD diagnosis is considered. EBV, Epstein-Barr virus. | | | |

data behind the figures can be downloaded from our website, at [srtr.transplant.hrsa.gov](http://srtr.transplant.hrsa.gov)

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| --- | --- | --- | --- |
| 18 OPTN/SRTR 2013 Annual Data Report | | | |
| outcomes | | | |
|  | Cancer site | Rate per  Observed 100,000 PY Lower CIUpper CI |  |
| Lip  Mouth, tongue, other oral cavity and pharynx Salivary gland  Nasopharynx  Oropharynx including tonsil  Esophagus  Stomach  Small intestine  Colorectum  Anus, anal canal and anorectum  Liver  Other biliary  Pancreas  Larynx  Lung and bronchus  Soft tissue including heart  Melanoma of the skin  Other non-epithelial skin  Breast  Cervix uteri  Corpus uteri  Ovary  Vagina and other female genital organs Vulva  Prostate  Testis  Penis and other male genital organs Urinary bladder, ureter, and other urinary organs Kidney  Eye and orbit  Brain, cranial nerves, and other nervous system Thyroid  Hodgkin lymphoma  Non-Hodgkin lymphoma  Myeloma  Acute lymphocytic leukemia  Chronic lymphocytic leukemia  Acute myeloid leukemia  Acute monocytic leukemia  Chronic myeloid leukemia  Mesothelioma  Kaposi sarcoma  Miscellaneous  Tumors with poorly specified morphology | 4 4.7 1.312.1  3339.026.854.8  4 4.71.312.1  2 2.4 0.38.5  26 30.720.145.0  15 17.7 9.929.2  15 17.7 9.929.2  5 5.91.913.8  64 75.7 58.396.6  1315.48.226.3  32 37.8 25.953.4  5 5.9 1.913.8  21 24.8 15.437.9  13 15.4 8.226.3  137 162.0136.0191.5  10 11.85.721.7  48 56.841.975.3  13 15.48.226.3  58 188.3 143.0243.5  7 22.6 9.146.6  6 19.4 7.142.2  4 12.9 3.533.1  722.69.146.6  12 38.8 20.167.8  107 200.2 164.1242.0  3 5.6 1.216.3  611.24.124.3  2226.016.339.4  36 42.5 29.858.9  8 9.4 4.118.6  1416.59.027.7  16 18.9 10.830.7  6 7.12.615.4  159 188.4160.2220.0  17 20.1 11.732.1  55.91.913.8  11.20.06.6  10 11.85.721.7  11.20.06.6  4 4.71.312.1  1 1.2 0.06.6  13 15.48.226.3  91 107.6 86.6132.1  3946.132.863.0 |
| LI 6.9 Posttransplant cancer among liver transplant recipients, 2000-2009 Reported cancer data linked to OPTN data from California, Colorado, Connecticut, Georgia, Hawaii, Illinois, Iowa, Michigan, New Jersey, New York, North Carolina, Texas, Florida, and Utah state cancer registries. Reported cancers are counted once per type per person posttrans- plant. Denominator: person-years posttransplant for residents of the above states who under- wenttransplant2000-2009. Sex-specificdenominatorsareusedtocomputeratesforsex-specific cancers. | | | |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| liver | | | | | | | 19 |
| 1000  800  600  400  200  0 | New patients | Active Inactive  All | 1200  1000  800  600  400  200  0 | | Patients on list on Dec 31 each year  Active Inactive  All | pediatrictransplant | |
| 03 05 07 09 11 13 | | | | 03 05 07 09 11 13 | | | |
| LI 7.1 Pediatric candidates waiting for liver transplant  A new patient is one who first joined the list during the given year, without having been listed in a previous year. Previously listed candidates who underwent transplant and were subsequently relisted are considered new. Candidates concurrently listed at multiple centers are counted once. Concurrently listed candidates who are active at any program are considered active; those who are inactive at all programs are considered inactive.  LI 7.2 Distribution of pediatric candidates waiting for liver transplant  Candidates waiting for transplant any time in the given year. Candidates listed concurrently at multiple cen- ters are counted once. Age is determined at the later of listing date or January 1 of the given year. Pediatric candidates aged 12 to 17 years can be assigned MELD or PELD scores. Time on the waiting list is determ- ined at the earlier of December 31 or removal from the waiting list. Medical urgency status is the most severe during the year. Active and inactive patients are included. | | | | | | | |

data behind the figures can be downloaded from our website, at [srtr.transplant.hrsa.gov](http://srtr.transplant.hrsa.gov)

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| --- | --- | --- | --- | --- | --- | --- | --- |
| 20 OPTN/SRTR 2013 Annual Data Report | | | | | | | |
| pediatrictransplant | | | | | | | |
|  | | 2003 | 2013 |  |  | 2011 2012 2013 |  |
|  |  | N % | N% | Patients at start of year | 661650581 |
| Age < 1 1-5 6-10 11-17 18+ | 797.4 35733.5 16715.7 28827.0 17416.3 | 366.2 17830.5 10117.3 16027.4 10818.5 | Patients added during year Patients removed during year Patients at end of year  Removal reason  Deceased donor transplant  Living donor transplant Patient died Patient refused transplant Improved, tx not needed Too sick for transplant Other | | 685651705 696720709 650581577  479475499  595342 283534 151 789786 181915 333632 | |
| Sex Female Male | 56052.6 50547.4 | 29650.8 28749.2 |
| Race White Black  Hispanic  Asian  Other/unknown | 63960.0 16115.1 18117.0 625.8 222.1 | 33156.8 8314.2  13022.3 223.8  172.9 |
| Citizenship US citizen Non-citizen resident  Non-citizen non-resident  Other/unknown | 1,00394.2 191.8 292.7 141.3 | 55795.5 40.7  61.0  162.7 | LI 7.4 Liver transplant waitlist activity among pediatric candidates  Candidatesconcurrentlylistedatmorethanonecen- ter are counted once, from the time of earliest list- ing to the time of latest removal. Candidates who are listed, undergo transplant, and are relisted are coun- ted more than once. Candidates are not considered to be on the list on the day they are removed; counts onJanuary1maydifferfromcountsonDecember31 of the prior year. Candidates listed for multi-organ transplants are included. | | | |
| Liver tx history First transplant Retransplant | 87982.5 18617.5 | 53892.3 457.7 |
| Blood type A B  AB  O | 33231.2 14013.1 292.7 56453.0 | 17129.3 7713.2  172.9  31854.5 |
| Waiting time < 1 year 1-< 2 years  2-< 3 years  3-< 4 years  4-< 5 years  5+ years | 33131.1 15814.8 13212.4 989.2 777.2 26925.3 | 24742.4 7613.0  498.4  437.4  356.0  13322.8 |
| Medical urgency Status 1/1A/1B MELD 35+  MELD 30-34  MELD 15-29  MELD < 15  Inactive | 262.4 171.6 141.3 888.3 42840.2 49246.2 | 122.1  457.7  396.7  12120.8 17429.8 19232.9 |
| Multi-organ Liver alone Liver-kidney  Liver-pancreas-intestine  Liver-heart  Other | 97291.3 100.9 60.6  20.2 757.0 | 49785.2 142.4  5910.1  10.2  122.1 |
| All candidates | 1,065100.0 | 583100.0 |
| LI 7.3 Characteristics of pediatric candidates on the liver transplant waiting list on December 31, 2003, and Decem- ber 31, 2013  Candidates waiting for transplant on December 31, 2003, and December 31, 2013, regardless of first listing date; active/inactive status is on this date, and multiple listings are not counted. Pediatric candidates aged 12 to 17 years can be assigned MELD or PELD scores.  at more than one center are counted once, from the time of earliest listing to the time of latest re- moval. DD, deceased donor; LD living donor. | | | | | | | |

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| liver | | | | | | | | | | | | | | | 21 |
| 300  250  200  150  100  50  0 | Age | | < 1  1-5  6-10 | 11-17  All | | 6000  5000  4000  3000  2000  1000  0 | | | | Medical urgency | | | Status 1A Status 1B PELD 35+ PELD 30-34  PELD 15-29 PELD < 15 Inactive | pediatrictransplant | |
| 03 05 07 09 11 13 | | | | | | | | | 03 05 07 09 11 13 | | | | | | |
| LI 7.6 Deceased donor liver transplant rates among active pediatric waitlist candidates  Transplant rates are computed as the number of deceased donor transplants per 100 patient-years of active waiting in a given year. Age is calculated on the first active listing date in a given year. Pediatric candidates aged 12 to 17 years can be assigned MELD or PELD scores. | | | | | | | | | | | | | | | |
| 50  40  30  20  10  0 | Age | < 1  1-5  6-10 11-17  All | | | 50  40  30  20  10  0 | | | | | Race | | White Black  Hispanic  Asian  Other/unknown | | | |
| 02-03 04-05 06-07 08-09 10-11 12-13 | | | | | | | | 02-03 04-05 06-07 08-09 10-11 12-13 | | | | | | | |
| LI7.7Pretransplantmortalityratesamongpediatric livertransplantcandidates, byage  Mortality rates are computed as the number of deaths per 100 patient-years of waiting in the given year. Can- didates concurrently listed at multiple centers are counted once. Deaths after removal from the waiting list are not counted. Age is calculated on the later of listing date or January 1 of the given year. | | | | | | | | | | | | | | | |
| 800  600  400  200  0 | Deceased donor Living donor  All  03 05 07 09 11 13 | | | | | | | 60  50  40  30  20  10  0 | | | Related  Distantly related Unrelated directed Other  03 05 07 09 11 13 | | | | |
| LI 7.8 Pediatric liver transplants, by donor type  Recipients of liver transplant. | | | | | | | LI 7.9 Pediatric liver transplants from living donors  Relationship of living donor to recipient is as in- dicated on the OPTN Living Donor Registration Form. | | | | | | | | |

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| 22 OPTN/SRTR 2013 Annual Data Report | | | | | | |
| pediatrictransplant | | | | | | |
|  | | 2001-2003 | 2011-2013 | 8 | | |
|  |  | N % | N% |
| Age < 1 1-5 6-10 11-17 | 48028.2 61536.1 19511.5 41324.3 | 43827.5 60237.7 21413.4 34121.4 | 6 | | EBV-  EBV+  EBV Unknown  All |
| Sex Female Male | 93254.7 77145.3 | 82351.6  77248.4 | 4 | | |
| Race White Black  Hispanic  Asian  Other/unknown | 93454.8 31718.6 35420.8 754.4 231.4 | 84553.0  24815.5  35922.5  1026.4  412.6 | 2  0 | 0 12 24 36 48 60 | |
| Primary diagnosis Acute hepatic necrosis HCV  Cholestatic disease  Malignancy  Other/unknown | 21312.5 261.5 74043.5 18310.7 54131.8 | 19912.5  40.3  72745.6  21413.4  45128.3 | LI 7.11 Incidence of PTLD among pediatric liver transplant recipients, by recipient EBV status at transplant, 2001-2011  Cumulative incidence is estimated using the Kaplan-Meier competing risk method. Posttrans- plant lymphoproliferative disorder (PTLD) is identified as a reported complication or cause of death on the OPTN Transplant Recipient Follow-up Form or on the Posttransplant Ma- lignancy Form as polymorphic PTLD, mono- morphic PTLD, or Hodgkin disease. Only the earliest date of PTLD diagnosis is considered. EBV, Epstein-Barr virus. | | |
| Liver tx history First transplant Retransplant | 1,46786.1 23613.9 | 1,44990.8 1469.2 |
| Blood type A B  AB  O | 61135.9 23914.0 623.6 79146.4 | 53433.5  21413.4  774.8  77048.3 |
| Insurance Private Medicare  Medicaid  Other government  Other/unknown | 90753.3 342.0 59835.1 1015.9 633.7 | 70644.3  130.8  68342.8  1428.9  513.2 |
| Waiting time < 31 days 31-60 days  61-90 days  3-< 6 months  6-< 12 months  1-< 2 years  2-< 3 years  3+ years  Unknown | 61736.2 22012.9 1589.3 26215.4 23513.8 1186.9 321.9 412.4 201.2 | 61438.5  23814.9  1479.2  27016.9  18211.4  925.8  251.6  271.7  00.0 |
| Medical condition Hospitalized: ICU Hospitalized: not ICU  Not hospitalized  Unknown | 53431.4 29017.0 87951.6 00.0 | 37923.8  28117.6  93458.6  10.1 |
| Medical urgency Status 1/1A/1B MELD 35+  MELD 30-34  MELD 15-29  MELD < 15  Other/unknown | 69340.7 824.8 382.2 21712.7 26915.8 40423.7 | 54734.3  24215.2  20612.9  39825.0  20212.7  00.0 |
| Procedure type Whole liver Partial liver  Split liver | 1,05962.2 40023.5 24414.3 | 1,02164.0 31519.7  25916.2 |
| Donor type Deceased Living | 1,45085.1 25314.9 | 1,44390.5 1529.5 |
| Previous abdominal surgery | 86650.9 | 83452.3 |
| Portal vein thrombosis | 804.7 | 835.2 |
| Incident tumor found at tx | 60.4 | 40.3 |
| Spontaneous bacterial peritonitis | 513.0 | 322.0 |
| ABO compatibility Comp./iden. Incompatible | 1,67398.2 301.8 | 1,54997.1 462.9 |
| All recipients | 1,703100.0 | 1,595100.0 |
| LI 7.10 Characteristics of pediatric liver transplant recipients, 2001- 2003 and 2011-2013  Liver transplant recipients, including retransplants. As MELD/PELD scoring began in 2002, the 2001-2003 cohort includes many recipients of unknown status. Pediatric can- didates aged 12 to 17 years can be assigned MELD or PELD scores. HCV, hepatitis C virus. | | | | | | |

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| liver | | | | | | | | | | | | | | | | | | | 23 |
|  | |  | | | | |  | | | | pediatrictransplant | | | | | | | | |
| 100  80  60  40  20  0 | Induction agents  IL2-RA  T-cell depleting None | | 100  80  60  40  20  0 | Calcineurin inhibitor  Cyclosporine Tacrolimus | | | 100  80  60  40  20  0 | Anti-metabolite  Azathioprine Mycophenolate | | | | 100  80  60  40  20  0 | mTOR inhibitors  At transplant  1 year posttransplant | | | 100  80  60  40  20  0 | Steroids | At transplant  1 year posttransplant | |
| 03 05 07 09 11 13 | | | | 03 05 07 09 11 13 | | | | 03 05 07 09 11 13 | | | | | 03 05 07 09 11 13 | | | | 03 05 07 09 11 13 | | |
| LI 7.12 Immunosuppression in pediatric liver transplant recipients  One-yearposttransplantdataarelimitedtopatientsalivewithgraftfunctionat1yearposttransplant. Mycophenolateincludesmycophenolatemofetilandmycophenolate sodium. IL2-RA, interleukin-2 receptor antagonist; mTor, mammalian target of rapamycin. | | | | | | | | | | | | | | | | | | | |
| 100  90  80  70  60  50 | 30-day 1-year 3-year 5-year 10-year  91 93 95 97 99 01 03 05 07 09 11 13  Year | | | | | 100  90  80  70  60 | | | Year | 30-day 1-year 3-year 5-year 10-year | | | | 40  30  20  10  0 | <1  1-5  6-10 11-17  0 6 12 18 24 | | | | |
| LI 7.13 Graft survival among pediatric liver transplant recipients: deceased donor  All pediatric recipients of deceased donor livers, including multi-organ transplants. Patients are followed until the earliest of retransplant, death, or December 31, 2013. Estimates computed with Cox proportional hazards models reporting, ad- justed for age, sex, and race. | | | | | LI 7.14 Graft survival among pediatric livertransplantrecipients: livingdonor  All pediatric reciients of living donor livers, in- cluding multi-organ transplants. Patients are fol- lowed until the earliest of retransplant, death, or December 31, 2013. Estimates computed with Cox proportional hazards models reporting, ad- justed for age, sex, and race. | | | | | | | | | LI 7.15 Incidence of first acute rejec- tion among pediatric liver transplant recipients, by age, 2007-2011  Acute rejection is defined as a record of acute or hyperacute rejection, or a record on the OPTN Transplant Recipient Registration Form or Transplant Recipient Follow-up Form of an anti-rejection drug being administered. Only the first rejection event is counted. Cumulative inci- dence is estimated using the Kaplan-Meier com- peting risk method. | | | | | |

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| 24 OPTN/SRTR 2013 Annual Data Report | | | | | | | | |
| pediatrictransplant | 100  90  80  70  60 | Age | <1  1-5  6-10 11-17  All | 100  90  80  70  60 | | | Primary diagnosis | AHN  Chol. disease Malignancy  Other/unknown |
| 100  90  80  70  60 | | 0 12 24 36 48 60  Medical urgency  Status 1A, 1B, or PELD > 20 PELD £ 20  0 12 24 36 48 60 | | | 100  90  80  70  60 | | 0 12 24 36 48 60  Retransplant  1st transplant Retransplant  0 12 24 36 48 60 | |
| LI 7.16 Graft survival among pediatric liver transplant recipients: deceased donors, 2004-2008  Graft survival estimated using unadjusted Kaplan-Meier methods. Pediatric candidates aged 12 to 17 years can be assigned MELD or PELD scores. AHN, acute hepatic necrosis; Chol. disease, cholestatic disease; HCV, hepatitis C virus. | | | | | | | | |
| 6  5  4  3  2  1  0 | | 1 year after transplant  Graft failure  Infection  Cardio/cerebrovascular Malignancy  Respiratory  0 2 4 6 8 10 12 | | | 6  5  4  3  2  1  0 | 5 years after transplant  Graft failure  Infection  Cardio/cerebrovascular Malignancy  Respiratory  0 1 2 3 4 5 | | |
| LI 7.17 Cumulative incidence of death by cause among pediatric liver recipients, 2007- 2011  Primary cause of death is as reported on the OPTN Transplant Follow-up Form. Other causes of death in- clude hemorrhage, trauma, noncompliance, unspecified other, unknown, etc. Cumulative incidence is estim- ated using Kaplan-Meier competing risk methods. | | | | | | | | |

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| liver | 25 |
| LI 8.1 Centers performing adult transplants or listing active liver candidates, within DSAs, 2011- 2013 | |

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| 26 OPTN/SRTR 2013 Annual Data Report |
| LI8.2Centersperformingpedia-  tric transplants or listing active  livercandidates,withinDSAs,2011-  2013 |

|  |  |
| --- | --- |
| liver | 27 |
| List of Figures/Tables  waiting list  LI 1.1 Adults waiting for liver transplant  LI 1.2 Distribution of adults waiting for liver transplant  LI 1.3 Characteristics of adults on the liver transplant waiting list on December 31, 2003, and December 31, 2013  LI 1.4 Deceased donor liver transplant rates among active adult waitlist candidates  LI 1.5 Deceaseddonorlivertransplantratesper100waitlistyearsamongactiveadultcandidates, byDSA,2012-2013 LI 1.6 Percentage of adult waitlisted candidates who underwent deceased donor liver transplant within 5 years, by  DSA, 2008  LI 1.7 Liver transplant waitlist activity among adults  LI 1.8 Three-year outcomes for adults waiting for liver transplant, new listings in 2010  LI 1.9 Median months to liver transplant for waitlisted adults, by medical urgency at listing LI 1.10 Pretransplant mortality rates among adults waitlisted for liver transplant  deceased donation  LI 2.1 Deceased donor liver donation rates  LI 2.2 Deceased donor liver donation rates (per 1000 deaths), by state, 2009-2011 LI 2.3 Rates of organs recovered for transplant and not transplanted  LI 2.4 DCD liver donors  LI 2.5 Cause of death among deceased liver donors  living donation  LI 3.1 Liver transplants from living donors, by donor relation  LI 3.2 Living donor liver donation rates  LI 3.3 Living donor liver transplant graft type  LI 3.4 Rehospitalization in the first 6 weeks, 6 months, and 1 year among living liver donors, 2008-2012 LI 3.5 Biliary complications among living liver donors, 2009-2013  LI 3.6 Vascular complications requiring intervention among living liver donors, 2009-2013  LI 3.7 Other complications requiring intervention among living liver donors, 2009-2013  LI 3.8 Re-operation among living liver donors, 2009-2013  LI 3.9 BMI among living liver donors  LI 3.10 Living liver donor deaths, 2009-2013  transplant  LI 4.1 Total liver transplants  LI 4.2 Liver transplants  LI 4.3 Use of DCD livers among adult recipients, by recipient age  LI 4.4 Percentage of adult DCD liver transplants by DSA, 2011-2013  LI 4.5 Characteristics of adult liver transplant recipients, 2003 and 2013  LI 4.6 Immunosuppression in adult liver transplant recipients  LI 4.7 Top 15 medications filled by adult liver transplant recipients, 2009  LI 4.8 Median MELD scores for adult deceased donor liver recipients, by DSA, 2013  LI 4.9 Differences in lab MELD and allocation MELD scores among liver transplant recipients, 2013  donor-recipient matching  LI 5.1 Total HLA A, B, and DR mismatches among adult deceased donor liver-kidney transplant recipients  LI 5.2 Adult liver donor-recipient serology matching, 2009-2013 | |

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| --- |
| 28 OPTN/SRTR 2013 Annual Data Report |
| outcomes  LI 6.1 Graft failure within the first 90 days posttransplant among adult liver transplant recipients  LI 6.2 Graft failure among adult liver transplant recipients: deceased donor  LI 6.3 Graft failure among adult liver transplant recipients: living donor  LI 6.4 Graft survival among adult liver transplant recipients, 2008: deceased donors  LI 6.5 Graft survival among adult liver transplant recipients, 2008: living donors  LI 6.6 Recipients alive with a functioning liver graft on June 30 of the year, by age at transplant  LI 6.7 Incidence of first acute rejection among adult liver transplant recipients, by age, 2007-2011  LI 6.8 Incidence of PTLD among adult liver transplant recipients, by recipient EBV status at transplant, 2007-2011 LI 6.9 Posttransplant cancer among liver transplant recipients, 2000-2009  pediatric transplant  LI 7.1 Pediatric candidates waiting for liver transplant  LI 7.2 Distribution of pediatric candidates waiting for liver transplant  LI 7.3 CharacteristicsofpediatriccandidatesonthelivertransplantwaitinglistonDecember31,2003,andDecember  31, 2013  LI 7.4 Liver transplant waitlist activity among pediatric candidates  LI 7.5 Three-year outcomes for pediatric candidates waiting for liver transplant among new listings, 2010 LI 7.6 Deceased donor liver transplant rates among active pediatric waitlist candidates  LI 7.7 Pretransplant mortality rates among pediatric liver transplant candidates, by age  LI 7.8 Pediatric liver transplants, by donor type  LI 7.9 Pediatric liver transplants from living donors  LI 7.10 Characteristics of pediatric liver transplant recipients, 2001-2003 and 2011-2013  LI 7.11 Incidence of PTLD among pediatric liver transplant recipients, by recipient EBV status at transplant, 2001-  2011  LI 7.12 Immunosuppression in pediatric liver transplant recipients  LI 7.13 Graft survival among pediatric liver transplant recipients: deceased donor  LI 7.14 Graft survival among pediatric liver transplant recipients: living donor  LI 7.15 Incidence of first acute rejection among pediatric liver transplant recipients, by age, 2007-2011 LI 7.16 Graft survival among pediatric liver transplant recipients: deceased donors, 2004-2008  LI 7.17 Cumulative incidence of death by cause among pediatric liver recipients, 2007-2011  transplant center maps  LI 8.1 Centers performing adult transplants or listing active liver candidates, within DSAs, 2011-2013  LI 8.2 Centers performing pediatric transplants or listing active liver candidates, within DSAs, 2011-2013 |