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2014 U.S. organ and tissue transplant cost estimates and discussion





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This 2014 report represents Milliman's triennial summary of estimated U.S. average costs per member per month (PMPM), billed charges, and utilization related to the 30 days prior and 180 days after transplant admission for treatment for organ and tissue transplants. For charges pre- and post-transplant admission, we include all medical costs associated with the transplant patient.

I. OVERVIEW

This 2014 report represents Milliman's triennial summary of estimated U.S. average costs per member per month (PMPM), billed charges, and utilization related to the 30 days prior and 180 days after transplant admission for treatment for organ and tissue transplants. For charges pre- and post-transplant admission, we include all medical costs associated with the transplant patient.

Organ transplants include single-organ transplants such as heart, intestine, kidney, liver, lung, pancreas, and a number of multiple-organ transplants.

Tissue transplants include bone marrow and cornea transplants. We split the bone marrow estimates by donor method: autologous, where the donor is the recipient; and allogeneic, where the donor may be related or unrelated to the recipient.

Highlights of this report include:

- **Section II:** 2014 PMPM costs are estimated to be \$7.41 and \$9.79 for under-age-65 and ages-65-and-over recipients, respectively. These PMPM costs reflect average annual increases of 6% and 10% compared with those in our 2011 report. The moderate trend in the under-age-65 is due to a 0% composite utilization trend and a 6% composite billed charge trend. However, there is a wide range of annual utilization and charge trends by type of transplant, with trends ranging from -23% to 7% for utilization and -2% to 23% for charge. The higher trend for the ages-65-and-over population was mainly due to the difference in the mix of transplants between the under-age-65 and ages-65-and-over populations. Hospital lengths of stay for most transplants have not changed much since the 2011 report. While billed charges have increased about 6% per year, many recipients or health plans do not pay billed charges because of transplant provider networks.
- **Section IV:** Survival rates have generally shown mixed improvement and decline by transplant from those in our 2011 report.

II. COSTS PMPM, CHARGES, AND UTILIZATION

Table 1 summarizes the estimated U.S. average 2014 transplant costs PMPM for the under-age-65 and ages-65-and-over populations. "Costs" means the product of utilization and billed charges. Table 2 summarizes the estimated U.S. average 2014 billed charges per transplant.

The estimated number of transplants shown in Table 1 reflects removal of transplants provided to foreign citizens. To determine utilization rates, we assumed 2014 U.S. under-age-65 and ages-65-and-over population estimates of 277.0 million and 45.4 million, respectively. These population estimates are based on U.S. government resident population census estimates as of July 1, 2010, and their projections to 2015.

Charges for pre-transplant, follow-up, outpatient (OP) immunosuppressants and other drugs as used in our 2011 and 2014 reports cover the time period from 30 days pre-transplant to 180 days post-transplant discharge for follow-up and outpatient immunosuppressant and other drugs. Also for these categories, we included all medical costs associated with the transplant patient, not just those related to the transplant.

Charges for pre-transplant, follow-up, outpatient (OP) immunosuppressants and other drugs as used in our 2011 and 2014 reports cover the time period from 30 days pre-transplant to 180 days post-transplant discharge for follow-up and outpatient immunosuppressant and other drugs.

TABLE 1: ESTIMATED U.S. AVERAGE 2014 TRANSPLANT COSTS PER MEMBER PER MONTH (PMPM)

TRANSPLANT	UNDER AGE 65					AGES 65 AND OVER		
	TOTAL		ESTIMATED			ESTIMATED		ESTIMATED COSTS PMPM
	ESTIMATED NUMBER OF TRANSPLANTS	ESTIMATED BILLED CHARGES	ESTIMATED NUMBER OF TRANSPLANTS	ANNUAL UTILIZATION PER 1,000,000	ESTIMATED COSTS PMPM	ESTIMATED NUMBER OF TRANSPLANTS	ANNUAL UTILIZATION PER 1,000,000	
SINGLE-ORGAN/TISSUE								
BONE MARROW - ALLOGENEIC	8,709	\$930,600	7,934	28.64	\$2.22	775	17.06	\$1.32
BONE MARROW - AUTOLOGOUS	12,460	378,000	9,794	35.36	1.11	2,666	58.68	1.85
CORNEA	49,988	28,600	17,396	62.80	0.15	32,592	717.35	1.71
HEART	2,320	1,242,200	1,946	7.03	0.73	374	8.23	0.85
INTESTINE	51	1,547,200	50	0.18	0.02	1	0.02	0.00
KIDNEY	15,978	334,300	12,837	46.35	1.29	3,141	69.13	1.93
LIVER	5,723	739,100	4,972	17.95	1.11	751	16.53	1.02
LUNG - SINGLE	681	785,000	376	1.36	0.09	305	6.71	0.44
LUNG - DOUBLE	1,220	1,037,700	970	3.50	0.30	250	5.50	0.48
PANCREAS	149	317,500	149	0.54	0.01	0	0.00	0.00
MULTIPLE-ORGAN								
HEART-LUNG	29	2,313,600	29	0.10	0.02	0	0.00	0.00
INTESTINE WITH OTHER ORGANS	49	1,844,700	49	0.18	0.03	0	0.00	0.00
KIDNEY-HEART	85	1,840,300	74	0.27	0.04	11	0.24	0.04
KIDNEY-PANCREAS	773	558,600	771	2.78	0.13	2	0.04	0.00
LIVER-KIDNEY	471	1,190,300	405	1.46	0.14	66	1.45	0.14
OTHER MULTI-ORGAN	38	1,620,800	36	0.13	0.02	2	0.04	0.01
TOTAL					\$7.41			\$9.79

This report estimates total PMPM costs for under-age-65 recipients that are \$0.26 lower than the 2014 Health Cost Guidelines as a result of using a different population in the Guidelines. Most of this decrease is attributed to autologous bone marrow, cornea, liver and kidney.

Differences from Milliman's 2014 Health Cost Guidelines

Users of both this report and the 2014 Milliman Health Cost Guidelines™ may notice differences in the estimated under-age-65 PMPM costs between the two sources. This report estimates total PMPM costs for under-age-65 recipients that are \$0.26 lower than the 2014 Health Cost Guidelines as a result of using a different population in the Guidelines. Most of this decrease is attributed to autologous bone marrow, cornea, liver and kidney.

Charges

Table 2 shows estimated U.S. average 2014 billed charges per transplant. Categories making up the total charges are defined below.

- **30 days pre-transplant:** These charges include all medical costs for the transplant patient incurred during the 30 days prior to the transplant hospital admission, which can include medical costs not related to the transplant. These charges could include history of the candidate, noting indications and contraindications for the transplant; comprehensive physical, psychological, and laboratory evaluations, including blood and tissue typing and serum and cell compatibility matching; cross-matching for donor compatibility; hepatitis and HIV screening; antibody screening; medical and psychological testing; lab tests; and X-rays. Because of the time period between evaluation and transplant, evaluation costs are exceedingly difficult to identify in claim databases, which are our primary source of charge data. Therefore, it is not practical to separate these charges into those related and not related to the transplant because of the short 30-day time period defined.
- **Procurement:** This includes donated organ or tissue recovery services, which may include retrieval, preservation, transportation, and other acquisition costs. This category definition is unchanged from that used in our 2011 report.
- **Hospital transplant admission:** This covers facility charges for the transplant only. Any re-admissions within 180 days of the transplant discharge date are included in the 180 Days Post-Transplant Discharge category, whether related to the transplant or not. Hospital services include room and board and ancillary services such as use of surgical and intensive care facilities, inpatient nursing care, pathology and radiology procedures, drugs, supplies, and other facility-based services. Hospital services may also include use of immunosuppressive and other drugs provided during the hospital stay.
- **Physician during transplant:** These are charges for professional non-facility services while the recipient is hospitalized for the transplant, including surgery procedures and other services identified by CPT or HCPCS procedure codes.
- **180 days post-transplant discharge:** This covers post-discharge facility and professional non-facility services, including any hospital readmissions. Services may also include regular lab tests, regular outpatient visits, and evaluation and treatment of complications. These services can include both those related and not related to the transplant.
- **OP immunosuppressants and other Rx:** This category includes all outpatient drugs prescribed from discharge for the transplant admission to 180 days post-transplant discharge, including immunosuppressants, other drugs related to the transplant, and other drugs not related to the transplant. Anti-anxiety medications, antifungal antibiotics, anti-virals, colony-stimulating factors, gastrointestinal drugs, hypertension drugs, and post-operative pain management drugs are examples of drugs other than outpatient immunosuppressants related to the transplant that could also be used in treatment. Immunosuppressant drug charges in this report include assumed discounts of 60% and 15% from average wholesale prices for generics and brand drugs, respectively, which is similar to the Health Cost Guidelines assumptions for all prescription drugs.

TABLE 2: ESTIMATED U.S. AVERAGE 2014 BILLED CHARGES PER TRANSPLANT

TRANSPLANT	30 DAYS PRE-TRANSPLANT	PROCUREMENT	HOSPITAL TRANSPLANT ADMISSION	PHYSICIAN DURING TRANSPLANT	180 DAYS POST-TRANSPLANT DISCHARGE	OP IMMUNO-SUPPRESSANTS AND OTHER RX	TOTAL
SINGLE-ORGAN/TISSUE							
BONE MARROW – ALLOGENEIC	\$57,600	\$55,700	\$479,600	\$23,400	\$290,300	\$24,000	\$930,600
BONE MARROW – AUTOLOGOUS	56,300	10,700	212,300	10,800	81,800	6,100	378,000
CORNEA	0	0	20,000	8,600	0	0	28,600
HEART	50,900	97,200	771,500	88,600	198,400	35,600	1,242,200
INTESTINE	78,900	92,100	952,900	112,400	272,700	38,200	1,547,200
KIDNEY	23,200	84,400	119,600	20,500	66,800	19,800	334,300
LIVER	37,300	95,000	399,100	53,100	128,900	25,700	739,100
LUNG – SINGLE	21,800	90,200	435,200	44,600	165,800	27,400	785,000
LUNG – DOUBLE	30,700	129,700	566,900	59,100	219,800	31,500	1,037,700
PANCREAS	12,100	93,800	104,300	18,800	67,700	20,800	317,500
MULTIPLE-ORGAN							
HEART-LUNG	88,500	168,700	1,607,100	108,700	304,200	36,400	2,313,600
INTESTINE WITH OTHER ORGANS	88,600	236,400	1,045,400	132,800	297,400	44,100	1,844,700
KIDNEY-HEART	76,100	136,000	1,162,100	132,500	296,500	37,100	1,840,300
KIDNEY-PANCREAS	35,900	123,300	227,000	35,200	114,700	22,500	558,600
LIVER-KIDNEY	60,800	161,500	644,500	86,700	210,300	26,500	1,190,300
OTHER MULTI-ORGAN	76,700	177,600	926,100	116,500	288,600	35,300	1,620,800

Basis of utilization and charge estimates

We based utilization estimates on data from the U.S. Organ Procurement and Transplantation Network (OPTN), the Scientific Registry of Transplant Recipients (SRTR), the Center for International Blood and Marrow Transplant Registry (CIBMTR), and the Eye Bank Association of America. None of the entities on which we relied for data have reviewed or approved our estimates. The content of this report is the responsibility of the authors alone and does not necessarily reflect the views or policies of the Department of Health and Human Services, nor does mention of trade names, commercial products, or organizations imply endorsement by the U.S. government.

We developed charge estimates for 30 days pre-transplant, physician during transplant, 180 days post-transplant discharge, and non-immunosuppressant drugs based on Milliman proprietary claim data. We based procurement charge estimates on our judgment and 2011 data from Arkansas, Arizona, Iowa, Kentucky, Massachusetts, Maryland, North Carolina, New Jersey, New York, Oklahoma, Oregon, Tennessee, Texas, Vermont, and Washington state hospital data, trended to 2014 and normalized to a national average basis using Milliman area relativity research.

We based hospital charge estimates on 2011 Arkansas, Arizona, California, Colorado, Florida, Hawaii, Iowa, Illinois, Kentucky, Massachusetts, Maryland, Michigan, North Carolina, Nevada, New Jersey, New Mexico, New York, Oklahoma, Oregon, Rhode Island, South Carolina, Tennessee, Texas, Utah, Vermont, Washington state, and Wisconsin hospital data normalized to a national average basis.

Our bone marrow charge estimates do not reflect any savings from outpatient treatment because we lacked sufficient outpatient bone marrow data.

We developed charge estimates for 30 days pre-transplant, physician during transplant, 180 days post-transplant discharge, and non-immunosuppressant drugs based on Milliman proprietary claim data.

We developed cornea hospital charges from 2011 Wisconsin hospital inpatient and outpatient data. The 2011 Wisconsin hospital data showed that outpatient cornea transplants represent over 99% of these transplants and just under 99% of billed charges.

We assumed no outpatient immunosuppressant charges for autologous bone marrow and cornea transplants. For all other transplants, we estimated when outpatient immunosuppressant coverage began by using estimated 2011 hospital lengths of stay. Average wholesale prices were based on the Medi-Span database and our judgment to project these charges to 2014. We assumed average dosing regimens from MedlinePlus.

Hospital lengths of stay

Table 3 shows that estimated hospital lengths of stay generally have been fairly stable since our 2011 report.

TABLE 3: HOSPITAL LENGTHS OF STAY BY TRANSPLANT (DAYS)

TRANSPLANT	2011 REPORT	2014 REPORT
	2008 STATE DATABASES	2011 STATE DATABASES
SINGLE-ORGAN/TISSUE		
BONE MARROW - ALLOGENEIC	33.1	33.3
BONE MARROW - AUTOLOGOUS	20.4	19.7
HEART	40.1	40.2
INTESTINE	69.4	78.8
KIDNEY	7.3	6.9
LIVER	20.9	21.0
LUNG - SINGLE	18.9	21.2
LUNG - DOUBLE	28.1	29.5
PANCREAS	9.4	8.8
MULTIPLE-ORGAN		
HEART-LUNG	44.7	41.7
KIDNEY-HEART	46.0	53.5
KIDNEY-PANCREAS	12.4	10.9
LIVER-KIDNEY	27.5	32.7

Annual number of transplants

Tables 4A, 4B, and 4C show the annual number of transplants performed in the United States from 2010 to 2014. These numbers include all ages and transplants for non-U.S. citizens. We project increases in the numbers of some transplants from 2013 to 2014 because of projected population increases even though the expected transplant rate per million people may decrease for various types of transplants.

We based Tables 4A and 4B on OPTN data as of September 27, 2013. We estimated the split of lung transplants between single and double lung using 2011 state hospital databases and our judgment. We based the bone marrow estimates in Table 4C on North American data from the CIBMTR. We based the cornea estimates in Table 4C on information from the 2012 Eye Banking Statistical Report.

TABLE 4A: SINGLE-ORGAN TRANSPLANTS PERFORMED IN THE UNITED STATES

YEAR	HEART	INTESTINE	KIDNEY	LIVER	LUNG-SINGLE	LUNG-DOUBLE	PANCREAS
2010	2,255	65	16,438	5,814	631	1,130	267
2011	2,232	66	16,313	5,853	648	1,162	226
2012	2,277	55	15,935	5,720	625	1,120	191
2013*	2,304	57	16,114	5,783	665	1,193	171
2014*	2,338	54	16,107	5,780	685	1,229	150

Above numbers include ages 65+ and foreign citizens
* Milliman estimates

TABLE 4B: MULTIPLE-ORGAN TRANSPLANTS PERFORMED IN THE UNITED STATES

YEAR	HEART-LUNG	INTESTINE WITH OTHER ORGANS	KIDNEY-HEART	KIDNEY-PANCREAS	LIVER-KIDNEY	OTHER MULTI-ORGANS
2010	42	86	60	828	388	26
2011	27	63	72	795	413	31
2012	29	51	78	801	462	34
2013*	29	51	81	785	457	36
2014*	29	49	85	777	471	36

Above numbers include ages 65+ and foreign citizens
* Milliman estimates

TABLE 4C: TISSUE TRANSPLANTS PERFORMED IN THE UNITED STATES

YEAR	BONE MARROW-AUTOLOGOUS	BONE MARROW-ALLOGENEIC	CORNEA
2010	10,115	7,458	42,642
2011	10,600	7,887	46,196
2012	11,200	8,100	46,684
2013*	11,809	8,415	48,538
2014*	12,460	8,709	49,988

Above numbers include ages 65+ and foreign citizens
* Milliman estimates

Bone marrow classifications

Table 5 shows that bone marrow transplants can be classified according to graft source: bone marrow, peripheral blood stem cell, bone marrow cell plus peripheral blood stem cell, or umbilical cord blood stem cell. Generally speaking, bone marrow cell graft use continues to decrease and peripheral blood stem cell graft use continues to increase.

TABLE 5: BONE MARROW TRANSPLANT GRAFT SOURCES, 2006-2010

GRAFT SOURCES				
AGE AT TIME OF TRANSPLANT	BONE MARROW	PERIPHERAL BLOOD STEM CELL	BONE MARROW PLUS PERIPHERAL BLOOD STEM CELL	CORD BLOOD STEM CELL
AUTOLOGOUS				
UNDER 21	ABOUT 6%	ABOUT 93%	ABOUT 1%	N/A
21+	ABOUT 1%	ABOUT 98%	ABOUT 1%	N/A
ALLOGENEIC				
UNDER 21	ABOUT 50%	ABOUT 25%	N/A	ABOUT 25%
21+	ABOUT 15%	ABOUT 80%	N/A	ABOUT 5%

Source: 2012 CIBMTR Summary Slides_2012-S

Actual PMPM transplant costs may vary from our estimates for a variety of reasons that are beyond the scope of our report.

Actual costs versus Milliman estimates

As we mentioned in Section II, "costs" means the product of utilization and billed charges. We did not research the actual costs that hospitals and physicians incur to provide transplants, as that would involve proprietary arrangements. Actual PMPM transplant costs may vary from our estimates for a variety of reasons that are beyond the scope of our report:

- The transplant cost estimates assume full insurance coverage; patient cost-sharing and benefit limitations would reduce full coverage costs.
- Costs may vary by geographic area and transplant center due to volume or incidence of complications.
- Growth in the average number of organs procured per donor and number of centers may change costs, as long as suitable donor organs and tissue can continue to be found.
- Private insurance, Medicare, Medicaid, and uninsured recipient costs may vary by transplant; for example, Medicare covers a significant portion of kidney transplants through the End Stage Renal Disease program.
- Federal and state legislative efforts and private initiatives may change utilization and costs.
- Changes in selection criteria may affect costs.
- Costs may vary by underlying diagnosis and/or disease state.
- Medical management may reduce costs, particularly with respect to hospital charges.
- Costs may be reduced with use of cost-control mechanisms such as greater donor and recipient selectivity by centers, critical pathways to reduce inpatient lengths of stay, and aggressive use of outpatient therapies and other more cost-effective treatments.

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- Wide availability of mechanical, artificial, or cloned organs, experimental procedures becoming accepted practice, or other innovations may affect costs.
 - Cost estimates may be subject to change if the OPTN data and other data relied on changes due to future data submissions or corrections.
 - Administration costs and profit margins will vary, and were not considered in our analysis.
 - Any estimate of costs after the first year should reflect adjustments for trend, survival, and probability of re-transplantation.

Actual charges compared to Milliman billed charge estimates

“Charges” in this report refer to the amount billed, which may not be the actual amount paid for the transplant services due to the presence of case rates, discounts, or other negotiated reimbursement arrangements. Significant reductions from billed charge levels may be obtained and the chances for successful treatment may be maximized by directing patients to specific centers. Actual charges will likely vary for private insurers, Medicare, or Medicaid.

Negotiated case rates may combine hospital and physician charges. Procurement charges may be included in the negotiated case rate, but usually the procurement charges reflect slight, if any, discounts from billed levels.

We have observed that case rates do not typically cover pre-transplant medical services and maintenance therapy outpatient immunosuppressants. Some case rates may include follow up costs within a specified time period such as the first 90 days after discharge. Services and charges not defined under a case rate may be provided by the patient’s normal provider network.

Some transplant centers address charge variation by developing separate payment rates by diagnosis or by patient disease state. Our charge estimates should be adjusted to reflect diagnosis, disease state, or other variables specific to a given situation.

An outlier provision may provide additional payment beyond the case rate after a specified number of days in the hospital or after a certain level of billed charges. The outlier provision may pay for hospital days at a discount from billed charges or at a per diem rate. Centers may also have outlier payments for physician services.

Actual outpatient immunosuppressant charges will vary from our estimates for several reasons:

- Actual hospital lengths of stay will vary from our estimates, which affects the amount of time that outpatient immunosuppressants are required.
- Drug discounts other than those assumed in this report will yield different estimates.
- Actual dosing regimens will vary from the dosing regimens assumed.
- The actual use and prevalence of single and multiple outpatient immunosuppressant regimens will vary from our estimates.

The transplant charge estimates do not reflect differences in charges due to age. Billed transplant charges may vary for pediatric patients, adults under the age of 65, and patients ages 65 and over.

Charges may continue after the first year and may include continued testing and evaluation, medical services for transplant rejection, and outpatient immunosuppressants.

“Charges” in this report refer to the amount billed, which may not be the actual amount paid for the transplant services due to the presence of case rates, discounts, or other negotiated reimbursement arrangements.

III. PRIMARY DIAGNOSES

Table 6 summarizes the most common primary indications for transplantation by organ/tissue. Organ data is based on data from the OPTN/SRTR 2011 Annual Report. Bone marrow data is based on 2010 North American data from the CIBMTR 2012 Summary Slides. Cornea data comes from the 2012 Eye Banking Statistical Reports. Since our 2011 report, the order and magnitude of the top indications has changed slightly for several types of transplants.

TABLE 6: INDICATIONS FOR TRANSPLANT

ORGAN OR TISSUE	MOST COMMON PRIMARY DIAGNOSIS AND PREVALENCE	SECOND-MOST COMMON PRIMARY DIAGNOSIS AND PREVALENCE	NEXT MOST COMMON PRIMARY DIAGNOSIS AND PREVALENCE
SINGLE-ORGAN/TISSUE			
BONE MARROW - ALLOGENEIC	ACUTE MYELOGENOUS LEUKEMIA (35%)	ACUTE LYMPHOCYTIC LEUKEMIA (15%)	MYELOYDYSPLASTIC SYNDROME/ MYELOPROLIFERATIVE DISEASE (13%)
BONE MARROW - AUTOLOGOUS	MULTIPLE MYELOMA (55%)	NON-HODGKIN'S LYMPHOMA (25%)	HODGKIN'S DISEASE (9%)
CORNEA	KERATOCONUS (20%)	REPEAT CORNEAL TRANSPLANT (12%)	POST-CATARACT SURGERY EDEMA (10%)
HEART	CARDIOMYOPATHY (52%)	CORONARY ARTERY DISEASE (32%)	CONGENITAL DISEASE OR DEFECT (10%)
INTESTINE	SHORT GUT SYNDROME: OTHER (58%)	SHORT GUT SYNDROME: NECROTIZING ENTEROCOLITIS (12%)	SHORT GUT SYNDROME: CONGENITAL (11%)
KIDNEY	DIABETES (25%)	HYPERTENSION (22%)	GLOMERULONEPHRITIS (19%)
LIVER	HEPATITIS C VIRUS (HCV) (21%)	MALIGNANCY (20%)	ALCOHOLIC LIVER DISEASE (16%)
LUNG (SINGLE AND DOUBLE)	RESTRICTIVE LUNG DISEASE - IDIOPATHIC PULMONARY FIBROSIS (49%)	OBSTRUCTIVE LUNG DISEASE - COPD/EMPHYSEMA (32%)	CYSTIC FIBROSIS (14%)
PANCREAS	DIABETES MELLITUS - TYPE I (84%)	DIABETES MELLITUS - TYPE II (4%)	DIABETES MELLITUS - TYPE UNKNOWN (1%)
MULTIPLE-ORGAN			
HEART-LUNG	PRIMARY PULMONARY HYPERTENSION (33%)	CONGENITAL HEART DEFECT - WITH SURGERY (17%)	IDIOPATHIC PULMONARY FIBROSIS (13%)
KIDNEY-PANCREAS	DIABETES MELLITUS - TYPE I (86%)	DIABETES MELLITUS - TYPE II (7%)	DIABETES MELLITUS - TYPE UNKNOWN (1%)

IV. WAITING TIMES AND SURVIVAL RATES

Waiting times

Table 7 summarizes transplant waiting times in days by organ, based on data from the OPTN/SRTR 2011 annual report. The waiting times reflect a patient who has been registered on a waiting list and takes into account all the things that can happen to the patient after wait listing, such as receiving a transplant, being removed from the waiting list, and dying. No data is shown for bone marrow because we were unable to find a data source for tissue transplant waiting times.

The percentile-based waiting times shown in Table 7 are estimates of the time in which 50% of patients received a transplant. For example, a heart transplant patient placed on a waiting list in 2011 had a 50% chance of being transplanted within 172 days.

Table 7 also shows that waiting times vary by organ over time. Waiting times may also vary by other characteristics not shown. Waiting time estimates shown in Table 7 can differ from the estimates shown in our 2011 report because of additions, deletions, or other revisions that OPTN may have made to its data or the manner in which it measures the wait.

The percentile-based waiting times shown in Table 7 are estimates of the time in which 50% of patients received a transplant.

TABLE 7: WAITING TIMES BY TRANSPLANT

ORGAN	2004	2006	2008	2011@
50TH PERCENTILE (i.e., MEDIAN) TIME TO TRANSPLANT IN DAYS				
HEART	166	111	168	180
INTESTINE	212	257	142	207
KIDNEY	1,219	*	*	877
LIVER	400	286	*	232
LUNG (SINGLE AND DOUBLE)	792	134	148	181
PANCREAS ALONE	376	436	*	236
PANCREAS AFTER KIDNEY	552	887	*	472
HEART-LUNG#	284	142	72	NA
KIDNEY-PANCREAS	428	444	*	414

* Not determined due to insufficient follow-up; fewer than this percentile have been transplanted.

#These values are the 25th percentile as all 50th percentile values were not determined. Heart-Lung data not available for 2011.

@ 2011 values are based on average days, not median.

Survival rates

Table 8 summarizes one-year, three-year, five-year and 10-year patient survival rates by transplant. The organ transplant survival rates for patients transplanted during 2002 through 2007 generally show mixed improvement and decline by transplant from those in our 2011 report, and are based on the OPTN/SRTR 2011 annual report.

Bone marrow transplant survival rates are based on 2000 to 2010 CIBMTR survival rate data. Autologous and allogeneic survival rates vary significantly by individual diagnosis, age, type of donor, and disease stage. We developed composite autologous bone marrow estimates reflecting survival rates for multiple myeloma, non-Hodgkin's lymphoma, Hodgkin's disease, and acute myelogenous leukemia, which represented more than 91% of all North American autologous bone marrow transplants in 2010. The composite allogeneic bone marrow estimates we developed reflect survival rates for acute myelogenous leukemia, acute lymphoblastic leukemia, myelodysplasia, non-Hodgkin's lymphoma, aplastic anemia, chronic myelogenous leukemia, multiple myeloma, and Hodgkin's disease, which represent more than 87% of all allogeneic bone marrow transplants in 2008. The CIBMTR has not reviewed or approved our composite survival estimates.

TABLE 8: PATIENT SURVIVAL RATES BY TYPE AND YEAR OF TRANSPLANT

ORGAN	ONE-YEAR		THREE-YEAR		FIVE-YEAR		TEN-YEAR
	2014 REPORT	2011 REPORT	2014 REPORT	2011 REPORT	2014 REPORT	2011 REPORT	2014 REPORT
HEART	87%	88%	80%	79%	75%	72%	N/A
INTESTINE	74	79	54	59	52	48	34
KIDNEY	93	96	85	91	74	85	48
LIVER	86	86	78	78	69	72	53
LUNG	86	83	68	63	56	47	27
PANCREAS	81	79	63	63	55	46	41
HEART-LUNG	N/A	66	N/A	50	N/A	39	N/A
KIDNEY-PANCREAS	96	95	89	90	84	86	67
TISSUE	2000-2010	1998-2008	2000-2010	1998-2008	2000-2010	1998-2008	
BONE MARROW - AUTOLOGOUS	85%-89%	83%-87%	67%-71%	64%-68%	54%-58%	51%-55%	
BONE MARROW - ALLOGENEIC	61%-65%	58%-62%	48%-52%	46%-50%	43%-47%	42%-46%	

TABLE 9A: 2012 RECIPIENT DEMOGRAPHICS: SINGLE-ORGAN/TISSUE TRANSPLANTS

	BONE MARROW	HEART	INTESTINE	KIDNEY	LIVER	LUNG	PANCREAS
GENDER							
MALE	54%	70%	59%	61%	66%	60%	53%
FEMALE	46	30	41	39	34	40	47
TOTAL	100%	100%	100%	100%	100%	100%	100%
RACE							
WHITE	71%	66%	64%	52%	70%	83%	78%
BLACK	9	20	23	25	11	8	11
HISPANIC	14	9	11	16	14	7	10
ASIAN	3	4	1	6	4	2	0
OTHER	3	1	1	2	1	0	1
TOTAL	100%	100%	100%	100%	100%	100%	100%
AGE							
UNDER 1	1%	5%	4%	0%	2%	0%	0%
1-5	5	4	33	1	3	0	0
6-10	3	3	11	1	1	0	0
11-17	4	5	2	3	2	1	0
18-34	15	9	16	13	5	11	16
35-49	18	18	20	26	15	12	57
50-64	38	42	15	38	58	47	27
65+	16	15	0	18	13	28	0
TOTAL	100%	100%	100%	100%	100%	100%	100%

TABLE 9B: 2014 RECIPIENT DEMOGRAPHICS: MULTIPLE-ORGAN TRANSPLANTS

	HEART-LUNG	INTESTINE WITH OTHER ORGANS	KIDNEY-HEART	KIDNEY- PANCREAS	LIVER-KIDNEY	OTHER MULTI- ORGAN
GENDER						
MALE	45%	57%	79%	64%	64%	56%
FEMALE	55	43	21	36	36	44
TOTAL	100%	100%	100%	100%	100%	100%
RACE						
WHITE	70%	71%	59%	66%	65%	74%
BLACK	17	18	19	20	15	15
HISPANIC	10	11	14	12	16	9
ASIAN	3	0	5	1	3	0
OTHER	0	0	3	1	1	2
TOTAL	100%	100%	100%	100%	100%	100%
AGE (AT TIME OF TRANSPLANT)						
UNDER 1	0%	14%	0%	0%	0%	0%
1-5	0	29	0	0	2	0
6-10	0	4	1	0	0	0
11-17	7	10	1	0	1	15
18-34	24	18	9	21	5	24
35-49	24	2	17	57	17	26
50-64	41	22	56	21	58	26
65+	3	2	15	0	16	9
TOTAL	100%	100%	100%	100%	100%	100%

V. 2012 RECIPIENT DEMOGRAPHICS

Tables 9A and 9B highlight 2012 transplant recipient demographics. The demographic data and categories are based on OPTN data as of September 27, 2013, for solid organs and 2011 state hospital databases for bone marrow.

Deceased donor data reflects only donors recovered by U.S. organ procurement organizations.

VI. DONOR FACTS AND DATA

Deceased donor

Deceased donor data reflects only donors recovered by U.S. organ procurement organizations. United Network for Organ Sharing defines a recovered, deceased donor as one from whom at least one vascularized solid organ—heart, intestine, kidney, liver, lung, or pancreas—was recovered for

TABLE 10: PRIMARY ORGAN TRANSPLANTS FROM DECEASED DONORS

YEAR	HEART	INTESTINE	KIDNEY	LIVER	LUNG	PANCREAS	HEART- LUNG	KIDNEY- PANCREAS
2009	2,211	178	10,442	6,101	1,659	375	30	854
2010	2,332	150	10,622	6,009	1,769	349	42	828
2011	2,322	128	11,043	6,095	1,821	287	27	795
2012	2,378	106	10,868	6,010	1,753	242	29	801

transplantation. Hearts recovered for heart valves are not counted.

Table 10 summarizes U.S. deceased donor counts from 2009 to 2012, based on OPTN data as of September 27, 2013. Unlike Tables 1, 4A, and 4B, heart, intestine, kidney, liver, lung, and pancreas transplants in Table 10 include multiple-organ transplants with that organ. Heart-lung and kidney-pancreas transplants are the exception, as those transplants are counted separately and only counted once.

The most common transplants using living donors include bone marrow, kidney, and liver.

Living donor

The most common transplants using living donors include bone marrow, kidney, and liver. However, intestine, lung, pancreas, and kidney-pancreas transplants can also use living donors. Living lung donors have a segment of one lung removed for transplants. Lung lobes do not regenerate the donated segment, but the average decrease of 15% in the living donor's lung capacity generally yields minimal physical limitations for the donor. The liver can regenerate the donated segment. A donor may live with one kidney with little danger because the remaining kidney enlarges to do the work that both kidneys previously shared.

TABLE 11: PRIMARY ORGAN TRANSPLANTS FROM LIVING DONORS

YEAR	INTESTINE	KIDNEY	LIVER	LUNG	PANCREAS	KIDNEY-PANCREAS
2009	2	6,387	219	1	0	0
2010	1	6,277	282	0	0	0
2011	1	5,771	247	1	0	0
2012	0	5,617	246	1	0	0

Living donor data includes living donors from whom organs were transplanted in the United States. The number of living donor transplants may differ from the number of living donors because living donors might donate segments from more than one organ, or there may be multiple donors for one transplant.

Table 11 summarizes U.S. living donor counts from 2009 to 2012, based on OPTN data as of September 27, 2013. Unlike Tables 1, 4A, and 4B, intestine, kidney, liver, lung, and pancreas transplants include multiple-organ transplants with that organ. Kidney-pancreas transplants are the exception, as these transplants are counted separately and only counted once.

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