

Since the first organ transplant was performed in Boston in 1954, organ transplantation has become a viable option for many individuals with chronic disease. Most recently, in July 2014, vascularized composite allografts (VCAs) were added to the list of organs available for transplant (VCAs are body parts such as hands, joints, face, etc.). Unfortunately, there are never as many organs available for transplant as there are patients in need. There are also questions of organ compatibility (blood and tissue types) and patient priority (access to organs based on greatest medical need) (United Network for Organ Sharing [UNOS], 2020b). A total of 15,157 people donated one or more organs from January through November 2020 resulting in 35,279 transplants performed, yet 108,618 people were still awaiting a transplant as of November 17, 2020 (Table 1) (Organ Procurement and Transplantation Network (OPTN), 2020b).

ORGAN PROCUREMENT AND TRANSPLANTATION NETWORK (OPTN)

Due to the need to organize data and match donors with patients, the United Network for Organ Sharing (UNOS) developed an organ matching computer database in 1977. Revolutionizing and nationalizing the organ transplant network, this system facilitated access for both doctors and patients to information about organ availability and need (UNOS, 2020b). The Organ Procurement and Transplantation Network was established through a congressional act in 1984. “The act established the Organ Procurement and Transplantation Network (OPTN) to maintain a national registry for organ matching. The act

also called for the network to be operated by a private, non-profit organization under federal contract” (OPTN, n.d.b). UNOS is the only organization under federal contract to operate the OPTN since its inception.

TRANSPLANT RECIPIENTS

Patients with medical conditions that may warrant an organ transplant are referred by their physician to a transplant center. A “transplant team,” which typically includes a transplant coordinator, physician, surgeon, financial coordinator, insurance case manager, dietician, and social worker, evaluates the patient (Transplant Living, 2020c). If the patient is determined to be a good transplant candidate, his/her medical profile is added to the national organ transplant waiting list which is maintained by the OPTN and operates using UNOS computer databases. This waiting list is not a ranked list but rather a “pool” of transplant candidates (UNOS, 2020a).

TABLE 1 ORGAN TRANSPLANT WAITING LIST (AS OF 11/17/2020)

<i>Organ Type</i>	<i>US</i>	<i>TX</i>
Kidney	91,876	8,547
Liver	12,103	1,322
Heart	3,458	318
Lung	984	81
Kidney & Pancreas	1,721	98
Pancreas	893	30
Intestine	224	0
Heart & Lung	39	4
Craniofacial/face/scalp	4	1
Abdominal Wall	4	0
Uterus	6	0
Upper Limb	6	0
ALL	108,618	10,155
(OPTN, 2020b)		

ORGAN DONORS

An organ donor is someone from whom at least one organ or tissue is recovered for the purpose of transplantation. Donors are designated either living or deceased (UNOS, 2020c). Living donors can give a kidney, or a portion of a lung, liver, pancreas or intestine. “A few living donor uterus transplants have been performed as part of clinical trials” (Transplant Living, 2020b).

Organ	Living Donor	Deceased Donor	Total
Kidney	6,864	22,206	29,070
Liver	524	9,151	9,675
Lung	0	5,252	5,252
Heart	0	3,635	3,635
Pancreas	0	1,374	1,374
Intestine	0	86	86
ALL	7,388	41,704	49,092

(OPTN, 2020a)

Donor registries are confidential databases that provide access to authorized individuals confirming consent to organ donation. Until recently, not all donor registries were deemed “consensual.” First Person Consent legislation was required in order for a donor registry to be considered as giving consent to a hospital to harvest organs for transplantation. The Revised Uniform Anatomical Gift Act, effective September 1, 2009, now serves that purpose and a donor may give consent by authorizing a statement or symbol indicating the intent to donate on driver’s licenses and identification cards as well as wills and other documents (Statutes, n.d.). All 50 states (and the District of Columbia) currently have donor registries, and they are all tied to the Department of Motor Vehicles for easy registration access to the public (U.S. Department of Health and Human Services [HHS], n.d.). Additionally, the Act states that “in the absence of an express, contrary indication by the donor, a person other than the donor is barred from making, amending, or revoking an anatomical gift of a donor's body or part if the donor made an anatomical gift” (Statutes, n.d.).

MATCHING DONORS AND RECIPIENTS

There are five steps involved in the process of matching a donor with a recipient:

- An organ is donated: organ size, blood type, tissue type, genetic information about the donor and the condition of the organ are reported in UNOS.
- UNOS computes a list of compatible patients: the computer ranks candidates by compatibility with the organ and other allocation policies.
- The most compatible candidate’s transplant center is notified.
- The transplant center’s team of doctors must refuse or accept the organ. This is decided on the basis of: medical criteria, organ condition, candidate condition, staff and patient availability, and organ transportation. By law, the medical team has only one hour to accept or decline the organ.
- The organ is either accepted or declined. If it is declined, it is offered to the next most compatible candidate, and so on until it is placed with a recipient.

(OPTN, n.d.a)

Each organ type has a different set of criteria for distribution taking into consideration the unique medical considerations involved.

Generally, priority is given to patients that are:

- Closest biological match
- Most urgent, medically
- Children
- Close proximity
- Longest wait time (often used as tie breaker)

(UNOS, 2020a)

Since the waiting list is a “pool” of candidates versus an actual list, waiting times for individuals can vary widely. The table below depicts how long current transplant candidates have been on the list:

TABLE 3 TRANSPLANT WAITING TIME (ALL ORGANS) (AS OF NOVEMBER 17, 2020)		
	National	Texas
All time	119,272	10,155
< 30 days	4,898	525
30 to <90 days	7,726	747
90 days to < 6 months	8,719	798
6 months to < 1 year	16,823	1,605
1 year to < 2 years	27,380	2,760
2 years to < 3 years	17,954	1,708
3 years to < 5 years	19,415	1,605
5 or more years	16,357	956
(OPTN, 2020b)		

As the table illustrates, almost 50% of those waiting for transplant have been waiting for two years or more. The primary reason for such a long waiting period is the shortage of organs available for transplantation. Every day, 17 people on the waiting list for an organ transplant die due to lack of available organs (OPTN, n.d.a). From January through October 2020, 4,630 people died awaiting an organ transplant, 403 of whom were in Texas (OPTN, 2020a).

TABLE 4 PATIENTS WHO DIED AWAITING TRANSPLANT JANUARY THROUGH OCTOBER 2020	
Organ	# of Patients
Kidney	3,297
Liver	890
Heart	204
Lung	126
Heart/Lung	7
Kidney & Pancreas	73
Pancreas	23
Intestine	10
Total	4,630
(OPTN, 2020b)	

PEDIATRIC TRANSPLANTS

Children are not exempt from the need for an organ transplant. 4.5% of all the transplants from January through November 2020 were received by children under the age of 18. On November 17, 2020, 1,882 pediatric patients (ages 17 and below) were on the waiting list for one or more organs. During that same period, pediatric transplants accounted for 2.2% of all

transplants performed in the San Antonio area (OPTN, 2020b). As a result of the Children’s Health Act of 2000, the OPTN adopted several measures to address organ allocation to pediatric patients. Since then, many specific aspects of organ allocation to children were updated:

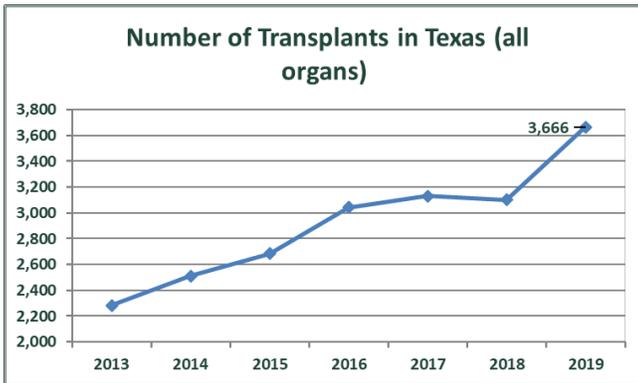
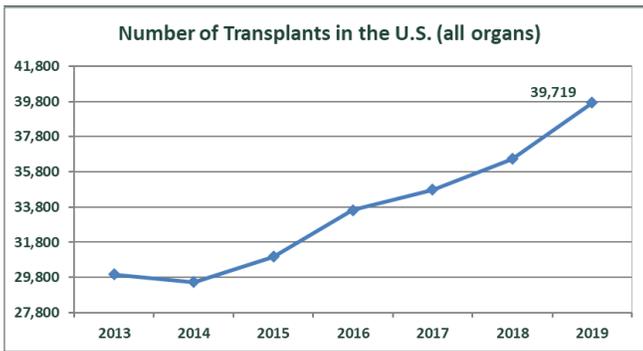
- Kidneys from donors less than 35 years old are offered to pediatric patients first
- Changes in liver allocations giving additional preference to pediatrics were made in 2012
- Pediatric donor lungs are now offered first to pediatric patients
- Pediatric candidates awaiting heart transplants are given priority and preferential allocation of all pediatric hearts since 2009
- Effective March 2017, pediatric donor lungs will be offered to candidates under 18 years old in wider geographic areas (OPTN, 2017; 2020c)

Typically, pediatric patients fare as well or better than adult patients. Five year survival rates for children between 6-10 years old are the best among all types of renal transplants. That same age group also has the best outcomes among liver recipients and the best five year survival rate of all heart transplants (OPTN, 2020b).

TRANSPLANTS IN TEXAS

Since the year 2000, transplants both in Texas and in the United States have been steadily increasing, reducing the number of deaths in people awaiting transplants. In 2019, the national number of transplants performed reached an all-time high of 39,719. Unfortunately, it came nowhere near reaching the over 108,000 people on the waiting list (OPTN, 2020b).

According to data from the OPTN (2020b), the following graphs represent trends in the growth of transplant surgeries performed both nationally and in Texas from 2013 through 2019.



Currently, four of the 25 Texas facilities that actively perform organ transplants are in the San Antonio area:

- CHRISTUS Santa Rosa Medical Center (CSRMC)
- Methodist Specialty and Transplant Hospital (MSTH)
- University Children’s Health (UCH)
- University Hospital (UH)

Center	Adult (Ages 18+)	Pediatric (Ages <1-17)	Total
CSRMC	0	0	0
MSTH	390	0	390
UCH	0	13	13
UH	199	0	199
Total	589	13	602

(OPTN, 2020b)

SURVIVAL

Organ recipients who survive organ transplants are generally able to live normal lives with the aid of medications. One major risk associated with post-transplant patients is organ rejection, which occurs when the body of the patient does not recognize the new organ and considers it a threat. The body begins to attack it with white blood cells, attempting to destroy the organ as it would any other invader such as

a virus. To reduce the likelihood of an organ being rejected, immunosuppressants are administered post-transplant surgery in order to stop the immune system (white blood cells) from attacking the organ. However, this does not exclude the possibility of the body ultimately rejecting the organ, infections, or other illnesses (Transplant Living, 2020a).

Organ	1 Year	5 Years
Kidney	97.2%	86.7%
Pancreas	91.9%	80.1%
Pancreas/Kidney	97.6%	88.4%
Liver	91.2%	75.8%
Intestine	81.1%	58.0%
Heart	90.8%	78.1%
Lung	87.7%	55.5%
Heart and Lung	80.0%	48.9%

(OPTN, 2020b)

Health precautions and regular doctor visits are essential to reduce the risk of further health complications. There are a variety of health concerns affecting transplant recipients including:

- Anxiety and depression
- Diabetes
- GI upset
- Gout
- High cholesterol
- Hypertension
- Shingles
- Cancer

“Cancer is more common in transplant patients than the general population. Research has shown that it is likely for patients who live for at least 10 years after a transplant to develop some type of cancer, including skin cancer” (Transplant Living, 2020a).

COVID-19 CONSIDERATIONS

The Board off Directors of the OPTN have taken emergency measures to safeguard the health of both those waiting for transplant and transplant recipients:

- “Updates to Candidate Data
 - If a transplant hospital is unable to bring a candidate in for updated lab testing

- they are allowed to reuse previously reported results for that candidate
 - Only applies to candidates already on the waiting list
 - *Relaxed Data Submission Requirements for Follow-up Forms*
 - Since patients may not be able to see their doctor, transplant hospitals are not required to complete follow-up data
 - *Modifications to Kidney Wait Time Initiation for Non-Dialysis Candidates*
 - Kidney patients who are not on dialysis can qualify for wait time based on certain lab values, but wait time does not begin until the patient is added to the waiting list
 - During the pandemic, transplant hospitals may have difficulty completing all necessary testing and doctors' visits in order to list these kidney patients
 - Once listed, transplant hospitals can now apply to change the patient's wait time to begin on the date the program selected the patient as a candidate before all necessary testing requirements were met
 - *COVID-19 Infectious Disease Testing in DonorNet®*
 - COVID-19 donor testing status and results were added to DonorNet to help OPOs and transplant programs communicate this important information in a standard way”
- (OPTN, 2020a)

REFERENCES

- Organ Procurement and Transplantation Network (OPTN). (n.d.a). *About transplantation*. Retrieved July 12, 2019, from <https://optn.transplant.hrsa.gov/learn/about-transplantation/>
- Organ Procurement and Transplantation Network (OPTN). (n.d.b). *History and NOTA*. Retrieved November 18, 2020, from <https://optn.transplant.hrsa.gov/governance/about-the-optn/history-nota/>

Organ Transplantation Research Brief

- Organ Procurement and Transplantation Network (OPTN). (2017). *Modify pediatric lung policy*. Retrieved from <https://optn.transplant.hrsa.gov/governance/public-comment/modify-pediatric-lung-policy/>
- Organ Procurement and Transplantation Network (OPTN). (2020a). *COVID-19 Emergency Policies and Data Collection*. Retrieved from <https://optn.transplant.hrsa.gov/governance/public-comment/covid-19-emergency-policies-and-data-collection/>
- Organ Procurement and Transplantation Network (OPTN). (2020b). *Data*. Retrieved from <https://optn.transplant.hrsa.gov/data/>
- Organ Procurement and Transplantation Network (OPTN). (2020c). *Policies*. Retrieved from https://optn.transplant.hrsa.gov/media/1200/optn_policies.pdf#nameddest=Policy_05
- Statutes. (n.d.). *Health and safety code: Chapter 692A Revised uniform anatomical gift act*. Retrieved November 18, 2020, from <http://www.statutes.legis.state.tx.us/Docs/HS/htm/H.S.692A.htm>
- Transplant Living. (2020a). *After the transplant*. Retrieved from <https://transplantliving.org/after-the-transplant/>
- Transplant Living. (2020b). *Becoming a living donor*. Retrieved from <https://transplantliving.org/living-donation/being-a-living-donor/>
- Transplant Living. (2020c). *People you should know*. Retrieved from <https://transplantliving.org/before-the-transplant/getting-on-the-list/people-you-should-know/>
- United Network for Organ Sharing (UNOS). (2020a). *Frequently asked questions*. Retrieved from <https://www.unos.org/transplantation/faqs/>
- United Network for Organ Sharing (UNOS). (2020b). *History*. Retrieved from <https://unos.org/transplant/history/>
- United Network for Organ Sharing (UNOS). (2020c). *Living donation*. Retrieved from <https://www.unos.org/donation/living-donation/>
- U.S. Department of Health and Human Services (HHS). (n.d.). *Sign up to be an organ donor*. Retrieved November 18, 2020, from <https://www.organdonor.gov/register.html>