

1: Am J Transplant. 2007;7(5 Pt 2):1376-89.

Liver and intestine transplantation in the United States, 1996-2005.

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The number of liver transplants performed yearly has slowly and steadily increased over the last 10 years, reaching 6441 procedures in 2005. The number of living donor liver transplants performed rose steadily from 1996 to 2001, when it peaked at 519; since 2003 there have been approximately 320 such procedures performed each year. The continual increase in the size of the waiting list for a liver transplant, which peaked in 2001 at 14 897 patients, was interrupted in 2002 by the implementation of the allocation system based on the model for end-stage liver disease and pediatric end-stage liver disease (MELD/PELD). Activity in all areas of intestinal transplantation continues to increase. One-year patient and graft survival following intestine-alone transplantation now seem to be superior to outcomes following liver-intestine transplantation. Other topics covered here include the recent 'Share 15' component of the MELD allocation system; liver transplantation following donation after cardiac death; simultaneous liver-kidney transplantation and waiting list and post-transplant outcomes for both liver and intestine transplantation, broken out by a variety of clinical and demographic factors.

Publication Types:

Research Support, U.S. Gov't, P.H.S.

Mesh Terms:

Adolescent
 Adult
 Age Distribution
 Child
 Demography
 Female
 Hepatectomy
 Humans
 Intestines/transplantation*
 Liver Transplantation/statistics & numerical data*
 Liver Transplantation/trends
 Living Donors
 Male
 Middle Aged
 Reoperation/statistics & numerical data
 Tissue and Organ Harvesting/methods
 Tissue and Organ Procurement/statistics & numerical data
 Tissue and Organ Procurement/trends
 Transplantation, Homologous/statistics & numerical data*
 Transplantation, Homologous/trends
 United States
 Waiting Lists

Grant Support:

234-2005-37009C/PHS

PMID: 17428286 [PubMed - indexed for MEDLINE]

2: Clin Transpl. 2005;:17-28.

Liver transplantation in the United States.

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Based on the data reported to the OPTN/UNOS Liver Transplant Registry between 1987-2005, we found: 1. The number of deceased-donor liver transplantations increased slowly each year, with most of the increase being in adult recipients. The number of LD transplants, on the other hand, decreased sharply after 2002, following 3 years of rapid increase from 1998-2001 in both pediatric and adult recipients. 2. The number of DD liver recipients with non-cholestatic liver diseases increased very quickly during the past 18 years. Malignant disease as a cause of end-stage liver disease increased after implementation of MELD in 2002. Among LD liver recipients, non-cholestatic disease increased sharply from 1998-2001, but decreased from 2002. Malignant diseases as a cause for LD transplants decreased after 2002. 3. Among pediatric recipients, LD transplants provided better 5-year graft survival rates than transplants from deceased donors; in contrast, LD transplants in adults had poorer graft survival rates than those from deceased donors. 4. The use of marginal donors, including older donors, HCV (+) donors, donation after cardiac death donors, and diabetic donors, increased in the past 18 years. HCV(+) livers transplanted into HCV(+) cirrhosis recipients had similar graft survival when compared with HCV(-) donor livers, whereas when they were transplanted into non-HCV cirrhosis patients, they had poorer graft survival (60% vs. 70% at 5 years, respectively). When livers from diabetic donors were transplanted into diabetic recipients, they had much poorer graft survival than transplants from non-diabetic donors (54% vs. 77% at 5 years, respectively). 5. Split and partial liver transplants had poorer 5-year graft survival rates (58% and 57%, respectively) than whole liver transplants (62%), but the difference was mainly due to poorer outcomes during the first posttransplant year. 6. PELD allocation has resulted in improved one- and 3-year graft survival rates among pediatric liver recipients. Among adults MELD-based allocation has resulted in better one-year survival rates. When comparing the different original diseases, only HCC patients showed better one- and 3-year graft survival rates after MELD. 7. Within one year after transplantation, primary non-function and infection were the major causes of graft failure. These decreased after 1996, but recurrent hepatitis has increased as a cause of graft failure. After one year, chronic rejection and infection had decreased, while hepatitis recurrence still increased. 8. Cardiovascular deaths and deaths from multiorgan failure that occurred within the first year after transplantation have increased since 1996, while deaths due to infections have decreased. After the first year, deaths from graft failure increased, while CVD and infections decreased.

Mesh Terms:

- Adult
- Age Distribution
- Cadaver
- Child
- Continental Population Groups
- Graft Survival
- Humans
- Liver Diseases/classification
- Liver Diseases/surgery
- Liver Transplantation/statistics & numerical data*
- Living Donors/statistics & numerical data
- Registries
- Retrospective Studies
- Tissue Donors/statistics & numerical data
- Tissue and Organ Procurement/statistics & numerical data
- United States

PMID: 17424722 [PubMed - indexed for MEDLINE]

3: J Trauma Nurs. 2007 Jan-Mar;14(1):47-50.

Donation after cardiac death: lessons learned.

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Despite the increasingly positive outcome of organ transplantation as an accepted treatment of end-stage organ diseases, an average of 15 people die each day awaiting organ transplantation. According to the United Network for Organ Sharing, there are more than 90,000 people in the United States waiting for an organ transplant. In the United States, less than 1% of all deaths are attributed to brain death. A single brain-dead organ donor has the potential to save up to 8 individuals by donating organs and providing up to 50 people with tissue and cornea transplants. The reality is that the source of available brain-dead donors does not meet the needs of the growing waiting list. To help deal with the increasing demand for organs, donation after cardiac death has been reintroduced to families of patients with catastrophic brain injuries. Families have the right to be informed of all potential end-of-life options, including that of organ donation and the use of donation after cardiac death when appropriate. Hospitals and healthcare workers must be committed to provide the option of donation after cardiac death for both donor families and transplant recipients. The purpose of this article is to examine the process of implementing a donation after cardiac death policy in a 1,061-bed tertiary care hospital with level I trauma designation.

Publication Types:

Case Reports

Mesh Terms:

Adolescent
Brain Death/diagnosis
Brain Death/legislation & jurisprudence
Clinical Protocols
Family/psychology
Female
Heart Transplantation*/legislation & jurisprudence
Humans
Michigan
Organizational Policy
Patient Care Team/organization & administration
Personnel, Hospital/education
Personnel, Hospital/psychology
Practice Guidelines
Professional-Family Relations
Program Development
Registries
Third-Party Consent/legislation & jurisprudence
Tissue and Organ Procurement/organization & administration*
Trauma Centers/organization & administration*
Waiting Lists

PMID: 17420653 [PubMed - indexed for MEDLINE]

4: *Pediatr Crit Care Med*. 2007 Jan;8(1):76-7.

Comment on:

Pediatr Crit Care Med. 2007 Jan;8(1):47-9.

Deconstructing donation after cardiac death.

Frader JE.

Publication Types:

Comment
Editorial

Mesh Terms:

Child
Critical Care
Death*
Family
Humans
Intensive Care Units, Pediatric*
Kidney Transplantation
Liver Transplantation
Lung Transplantation
Tissue Donors*/ethics
Tissue and Organ Procurement*

PMID: 17251891 [PubMed - indexed for MEDLINE]

5: *Pediatr Crit Care Med.* 2007 Jan;8(1):47-9.

Comment in:

Pediatr Crit Care Med. 2007 Jan;8(1):76-7.

Donation after cardiac death in pediatric critical care.

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OBJECTIVE: To describe the unmet need for pediatric organs, the history of donation after cardiac death (DCD), implementation of DCD policies in children's hospitals, and the current U.S. experience with DCD in children. **DESIGN:** Review of existing literature and national data regarding DCD. **SETTING:** Three children's hospitals and a national organ procurement network. **PATIENTS:** Nationwide review of pediatric candidates for transplantation and pediatric DCD donors.

INTERVENTIONS: None. **MEASUREMENTS AND MAIN RESULTS:** Interest in DCD has greatly increased over the past several years due to limited organ availability for transplantation. Leading medical groups have evaluated and endorsed DCD, and more hospitals are offering DCD as part of end-of-life care options for dying patients and to increase donation. Children's hospitals need to evaluate this concept and develop ethically sound policies to meet the needs of patients and families. Preliminary reports regarding organ function from DCD donors are promising, and DCD is increasing. **CONCLUSIONS:** The widening gap between the need for organs and the availability of organs from brain-dead donors has led to a resurgence of both interest in and use of organs donated after cardiac death. Children's hospitals need to explore DCD as an option in select circumstances to serve grieving families who would like to donate and to increase organ availability for transplantation. DCD programs are dependent on input and support from critical care providers.

Publication Types:

Review

Mesh Terms:

Adolescent
Child
Child, Preschool
Critical Care*
Death*
Ethics Committees
Family
Female

Hospitals, Pediatric*
 Humans
 Liver Transplantation
 Male
 Tissue Donors*/ethics
 Tissue and Organ Procurement

PMID: 17251881 [PubMed - indexed for MEDLINE]

6: Pediatrics. 2007 Jan;119(1):e219-24.

Potential for donation after cardiac death in a children's hospital.

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OBJECTIVES: A task force was convened to decide whether a donation after cardiac death policy should be implemented at Children's Hospital Boston. As part of this process, we sought to determine the number of potential kidney donation after cardiac death donors in our PICUs. METHODS: We examined all 254 deaths in the Medical/Surgical ICU and the Cardiac ICU from 2002 to 2004 and identified potential donation after cardiac death donors. Inclusion criteria were age > or = 3 months, mechanical ventilation, and creatinine < or = 1.5 mg/dL. Exclusion criteria were HIV infection, malignancy other than primary brain tumor or nonmelanoma skin cancer, evidence of ongoing infection, death despite resuscitation attempts, and brain death. RESULTS: Twenty-one of the 254 deaths met criteria for brain death, and 233 patients did not. Of the 116 patients > 3 months of age for whom life support was withdrawn, 92 were not suitable for kidney donation after cardiac death. Of the 24 children identified as potentially eligible for donation after cardiac death, 14 died within 1 hour of withdrawal of support and could have proceeded with donation after cardiac death. In the other 10 children, donation would have been aborted because of prolonged time to death. CONCLUSIONS: Of all patients who died in our ICUs, 5.5% would have been potential candidates for donation after cardiac death. Assuming the rates of parental consent are similar to that of our heart-beating organ donors (47%), a donation after cardiac death protocol could have potentially yielded 7 additional organ donors and 14 additional kidneys over this 3-year period.

Mesh Terms:

Brain Death
 Child
 Heart Arrest*
 Hospitals, Pediatric
 Humans
 Intensive Care Units, Pediatric
 Kidney Transplantation*
 Tissue Donors
 Tissue and Organ Procurement*
 Withholding Treatment*

PMID: 17200246 [PubMed - indexed for MEDLINE]

7: Transplantation. 2006 Dec 27;82(12):1708-11.

Pediatric liver and kidney transplantation with allografts from DCD donors: A review of UNOS data.

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INTRODUCTION: Donation after cardiac death (DCD) is recognized as an important source of allografts to bridge the growing disequilibrium between the number of donors and recipients. Current transplant experience with DCD organs has focused on the adult recipient population, however little is known about the pediatric recipient experience. While there is increasing acceptance of these grafts in adults, transplant centers appear reluctant to use these grafts in the pediatric population. **METHODS:** We reviewed the United Network for Organ Sharing database from 1995-2005 to determine the national experience with pediatric recipients of DCD organs. **RESULTS:** Among 4026 renal transplants performed in children 18 years and younger, 26 (0.6%) received a renal allograft from a DCD donor. Ten (38.5%) received kidney allografts from pediatric donors (age < or = 18) and 16 (61.5%) from adult donors (age > 18 years). Graft survival at one and five years was 82.5%, 74.3% for kidneys from DCD donors compared to 89.6%, 64.8% from brain dead donors (DBD) (P = 0.7). Among 4991 liver transplants, 19 (0.4%) were from DCD donors. Sixteen patients (84.2%) received livers from pediatric donors and three (15.8%) from adult donors. Graft survival at one and five years was 89.2%, 79.3% for livers from DCD, compared to 75.6%, 65.8% for DBD (P = 0.3). **CONCLUSION:** The use of DCD donors in the pediatric population is very limited; however graft survival is comparable to DBD grafts. Although pediatric centers may have been reluctant to utilize this donor source, this limited experience demonstrates that the select use of DCD organs can produce acceptable and durable graft survival in the pediatric population.

Publication Types:

Research Support, U.S. Gov't, P.H.S.

Mesh Terms:

Adolescent
 Cadaver
 Child
 Databases, Factual
 Death, Sudden, Cardiac*
 Donor Selection*
 Female
 Humans
 Kidney Transplantation*
 Liver Transplantation*
 Male
 Tissue Donors*
 Treatment Outcome

Grant Support:

234-2005-370011C/PHS

PMID: 17198264 [PubMed - indexed for MEDLINE]

8: Ann Surg. 2006 Oct;244(4):555-62.

Donation after cardiac death as a strategy to increase deceased donor liver availability.

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OBJECTIVE: This study examines donation after cardiac death (DCD) practices and outcomes in liver transplantation. **SUMMARY BACKGROUND DATA:** Livers procured from DCD donors have recently been used to increase the number of deceased donors and bridge the gap between limited organ supply and the pool of waiting list

candidates. Comprehensive evaluation of this practice and its outcomes has not been previously reported. **METHODS:** A national cohort of all DCD and donation after brain-death (DBD) liver transplants between January 1, 2000 and December 31, 2004 was identified in the Scientific Registry of Transplant Recipients. Time to graft failure (including death) was modeled by Cox regression, adjusted for relevant donor and recipient characteristics. **RESULTS:** DCD livers were used for 472 (2%) of 24,070 transplants. Annual DCD liver activity increased from 39 in 2000 to 176 in 2004. The adjusted relative risk of DCD graft failure was 85% higher than for DBD grafts (relative risk, 1.85; 95% confidence interval, 1.51-2.26; $P < 0.001$), corresponding to 3-month, 1-year, and 3-year graft survival rates of 83.0%, 70.1%, and 60.5%, respectively (vs. 89.2%, 83.0%, and 75.0% for DBD recipients). There was no significant association between transplant program DCD liver transplant volume and graft outcome. **CONCLUSIONS:** The annual number of DCD livers used for transplant has increased rapidly. However, DCD livers are associated with a significantly increased risk of graft failure unrelated to modifiable donor or recipient factors. Appropriate recipients for DCD livers have not been fully characterized and recipient informed consent should be obtained before use of these organs.

Publication Types:

Research Support, U.S. Gov't, P.H.S.

Mesh Terms:

Adolescent
 Adult
 Aged
 Cadaver
 Child
 Child, Preschool
 Death*
 Female
 Humans
 Infant
 Liver Transplantation/statistics & numerical data*
 Male
 Middle Aged
 Tissue Donors/statistics & numerical data*
 Tissue and Organ Procurement*

Grant Support:

231-00-0116/PHS

PMID: 16998364 [PubMed - indexed for MEDLINE]

9: Am J Transplant. 2006 Feb;6(2):281-91.

Comment in:

Am J Transplant. 2007 May;7(5):1315-6.

Report of a National Conference on Donation after cardiac death.

Bernat JL, D'Alessandro AM, Port FK, Bleck TP, Heard SO, Medina J, Rosenbaum SH, Devita MA, Gaston RS, Merion RM, Barr ML, Marks WH, Nathan H, O'connor K, Rudow DL, Leichtman AB, Schwab P, Ascher NL, Metzger RA, Mc Bride V, Graham W, Wagner D, Warren J, Delmonico FL.

A national conference on organ donation after cardiac death (DCD) was convened to expand the practice of DCD in the continuum of quality end-of-life care. This national conference affirmed the ethical propriety of DCD as not violating the dead donor rule. Further, by new developments not previously reported, the conference resolved controversy regarding the period of circulatory cessation that determines death and allows administration of pre-recovery pharmacologic agents, it established conditions of DCD eligibility, it presented current data

regarding the successful transplantation of organs from DCD, it proposed a new framework of data reporting regarding ischemic events, it made specific recommendations to agencies and organizations to remove barriers to DCD, it brought guidance regarding organ allocation and the process of informed consent and it set an action plan to address media issues. When a consensual decision is made to withdraw life support by the attending physician and patient or by the attending physician and a family member or surrogate (particularly in an intensive care unit), a routine opportunity for DCD should be available to honor the deceased donor's wishes in every donor service area (DSA) of the United States.

Publication Types:

Congresses

Mesh Terms:

Adolescent
 Adult
 Child
 Death, Sudden, Cardiac*
 Humans
 Liver Transplantation/mortality
 Liver Transplantation/statistics & numerical data
 Middle Aged
 Patient Selection
 Tissue and Organ Procurement/ethics*

PMID: 16426312 [PubMed - indexed for MEDLINE]

10: Ann Surg. 2005 Oct;242(4):556-63; discussion 563-5.

Utilization of extended donor criteria liver allografts maximizes donor use and patient access to liver transplantation.

Renz JF, Kin C, Kinkhabwala M, Jan D, Varadarajan R, Goldstein M, Brown R Jr, Emond JC.

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OBJECTIVE: The objective of this study was to evaluate the effect of systematic utilization of extended donor criteria liver allografts (EDC), including living donor allografts (LDLT), on patient access to liver transplantation (LTX).
SUMMARY BACKGROUND DATA: Utilization of liver allografts that do not meet traditional donor criteria (EDC) offer immediate expansion of the donor pool. EDC are typically allocated by transplant center rather than regional wait-list priority (RA). This single-institution series compares outcomes of EDC and RA allocation to determine the impact of EDC utilization on donor use and patient access to LTX. **METHODS:** The authors conducted a retrospective analysis of 99 EDC recipients (49 deceased donor, 50 LDLT) and 116 RA recipients from April 2001 through April 2004. Deceased-donor EDC included: age >65 years, donation after cardiac death, positive viral serology (hepatitis C, hepatitis B core antibody, human T-cell lymphotropic), split-liver, hypernatremia, prior carcinoma, steatosis, and behavioral high-risk donors. Outcome variables included patient and graft survival, hospitalization, initial graft function, and complication categorized as: biliary, vascular, wound, and other. **RESULTS:** EDC recipients were more frequently diagnosed with hepatitis C virus or hepatocellular carcinoma and had a lower model for end-stage liver disease (MELD) score at LTX ($P < 0.01$). Wait-time, technical complications, and hospitalization were comparable. Log-rank analysis of Kaplan-Meier survival estimates demonstrated no difference in patient or graft survival; however, deaths among deceased-donor EDC recipients were frequently the result of patient comorbidities, whereas LDLT and RA deaths resulted from graft failure ($P < 0.01$). EDC increased patient access to LTX by 77% and reduced pre-LTX mortality by over 50% compared with regional data ($P <$

0.01). CONCLUSION: Systematic EDC utilization maximizes donor use, increases access to LTX, and significantly reduces wait-list mortality by providing satisfactory outcomes to select recipients.

Publication Types:

Comparative Study
Research Support, Non-U.S. Gov't

Mesh Terms:

Adolescent
Adult
Aged
Female
Follow-Up Studies
Graft Survival
Health Services Accessibility*
Humans
Liver Transplantation/statistics & numerical data*
Male
Middle Aged
Retrospective Studies
Tissue Donors/statistics & numerical data*
Tissue and Organ Procurement/utilization*
Transplantation, Homologous
Treatment Outcome
Waiting Lists

PMID: 16192816 [PubMed - indexed for MEDLINE]

11: Transplantation. 2005 Sep 15;80(5):564-8.

Comment in:

Transplantation. 2005 Sep 15;80(5):569-70.

A 10-year analysis of organ donation after cardiac death in the United States.

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BACKGROUND: The greatest challenge facing transplantation today is how to increase the number of organ donors. Patients with severe brain injury who are not brain-dead can donate organs after they are removed from a ventilator and allowed to die, termed donation after cardiac death (DCD). METHODS: We analyzed the database of all organs recovered from deceased donors in the United States from 1994 through 2003 to determine DCD trends in the United States. The database was obtained from the United Network for Organ Sharing (UNOS). RESULTS: There were 57,681 deceased donors reported from 1994 through 2003. Of these, 1,177 were donors without a heartbeat (DWHB), 55,206 were brain dead donors, and 1,298 were unspecified donors. At least one organ was transplanted from 1010 of the 1177 DWHB. Organ procurement organizations (OPOs) reported 0-212 DWHB accounting for up to 12.3 percent of deceased donors. There was a steady annual increase in the number of DWHB, but in 2003 there were still 19 of 59 OPOs that recovered no DWHB. A total of 2,231 organs were transplanted from the 1,177 DWHB donors, and another 665 organs were recovered for transplantation but not transplanted. The transplanted organs included 1,779 kidneys, 395 livers, 54 pancreata, 2 lungs, and 1 heart. Organs from DWHB can be successfully transplanted. CONCLUSIONS: Wider use of DWHB has the potential to greatly increase the number of organ transplants performed each year in the United States.

Mesh Terms:

Adolescent
Adult

Aged
Aged, 80 and over
Brain Death
Child
Databases, Factual
Death*
Female
Humans
Male
Middle Aged
Tissue and Organ Procurement/statistics & numerical data*
Tissue and Organ Procurement/trends*
Transplants/statistics & numerical data*
United States/epidemiology

PMID: 16177625 [PubMed - indexed for MEDLINE]

12: J Pediatr Gastroenterol Nutr. 2003 Sep;37(3):219-20.

Organ donation after cardiac death: a new trend in pediatrics.

Ferguson M, Zuk J.

Publication Types:
News

Mesh Terms:
Brain Death/diagnosis
Cadaver
Child
Death*
Humans
Intensive Care Units, Pediatric
Organ Transplantation/ethics
Tissue and Organ Procurement*/ethics

PMID: 12971358 [PubMed - indexed for MEDLINE]