# CHAPTER 9
# Aftercare and Outcome

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## 1 Aftercare

Intensive follow-up care at specialist paediatric transplant facilities, in collaboration with a paediatrician or family doctor, is crucial for the success of a kidney transplant. Certain examinations should be carried out routinely at regular intervals to detect complications early (Table 1). It is also important to check medication adherence, particularly among adolescent patients.

## 2 Outcome

According to data from the North American Pediatric Renal Trials and Collaborative Studies (NAPRTCS), the one-year survival rate for patients receiving a kidney from a living or deceased donor is currently 98% and 97%, respectively, while the five-year survival rate is 96% and 93%, respectively [1]. The most common causes of death are infection (40%), cardiopulmonary disease (13%), and malignancy (10%). Overall, however, the prognosis for patients undergoing kidney transplantation in childhood is significantly better than for those receiving long-term dialysis therapy. Transplant survival rates have improved considerably in recent years, particularly for deceased kidney transplants. According to recent data from the CTS registry, paediatric patients in Europe, North America and Australia can currently expect a 5-year transplant survival rate of 90% after living donation and 86% after deceased donation (Figure 1). The recently published data from the Cooperative European Paediatric Renal Transplant Initiative (CERTAIN) registry in conjunction with Eurotransplant data also show a

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**Table 1** Aftercare examinations following kidney transplantation in children

1. At every visit
   - Clinical examination: weight, length, blood pressure, physical examen (painful graft)
   - Laboratory tests:
     - Blood count with differential blood count and thrombocytes
     - Serum: creatinine, urea, cystatin C, electrolytes including magnesium and phosphate, glucose, blood gases in venous blood, trough levels of the immunosuppressants tacrolimus, cyclosporin A, mycophenolic acid, everolimus
     - Urine: dipstick, protein/creatinine ratio, albumin/creatinine ratio, cytology, culture if necessary. If correct urine collection is possible: 24-hour urine for protein excretion and protein/creatinine and albumin/creatinine ratio, creatinine and urea clearance
2. Every 3 months (in addition to 1.):
   - Laboratory tests: Reticulocytes, PTH, protein, uric acid, enzymes (AP, GPT, GOT, CHE, γGT, LDH), bilirubin, cholesterol, triglycerides, quantitative PCR for CMV, EBV, BKPyV (in the first 2 years post-transplant, depending on individual risk profile)
3. Annually (in addition to 1. and 2.):
   - Laboratory tests:
     - Glucose (fasting), $HbA_{1c}$, iron, ferritin, transferrin, cholesterol (HDL, LDL), triglycerides, creatin kinase, immunoglobulins, testosterone, oestradiol,
     - anti-HBS antibodies, anti-HC-AK, HC-DNA using quantitative PCR, antibody titres (IgG) for vaccine-preventable pathogens (mumps, measles, rubella, varicella, hepatitis A, hepatitis B), donor-specific HLA antibodies (more frequently than annually if there is a high immunological risk),
   - X-ray: left hand: if symptoms X-ray of other parts of the skeleton
   - Sonography of the kidney transplant and of the kidneys, Doppler sonography of the kidney transplant artery
   - ECG, echocardiography, ambulatory blood pressure measurement over 24 hours
   - Ophthalmological examination: cataract, glaucoma, fundus?
   - Dermatological status
   - Dental status
   - Stage of puberty

**Figure 1**

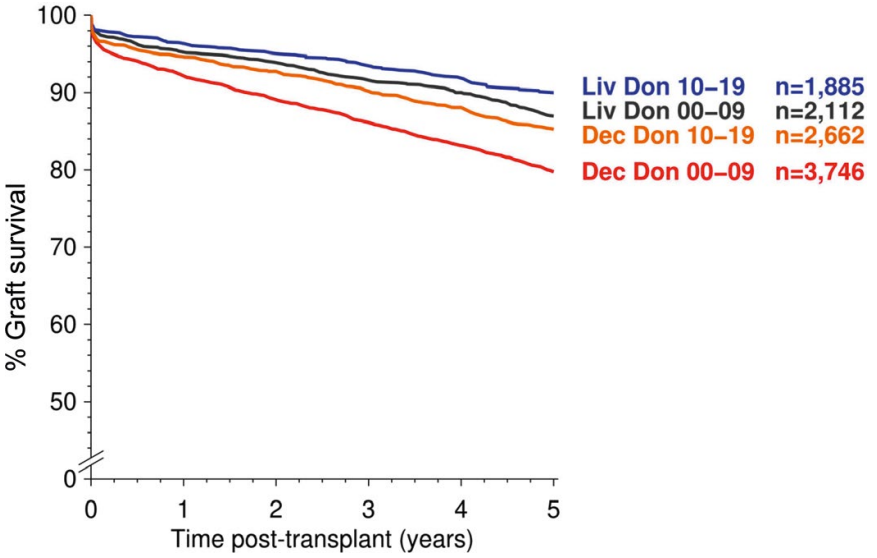
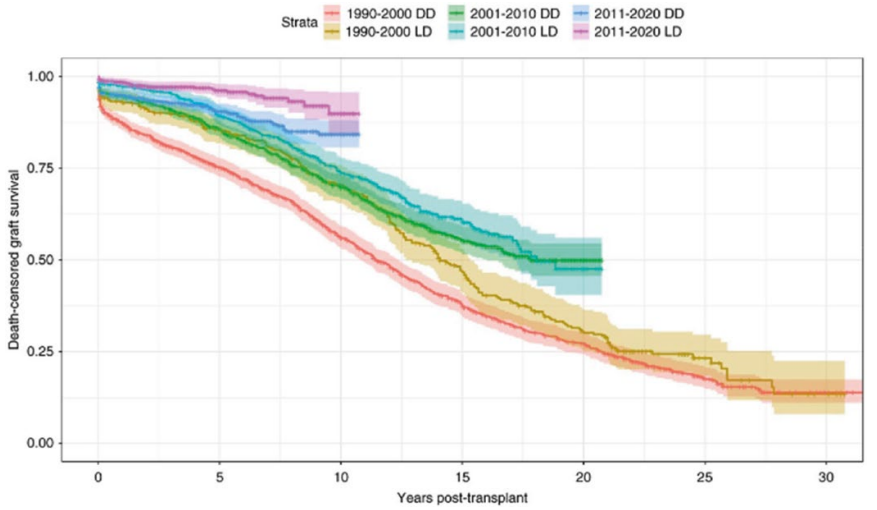



**Figure 2**



lower risk of premature graft loss after living kidney donation compared to deceased donation (Figure 2). In addition, analogous to the CTS data, this analysis showed a further improvement in treatment outcomes after both living and deceased donation in the cohort that received their transplant in the period 2011–2020 compared to the cohort in the period 2001–2010 [2].

### 2.1 Factors influencing kidney transplant survival

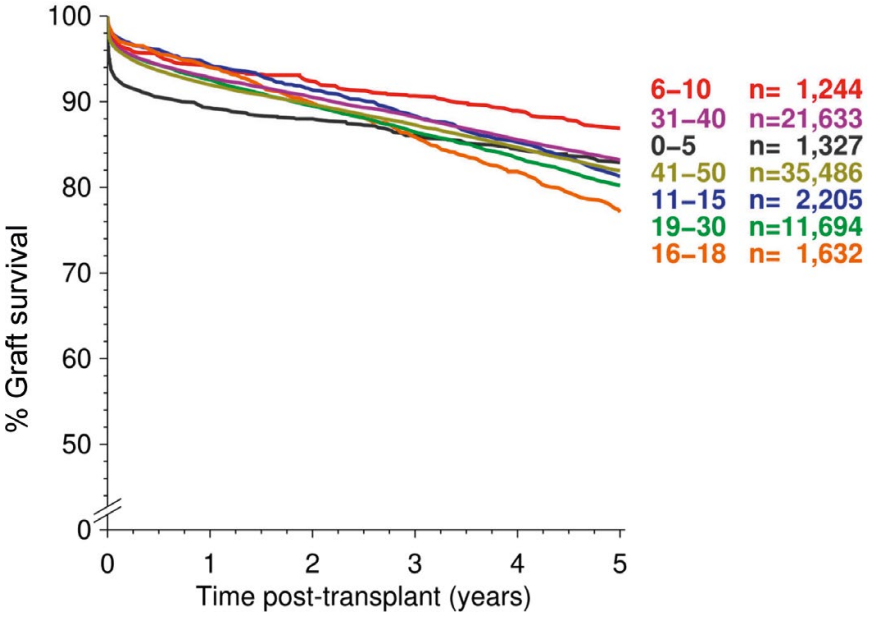
The following factors influence the survival of kidney transplants in children and adolescents:

- transplant source (deceased or living donation);
- pre-emptive transplantation or previous dialysis therapy;
- the age of the donor and recipient;
- the extent of HLA compatibility;
- sensitisation with the development of preformed HLA antibodies;
- a long cold ischaemia time;
- delayed kidney transplant function;
- acute and chronic rejection;
- intercurrent infections, particularly opportunistic ones;
- non-adherence;
- the recipient's underlying kidney disease and its possible recurrence in the transplant.

Non-immunological factors are also important, particularly arterial hypertension, pronounced secondary hyperparathyroidism, and inadequately treated metabolic acidosis.

The success of kidney transplants in children and adolescents depends on the recipient's age. While the results for children under five years of age were unsatisfactory around 20 years ago, the survival rate for kidney transplants in this age group is now comparatively good, thanks to improvements in surgical techniques and postoperative management (see Figure 3). Adolescents and young adults have the poorest five-year survival rates following a kidney transplant. According to an analysis of the NAPRTCS registry, the five-year survival rate for kidney transplants after living donation was 85% for children under five, 85% for those aged six to 12, and 79% for those aged over 12. Similar results can be seen in the Collaborative Transplant Study (CTS) registry (Figure 3). The poorer re-

**Figure 3**




sults observed in adolescents and young adults are largely due to non-adherence to regular use of immunosuppressive medication and to the transition to adult medical care during this vulnerable life phase.

As with adults, good HLA compatibility between the recipient and donor is associated with a higher survival rate for kidney transplants, whether the donor is living or deceased. The best results are achieved with an identical HLA profile. However, children and adolescents rarely have HLA-identical adult siblings who can be considered as donors. Therefore, the vast majority of living donations come from a parent, resulting in a haploidentical HLA match between parent and child. An optimal HLA match is also important to avoid sensitisation in young recipients who will require multiple transplants throughout their lifes [3]. In the Eurotransplant region, most paediatric kidney transplant centres therefore define one match on the HLA-DR locus and one match on the HLA-A or HLA-B locus as the minimum requirement for acceptance of a deceased kidney transplant offer.

## References

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