The Practitioner®

Renal replacement therapy should be tailored to the patient

Devine PA. Courtney AE. Renal replacement therapy should be tailored to the patient.
Practitioner 2014; 258 (1768):19-22

Dr Paul A Devine MB BCh
Specialty Trainee in Renal Medicine

Dr Aisling E Courtney FRCP
Consultant Nephrologist

Regional Nephrology Unit, Belfast City Hospital, Belfast, UK

Practitioner
Medical Publishing Ltd

©Practitioner Medical Publishing Ltd.
Reprint orders to *The Practitioner*, 10 Fernthorpe Road, London SW16 6DR, United Kingdom. Telephone: +44 (0)20 8677 3508
www.thepractitioner.co.uk

Renal replacement therapy should be tailored to the patient

AUTHORS
Dr Paul A Devine
MB BCh
Specialty Trainee in Renal Medicine

Dr Aisling E Courtney
FRCP
Consultant Nephrologist

Regional Nephrology Unit, Belfast City Hospital, Belfast, UK

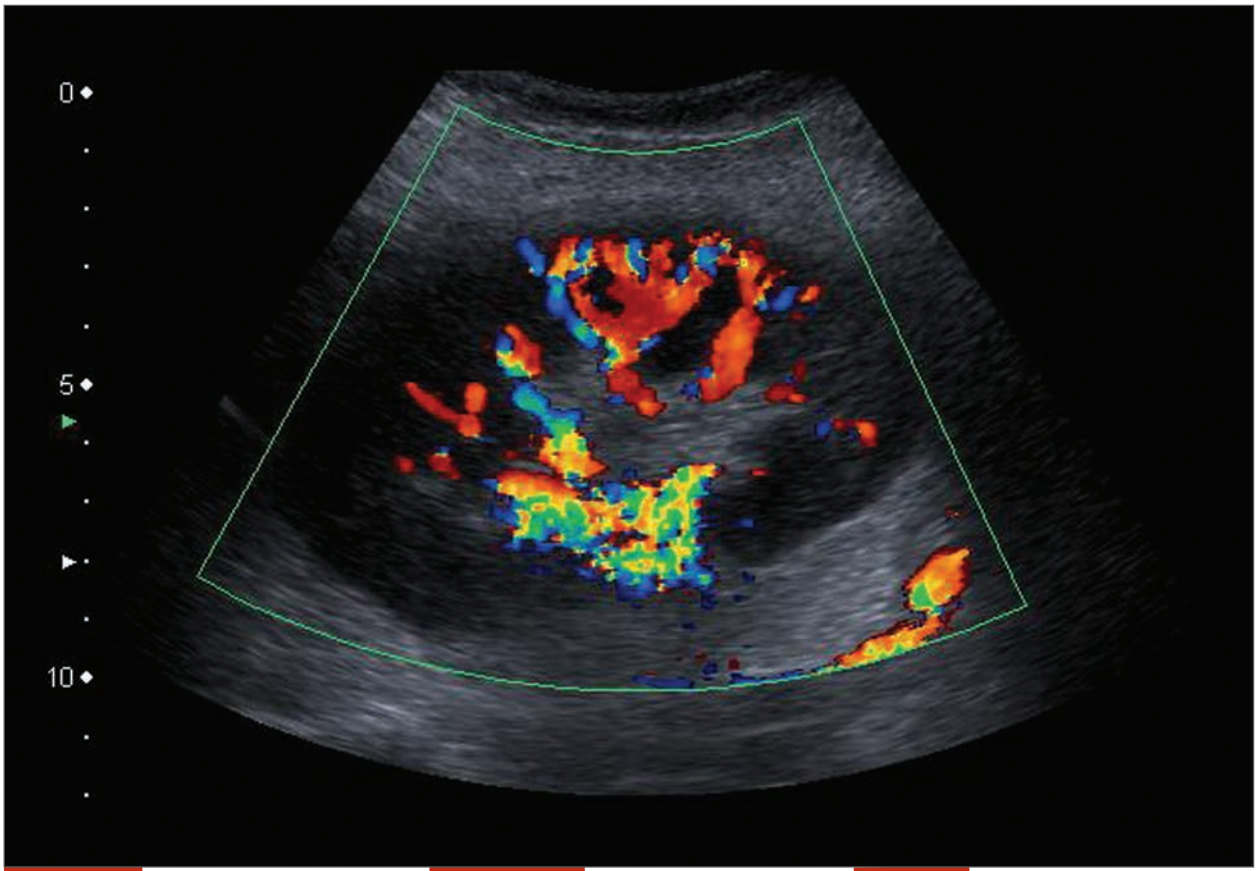


FIGURE 1
Doppler ultrasound of a transplant kidney

What factors influence choice of RRT?

END-STAGE RENAL DISEASE (ESRD) DESCRIBES LOSS OF KIDNEY FUNCTION which is both substantial, estimated glomerular filtration rate (eGFR) less than 15ml/min/1.73m^2, and irreversible. It is associated with acute life-threatening complications such as hyperkalaemia and pulmonary oedema, and chronic metabolic derangements that cannot be sustained in the long-term. These can only be overcome by renal replacement therapy (RRT), i.e. renal transplantation, peritoneal dialysis (PD) or haemodialysis (HD).

Patient education is paramount in ESRD management. This is a chronic condition associated with reduced life expectancy, and the potential treatment options are both invasive and time limited. Patients may well switch between all three modalities of RRT during their journey[1] and they should be aware of the practicalities of each, see table 1, p20.

The form of RRT instituted should primarily be based on patient preference subsequent to an individually tailored education programme from specialist staff.

This programme needs to take into account the patient's comorbidities and any contraindications to specific modalities of RRT.[2] Strong emphasis on patient choice can lead to improved patient satisfaction, quality of life and compliance with therapy.[1]

How should GPs follow up donors and recipients?

RENAL TRANSPLANTATION

Transplantation is viewed as the gold standard, as it replicates normal renal physiology much more closely than either dialysis modality, see figure 1, above. For those suitable, transplantation offers improved quality and quantity of life compared with maintenance dialysis therapy.[3-5] The survival benefits are more marked in younger recipients but even in high-risk groups with more limited life expectancy there is an »

Table 1

Options for renal replacement therapy for those with end-stage renal disease

	Transplantation	Home dialysis	Hospital haemodialysis	Conservative
Advantages	Better survival Better quality of life	Independence Better survival home-HD vs hospital-HD	Suitable for most patients All care provided	Non-invasive
Disadvantages	Risks of long-term immunosuppression	PD limited duration Risks of acute dialysis complications	Hospital dependency Limitations on long-term survival	Limited survival
Considerations for suitability	Fitness for: ● General anaesthetic ● Transplant surgery (anatomically) ● Long-term immunosuppression	● Physical ● Mental ● Emotional	● Waiting for transplant ● Unsuitable for transplant ● Unsuitable for home dialysis	● Substantial comorbidity ● Very advanced age ● Declined dialysis

advantage for those who receive transplants compared with those who do not.

Factors that need to be addressed when considering a patient's suitability for transplantation are shown in box 1, below.

'There are very few medical or surgical interventions that offer such a huge survival advantage as live donor transplantation'

Live donor transplantation

Ideally patients with ESRD should have a pre-emptive transplant before they require dialysis. Transplant survival is negatively influenced by the duration of dialysis before transplantation,[8] with a detrimental impact evident from six months onwards. This reflects the accumulation of comorbidity with maintenance dialysis, which is a poor substitute for normal renal function.

The ongoing challenge however is the gap between the number of people waiting for a renal transplant and the availability of suitable kidneys. This has in part driven the increase in recent years in the number of live kidney donors, and consistently more than 1,000 people per year in the UK now donate a kidney.[9]

There are several advantages to live donor transplantation:

- It allows pre-emptive transplantation, which is rare if waiting for a deceased organ
- The surgery is an elective procedure permitting optimisation of the recipient's health
- The quality of the kidney is almost invariably higher. Potential live donors undergo an intensive screening process which ensures that the transplanted kidney is disease-free, whereas deceased donors are often older, may have undetected kidney damage from comorbidities such as hypertension or diabetes, and are subjected to greater ischaemic injury.

The result is improved survival: 90% of recipients of a live donor transplant in the UK in 1999-2001 were alive ten years later, compared with 74% of deceased donor recipients.[9]

There are very few medical or surgical interventions that offer such a huge survival advantage as live donor transplantation.

Follow-up after transplantation

Transplant recipients, particularly those with a long duration of ESRD, carry a significant cardiovascular disease burden, and this is the most common cause of death.[6] Malignancy

Box 1

Assessing a patient's suitability for transplantation

Assessment for transplantation requires consideration of the patient's suitability for the following:

General anaesthetic and surgery

Hypertension and cardiovascular disease frequently co-exist with ESRD and approximately 25% of the maintenance dialysis population in the UK has diabetes mellitus[6,7]

Transplant surgery

Specific considerations for renal transplantation relate to adequate:

- Blood supply: many patients who have been on maintenance dialysis have extensive vascular calcification that may preclude successful vascular anastomosis
- Space for a kidney: this is relevant to patients with large native polycystic kidneys (who may require a nephrectomy), who have had two or more previous transplants, and in tiny children
- Urinary drainage: where the cause of renal failure is related to a high pressure or obstructed bladder, a suitable means for safe drainage is essential before transplantation

Long-term immunosuppression

Lifelong anti-rejection medication is essential, and for most the associated risks are outweighed by the improved life expectancy with a functioning transplant. However, those with recent or active malignancy, and individuals with persistent infection e.g. leg ulcers or osteomyelitis, will not be suitable for immunosuppression. The other group of concern in this category are those with acute mental illness, or a pattern of non-adherence with medication, when transplantation may not be appropriate.

and infection are the other major causes of mortality. Table 2, below, summarises key points in the management of renal transplant recipients.

An increasing number of GPs will now be looking after live kidney donors and important issues to consider are listed in table 3, below.

DIALYSIS

For most patients who are unsuitable for transplantation or do not receive a transplant pre-emptively, dialysis is a viable option. In terms of dialysis modality (HD versus PD), there is no conclusive evidence that either modality is superior, and unless there are obvious reasons why one therapy is unsuitable, patient preference is usually the deciding factor.

Peritoneal dialysis

The European Renal Best Practice Advisory Board suggests, but does not mandate, that PD should be presented as the logical first step.[1] PD offers several advantages, and can be particularly effective when the patient still has some residual urine output. Patients with ESRD require lifelong RRT, so initial use of a PD catheter will preserve veins for future HD.

However, PD does have limitations. First, it does not provide the same level of fluid and toxin removal as HD, so larger patients and those with no urine output may be under-dialysed. Additionally, PD can only be used for a limited period (the peritoneum cannot withstand continuous exposure to the contents of dialysate fluid long term), and many patients will be forced to transfer to HD within two to three years as PD gradually loses effectiveness.[10]

Table 2

Managing renal transplant recipients in general practice

Cardiovascular disease risk
- Cardiovascular disease is the most common cause of death, hence management of cardiovascular risk factors is vital

Cancer risk
- Malignancy is more frequent than in the general population
- Skin cancer recurs more frequently, is more aggressive and can be invasive
- Those on long-term immunosuppression should be investigated early if there are symptoms that may be causing concern

Infection
- Infection can quickly become life threatening
- Antibiotic therapy should be initiated earlier and for longer in patients on immunosuppression (even if they appear quite well)

Immunosuppressive medications
- Some of these have a narrow therapeutic window – too little risks rejection, too much risks toxicity and infection

Calcineurin inhibitors
- Calcineurin inhibitors (CNI: ciclosporin and tacrolimus) in particular can interact with other medication. A common culprit is clarithromycin. If no alternative antibiotic is available the dose of CNI must be reduced. This should be discussed with the local renal unit

Table 3

Follow-up of live kidney donors

Reduced eGFR
- Represents reduced nephron mass and not chronic kidney disease
- Is anticipated and accepted

Serum creatinine
- Will be above the upper limit of normal in most male and some female donors

Recommended follow-up
- Annual blood pressure, urine protein estimation (ACR or PCR), renal function. (This will usually be organised by the transplant unit but for logistical reasons some patients will prefer to attend their GP)
- The goal is a healthy lifestyle with avoidance of obesity and hypertension
- If hypertension does develop there should be a low threshold for initiation of antihypertensive therapy with the aim of very good blood pressure control

‘Haemodialysis at home allows increased frequency of dialysis which is associated with improved outcomes’

Haemodialysis

The majority of those on maintenance dialysis in the UK are on hospital-based haemodialysis. A major limitation, over and above the consequences of ESRD, is the dependency on thrice weekly hospital attendance, the time this takes, and the interruption to work, family and social life.

Home-based dialysis

There are obvious benefits associated with home-based therapy, both for the patient and the healthcare system in terms of reduced costs. Clearly it requires substantial engagement by the patient in terms of taking responsibility for their own care; some individuals are not able to take on this role and others resent the intrusion of dialysis equipment into their home.

An assisted PD programme is now widely available, in which healthcare workers visit the patient’s home and help, for example in lifting weighty dialysate bags when the patient is unable to do so alone, thus allowing many more (particularly elderly patients) to manage home dialysis.

Home HD allows increased frequency of dialysis which is associated with improved outcomes[11] and should be considered particularly »

key points

SELECTED BY
Dr Peter Saul
GP, Wrexham and Associate GP Dean for North Wales

End-stage renal disease (ESRD) describes loss of kidney function which is both substantial and irreversible. It is associated with acute life-threatening complications such as hyperkalaemia and pulmonary oedema, and chronic metabolic derangements that cannot be sustained in the long-term.

Patient education is paramount in ESRD management. The form of RRT instituted should primarily be based on patient preference subsequent to an individually tailored education programme from specialist staff. This programme needs to take into account the patient's comorbidities and any contraindications to specific modalities of RRT.

Transplantation replicates normal renal physiology much more closely than either dialysis modality. Assessment for transplantation requires consideration of the patient's suitability for general anaesthetic and surgery. Patients need to have an adequate blood supply and urinary drainage, and space for a kidney. They must also be suitable candidates for long-term immunosuppression.

Ideally patients with ESRD should have a pre-emptive transplant before they require dialysis. Ninety per cent of recipients of a live donor transplant in the UK in 1999-2001 were alive ten years later, compared with 74% of deceased donor recipients.

There is no conclusive evidence that either dialysis modality is superior, and unless there are obvious reasons why one therapy is unsuitable, patient preference is usually the deciding factor. Peritoneal dialysis (PD) does not provide the same level of fluid and toxin removal as haemodialysis (HD) and many patients will be forced to transfer to HD within two to three years as PD gradually loses effectiveness.

The majority of those on maintenance dialysis in the UK are on hospital-based haemodialysis. One of the major limitations is the dependency on thrice weekly hospital attendance. Home HD allows increased frequency of dialysis which is associated with improved outcomes and should be considered particularly for younger patients where transplantation is not an option.

For those who will be suitable for transplantation, optimum management of diabetes, smoking cessation, weight loss, and general fitness is crucial in facilitating this. Involvement with the patient and his/her family in advising on the advantages of live donor transplantation is also valuable. Patients may be unaware, for example, that a genetic relationship is not essential in order to donate a kidney.

We welcome your feedback

If you would like to comment on this article or have a question for the authors, write to:
editor@thepractitioner.co.uk

for younger patients where transplantation is not an option.

CONSERVATIVE CARE

A proportion of patients with ESRD have severe extra-renal comorbidity and hospital-based haemodialysis, (the only feasible option), would represent a huge burden for them and their carers. While HD may be life prolonging, the majority of the extra days gained will be spent in hospital.[12] In these cases a conservative approach is adopted with symptom management as the focus with close collaboration required between nephrologists, GPs and the community palliative care team.

'Patients may be unaware that a genetic relationship is not essential in order to donate a kidney'

PRIMARY CARE

Nephrologists rely heavily on the primary healthcare team for support at all stages of the patient journey. Initial involvement is with the management of progressive chronic kidney disease. In some cases this will prevent the patient reaching ESRD, in the at-risk patients it will involve identification and referral to a nephrologist in a timely manner. Late referral reduces access to transplantation[13] and can lead to higher mortality after starting dialysis.[14]

An increasing number of dialysis patients are now on home-based therapy so interaction with secondary care is appropriately more limited. Primary care physicians have much greater expertise in managing depression and sexual dysfunction, which are common in ESRD, and maintenance dialysis therapy can have a major impact on earning ability, family relationships and wellbeing.

For those who will be suitable for transplantation, optimum management of diabetes, smoking cessation, weight loss, and general fitness is crucial in facilitating this. Involvement with the patient and his/her family in advising on the advantages of live donor transplantation is also valuable. Patients may be unaware, for example, that a genetic relationship is not essential in order to donate a kidney.

The maximum survival benefit after transplantation is realised by those with optimum control of cardiovascular risk factors. Hence, the primary care team have a crucial role in ensuring the best possible outcomes for patients with ESRD.

REFERENCES

1 Covic A, Bammens B, Lobbedez T et al. Educating end-stage renal disease patients on dialysis modality selection: clinical advice from the European Renal Best Practice (ERBP) Advisory Board. *NDT Plus* 2010;3:225–33
2 Farrington K, Warwick G. Planning, initiation and withdrawal of RRT. Renal Association Fifth Edition of the Clinical Practice Guidelines 2009.www.renal.org/guidelines
3 Wolfe RA, Ashby VB, Milford EL et al. Comparison of mortality in all patients on dialysis, patients on dialysis awaiting transplantation and recipients of a first cadaveric transplant. *N Eng J Med* 1999;341:1725-30
4 Brown H, Forsythe JL. Impact of cadaveric renal transplantation on survival in patients listed for transplantation. *J Am Soc Nephrol* 2005;16:1859-65
5 Cameron JI, Whiteside C, Katz J et al. Differences in quality of life across renal replacement therapies: a meta-analytic comparison. *Am J Kidney Dis* 2000;35:629-37
6 Levey AS, Beto JA, Coronado BE. Controlling the epidemic of cardiovascular disease in chronic renal disease: What do we know? What do we need to learn? Where do we go from here? National Kidney Foundation Task Force on Cardiovascular Disease. *Am J Kidney Dis* 1998;32(5):853-906
7 Hill CJ, Fogarty DG. Changing trends in end-stage renal disease due to diabetes in the United Kingdom. *J Ren Care* 2012;38(1):12-22
8 Meier-Kriesche HU, Port FK, Ojo AO et al. Effect of waiting time on renal transplant outcome. *Kidney Int* 2000;58:1311-7
9 Organ donation and transplantation activity report 2012/13. NHS Blood and Transplant 2013. www.organdonation.nhs.uk/statistics/transplant_activity_report/current_activity_reporre/ukt/activity_report_2012_13.pdf
10 Chidambaram M, Bargman JM, Quinn RR et al. Patient and physician predictors of peritoneal dialysis technique failure: a population based retrospective cohort study. *Perit Dial Int* 2011;31:565-73
11 Kooistra MP, Vos J, Koomans HA, Vos PF. Daily home haemodialysis in The Netherlands: effects on metabolic control, haemodynamics, and quality of life. *Nephrol Dial Transplant* 1998;13(11):2853-60
12 McAdoo SP, Brown EA, Chesser AM et al. Measuring the quality of end of life management in patients with advanced kidney disease: results from the pan-Thames renal audit group. *Nephrol Dial Transplant* 2012;27:1548-54
13 Winkelmayer WC, Mehta J, Chandraker A et al: Predialysis nephrologist care and access to kidney transplantation in the United States. *Am J Transplant* 2007;7:872-9
14 Chan MR, Dall AT, Fletcher KE et al. Outcomes in patients with chronic kidney disease referred late to nephrologists: A meta-analysis. *Am J Med* 2007;120:1063-70

Useful information

NHS Blood and Transplant
www.nhsbt.nhs.uk

The Renal Association
www.renal.org

Edinburgh Renal Unit
www.edren.org

Kidney Patient Guide
www.kidneypatientguide.org.uk/contents.php