

## **What sort of dialysis should I choose?**

### **Dialysis modality selection: clinical advice from the European Renal Best Practice (ERBP) Advisory Board**

#### **Introduction.**

There is insufficient medical evidence to support a general preference of HD over PD, or vice versa. Therefore, the initial choice of modality should be made primarily by the well-informed patient.

All renal replacement therapy (RRT) centres should provide, or collaborate with other centres, to offer all available treatment options: PD (including CAPD, APD and aAPD (i.e. Assisted APD)), HD (including home HD and nocturnal programmes) and transplantation (including cadaveric and non-cadaveric), thus enabling all patients to select the modality that most suits their lifestyles.

All patients and their families should receive well-balanced information about the different RRT modalities, by means of a structured educational programme. This also applies to late-referred patients and those starting dialysis in an emergency situation, who should receive the information once their condition has stabilized. In some European countries the educational programmes involve experienced patients and their carers supported by health care professionals.

The present paper comprises the clinical advice on modality selection for RRT in patients with end-stage renal disease (ESRD). These recommendations have been issued by an ERBP Expert Group and approved by the ERBP Advisory Board.

Four areas of interest will be discussed:

- (i) Initial dialysis modality selection
- (ii) Choice between continuous ambulatory PD (CAPD) and automated PD (APD)
- (iii) Transition between RRT modalities
- (iv) Assisted PD

#### **What is the right approach to initial dialysis modality selection?**

Most studies suggest a better survival rate for patients on PD than on HD during the first few years after starting therapy.

However, after 2 or 3 years, the outcome on PD becomes equal to HD, or worse,

depending upon the study. These differences in outcome seem attributable to differences in the statistical approach, patient mix and the experience that the RRT centre has of using different modalities. Indeed, outcomes on RRT, both in absolute terms and in relative terms (PD vs HD), appear to be strongly influenced by country and centre experience. Based on these findings, the **ERBP Expert Group suggests that the 'PD first' approach should be presented to the patient as the most logical choice.** However, it also feels that there is **not enough hard evidence to consider it mandatory to start with PD.** Therefore, the patient's preference should be the primary factor in selection as patient satisfaction, compliance with therapy and their quality of life are better if they have been given the opportunity to make an informed choice.

**In most European Countries and also at EU level, it is legally required to inform patients of all treatment modalities.**

There is accumulating evidence that the outcome of patients is jeopardized if they are treated in centres where only one modality is available, or where the experience with alternative dialysis strategies is limited. In those centres, patients are obliged to accept the only available RRT option, or are treated suboptimally because of a lack of experience of other options. All centres should make sure they provide, or at least support in collaboration with another centre, all available modalities, including home HD.

Although no data on randomized controlled trials are available on this topic, some recent well-conceived cohort studies have indicated that outcome of home (daily) HD is superior to conventional in-centre dialysis, and even equivalent to cadaveric transplantation.. Even though it may not be feasible for all centres to develop their own freestanding home HD programme, it is strongly advised that centres organize such a programme jointly.

The option of renal transplantation, both cadaveric and from a living donor, should be discussed with the medically suitable patients, as the outcomes of transplanted patients appear to be better compared to those on standard haemodialysis. However, for the elderly and for patients with multiple co-morbidities, this benefit is less clear. The shortage of available organs raises the ethical question of whether patients who are more likely to benefit should be prioritized over others whose predicted outcome is more questionable.

**The following conditions should not be considered as 'absolute' contraindications to PD (an absolute contraindication is one which would make PD too risky to contemplate):**

- Physical or mental inability to perform PD
- Older age
- Poor adherence/non-compliance to therapy.

- Obesity.
- Congestive heart failure
- Polycystic kidney disease
- Diverticulosis
- Abdominal hernias
- Portal hypertension
- Liver transplantation

Performing PD requires a minimum of physical skills and mental capacity. It is clear that some physical problems, such as visual impairment and tremor or deformities of the hands, may interfere with PD handling.

In the opinion of the ERBP Expert Group, these problems do not a priori preclude the application of PD as an RRT. Several companies and research groups have invested in the development of tools to ease handling of the PD equipment, and it is the task of the PD team to provide creative solutions to individual problems. Moreover, several centres in the world have gained experience in the so-called 'assisted PD. In this setting, it is not the patient themselves who performs the PD but a nurse or another assisting person. Assisted PD must be considered as an alternative to in-centre HD for non-autonomous patients. Even with the additional cost of the assistance, assisted PD in developed countries has been reported to be cheaper than in-centre HD.

### **Is there a specific recommendation or contraindication for elderly patients?**

There are an increasing number of elderly patients starting dialysis worldwide. When advising such patients on modality selection, the following points should be considered:

Elderly patients starting RRT may have numerous co-morbidities at the initiation of dialysis. Older age is frequently associated with loss of strength, dexterity, vision or hearing. Furthermore, cognitive dysfunction may be present. The commencement of dialysis can be associated with a significant decline in the functional status, including cognitive functioning and assistance may therefore become necessary in self-care patients during the course of their PD treatment. In addition those who care for elderly patients on PD may experience adverse effects on their own quality of life, which may, in turn, lead to a loss of assistance. On the other hand, PD may present some advantages in the elderly patients with ESRD as the arrhythmia and hypotension that may occur during the HD sessions will be avoided.

Quality of life is particularly relevant for the elderly patients on dialysis. Travel time to and from the HD centre has a negative impact on patient's quality of life. Home therapy as offered by PD is associated with a better quality of life compared with in-centre HD. In view of the importance of maintaining a good overall quality of life, the option of non-dialytic (or so-called conservative) treatment should also be discussed with the patient and their relatives.

### **Is PD appropriate for patients who have problems adhering to their therapy?**

Presumed or real non-adherence to the prescribed PD regimen can be a challenge to the PD team. Nevertheless, it is unlikely that non-adherent PD patients will become compliant HD patients. It is important for the caregiver, particularly if there is a sudden change in adherence to discover the reason for this change. It is especially important to find out whether the non-compliance is related to the PD therapy itself or whether it is a general attitude of the patient. In some cases, the cause of noncompliance is a condition that requires attention from the caregiver, such as denial of disease, depression, social problems (like divorce or death of a beloved person), intercurrent illness and cognitive deterioration. Some of these conditions are only temporary and/or can be treated adequately. Some of the adherence problems may be solved by the implementation of assisted PD.

### **Is PD a realistic dialysis option for obese patients?**

There is currently not enough evidence to contraindicate PD in obese individuals. However, several comments on this issue are necessary. Obese patients, especially if diabetic, were shown to have a comparable risk of death after starting on PD compared to HD although such evidence is scanty. Most studies in PD patients have found similar or slightly worse survival in those who are obese compared to those with normal body mass index. Obese patients may need larger dialysate volumes, usually provided by APD, to achieve adequate Kt/V (a measure of the clearance of waste products from the body by the kidney), although the increase in body mass is not associated with a proportional increase in body water volume. **In patients with morbid obesity, PD may not be the preferred dialysis modality or is relatively contraindicated** as there may be: difficulties in peritoneal catheter placement and tunnel healing process; increased risk of fluid leaking out around the catheter and infection; possible further weight gain due to glucose absorption from the dialysate; as well as a risk of abdominal pain or discomfort.

### **Congestive heart failure in ESRD and dialysis options.**

Congestive heart failure (CHF) is increasingly common in patients with ESRD. PD, with its more subtle and gentle capacity for ultrafiltration, might be a better and more comfortable alternative. The only large registry study comparing the outcome of patients with CHF on PD vs HD was undertaken in the USA and found a higher mortality risk in PD patients. However, according to the ERBP Expert Group, the results of this study cannot be extrapolated to European patients, because of the different case mix and characteristics of the US population together with the fact that no icodextrin was available to help maintain fluid balance in PD patients. Also the statistical methods applied in this paper were biased in favour of HD. Many single-centre reports indicate that PD can improve quality of life. Based on the existing information, **it is difficult to either support or discard PD as a method of choice in CHF patients**. One particular subgroup, however, could be that of anuric PD patients with CHF, in which maintaining

adequate dry weight is quite difficult.

Furthermore, clinically unapparent overhydration could be present and significant for patients with diminished cardiac reserve, and use of additional specialist objective measures for dry weight assessment is recommended. Careful patient monitoring, control of water and salt intake, efforts to preserve peritoneal and renal function and, in many cases, the use of APD and icodextrin-based PD solutions, that do not use glucose to remove excess fluid, are critical for the management of these patients. However, if maintaining correct dry weight is still impossible to achieve, patients should be promptly transferred to HD, preferably using slow-ultrafiltration, long hour techniques.

### **Is there a reason to recommend/prefer CAPD or APD?:**

There is no reason to prefer CAPD over APD or vice versa, as long as the time between the PD fluid exchanges is matched to the patient's peritoneal 'transport' type. The transport type describes how quickly toxins are removed from the blood and glucose is absorbed from the dialysis fluid. The outcomes for both modalities have been found to be equal and choice should be guided by patient preference.

Although several studies have observed that outcomes on CAPD and APD are equal, it is important to maintain the appropriate dwell time for the appropriate patient. Failing to do so might lead to fluid overload and inadequate solute removal. It is conceivable that short dwells can more easily be obtained with the use of a cycler, whereas long dwells seem to be more appropriate for CAPD. Teams should try to accommodate the patient's lifestyle issues with the underlying membrane characteristics, by making full use of their experience and creativity.

### **When and how to change dialysis modality.**

Whilst the first two sections of this publication deal with the choice of RRT modality when a patient approaches ESRD, the present section focuses on the transition from one modality to another once one form of maintenance RRT has been started. **Three types of transition should be considered: HD to PD, PD to HD, and failed renal transplantation to either HD or PD.**

One single modality may not procure adequate treatment over an entire lifespan; therefore, nephrologists sometimes have to recommend switching modalities. The consequences of such decisions should be evaluated, to consider the benefits or threats not only in the short term, but also in the longer term. Patients with chronic kidney disease should be informed, before the start of their RRT, about the possibility of being switched to an alternative modality at a future date. For that reason, unless there are absolute contraindications for a particular modality, pre-dialysis information provided to patients should cover all possible therapies, without hallmarking any option as 'impossible' or 'bad'.

In the opinion of the ERBP Work Group, the patient's informed choice of treatment modality should be respected, as long as his/her clinical conditions permit. If a chosen RRT modality becomes inadequate, transition to another therapy should be proposed, and the underlying reasoning explained to the patient. Even in these circumstances, the choice of the well-informed patient should be respected. When patients decide not to follow medical advice, despite obvious treatment failure, it should be recorded that the change in treatment has been recommended but declined. The latter situation cannot be considered as inappropriate adherence to the original modality by the treating physician, as a well-informed patient's choice takes precedence.

### **When to be transferred from HD to PD**

Patients on HD should be informed about the option of PD when they suffer from any the following clinical conditions:

- Intradialytic haemodynamic intolerance (falls in blood pressure) and muscle cramps despite optimal adjustment of dry weight
- Difficulties in creating a well-functioning native vascular access
- Intractable or recurrent ascites (accumulation of fluid in the peritoneal cavity)

The rationale for considering PD in case of irremediable haemodynamic intolerance of HD or incapacitating muscle cramps is obvious. In contrast to HD, PD is a continuous therapy that is not characterized by large volume shifts or sudden changes in serum electrolytes like potassium or calcium. Alternatively, short daily or nocturnal HD, preferably performed at home, may also be considered, in order to improve haemodynamic stability.

Pre-dialysis counselling should include giving the patient information on: the importance of vascular access for HD; the need for preservation of arm veins for placement of vascular access; and the notion that starting with PD is a means of preserving the vascular potential. In HD patients, where creation of a well-functioning native vascular access is not possible, PD should be proposed as a better alternative than the use of permanent central vein catheters, which are associated with substantial morbidity and mortality. Infection risk on PD is comparable to that of HD patients with a native fistula, whereas the infection risk of a tunnelled HD catheter is twice as high.

Ascites may be due to heart failure, hepatic failure or cancer. While ultrafiltration during HD may be able to remove fluid from the body and sometimes alleviate the abdominal distension due to ascites, it will often fail to do so. PD may be a better alternative, since fluid can be drained out through the PD catheter. The theoretical concerns of excessive loss of albumin or higher infectious risk seem clinically irrelevant.

It has been demonstrated that the outcome of patients transferred from HD is similar to that achieved in patients who are kept on PD from the start of RRT.

### **Transition from PD to HD:**

Patients on PD should be informed about the option of HD when they suffer from any the following clinical conditions:

- Incapacity to maintain fluid balance .
- Relapsing or persistent peritonitis (inflammation of the membrane enclosing the peritoneal cavity, usually due to infection)
- Incapacity to control uraemic symptoms or to maintain a good nutritional state
- Changes in lifestyle circumstances.
- Declining residual renal function
- Intra-abdominal surgery.
- Sclerosing peritonitis (formation of a thick membrane around the bowel).

**Volume overload** is related to cardiac dysfunction and mortality. Guidance on how to achieve and maintain euvolaemia (i.e. the normal blood volume; neither too much {Hypervolaemia} or too little {Hypovolaemia}) in individual PD patients is hampered by two factors:

- the absence of a convenient and accurate device with which to measure volume status.
- lack of insight into the prevalence of and factors associated with volume overload.

Volume overload in PD can have several causes, which can be even present together in the same patient at the same time. The most common causes are excessive dietary intake of salt and/or water, and ultrafiltration failure. Ultrafiltration failure often occurs because the glucose that draws excess fluid from the body into the peritoneal cavity is transported into the blood too quickly. This ‘fast-transport’ status can be readily diagnosed by performing a validated membrane permeability test, and therapy can be adapted accordingly, as described in the EBPB guidelines on this issue (see Appendix v)

Most episodes of **peritonitis, exit-site infection or tunnel infection** can be treated successfully by adding antibiotics to the PD fluid and should not be a reason to transfer patients to HD. However there are some exceptions to this general rule. Exit-site or tunnel infections progressing to or accompanied by peritonitis (i.e. catheter-related peritonitis) with the same organism often require catheter removal. Resistant peritonitis and relapsing peritonitis commonly require catheter removal in order to resolve the problems.

Catheter removal is also needed in fungal peritonitis and in unresponsive cases of peritonitis with mycobacteria or multiple enteric microorganisms. Catheter removal in these cases requires a period of peritoneal rest before insertion of a new catheter (2 weeks at least and 6 weeks in case of mycobacterial peritonitis). This, of course, requires temporary transition to HD, unless residual renal function is still satisfactory.

The ERBP Work Group feels that insertion of a new PD catheter and resuming PD treatment should be considered if the patient wishes to stay on PD. It should also be kept in mind that persisting or relapsing peritonitis could be a hallmark of poor peritoneal membrane condition, making maintenance of PD risky. Patients should be warned that, in these circumstances, successful PD continuation is uncertain, and that transfer to HD might still be needed some time later. Reinsertion of a new catheter should preferably be done under laparoscopy, in order to visualize and—if necessary—treat adhesions.

### **The Importance of Residual Renal Function.**

The importance of residual renal function (RRF) as a determinant of PD patients' outcome has been demonstrated by numerous studies. The benefits of RRF have been attributed to its role in the maintenance of fluid balance, its association with lower inflammation and better nutritional status, its endocrine functions (erythropoietin production and alpha-hydroxylation of vitamin D) and its contribution to the removal of toxic substances. Based on these data, some have argued that PD patients should be switched to HD in case of a complete loss of RRF; however, it is quite likely that, also in HD patients, RRF is also an important predictor of outcome. In addition, several observational studies have demonstrated that PD in anuric patients is feasible, with acceptable outcomes. Special attention has to be paid, however, to the volume status of these patients. Given the importance of RRF for outcome, maximum efforts should be done to preserve it, by avoiding nephrotoxic insults.

**Surgical procedures** can disturb the integrity of the peritoneal membrane, leading to leakage or insufficient remaining surface area. However, some surgical procedures (e.g. removal of a non-functioning kidney) can be performed without disrupting the peritoneal membrane. It is recommended to inform the surgeons about the importance of preserving peritoneal membrane integrity, and to carefully consider surgical indications to avoid disruption of the peritoneal membrane.

### **Is a pre-emptive switch from PD to HD advocated?**

Some nephrologists advocate 'pre-emptive' switching of PD patients to HD after 2 or 3 years from PD start, even when every aspect of the treatment is going well. This recommendation is based on the findings that, after a few years, outcome on PD starts to get worse than on HD. PD may also become inadequate with declining RRF and the incidence of sclerosing peritonitis starts to rise with time spent on PD. The ERBP Expert Group endorses the recommendation of the International Society for Peritoneal Dialysis that time on PD alone should not be a decisive factor in itself for transferring patients from PD to HD. However, with increasing time on PD, physicians should be aware of the potential pitfalls of the technique, and discuss these and the possible alternatives with the patient.



## **Is there a recommended choice of dialysis modality for patients with failed renal transplantation?**

In patients with failed renal transplantation who return to dialysis, there is no proven difference in survival between HD and PD. Therefore, the choice of dialysis modality for these patients should be based on the same principles as those applying to the initial modality choice.

There is little data available on the impact of dialysis modality on the outcome of patients with failed kidney transplant. However, PD seems to be underused in this setting, for several probable reasons:

- in most dialysis centres, the majority of patients are on HD.
- the start of dialysis in emergency situations also favours HD.
- the fear of increased peritonitis rate or of rapid loss of RRF in patients transferred to PD.

Higher morbidity and mortality rates in patients starting PD after transplant failure compared to de novo PD patients have been reported. On the other hand, there is no significant difference in survival between these two categories of PD patients after correction for age and co-morbidity. Comparative studies (which are few and retrospective in nature) found no differences in survival of patients with failed renal transplantation on HD versus PD.

The issue of tapering immunosuppression or not after restarting PD is still a matter of controversy, since there is no evidence of the beneficial effects of preserving residual function in the transplanted kidney (similar to non-transplanted patients). On the other hand, the continuation of immunosuppressive therapy implies an increased risk of infections and malignancies. Therefore, the decision is currently based on local experience. Slow reduction of immunosuppressive drugs is probably preferable, as it was shown to be associated with similar RRF after 1 year on PD as in non-transplanted patients, without increasing the risk of peritonitis.

## **What does assisted PD mean?**

Assisted PD can be defined as a PD modality performed at the patient's home with the assistance of a health-care technician, a community nurse, a family member or a partner. Additional funding is necessary when patients are assisted by a nurse or by a health-care assistant. Therefore, when using the term 'assisted PD', information regarding the type of assistance must be provided. There are two modalities of assisted PD: assisted APD and assisted CAPD.

Assisted PD must be considered as an alternative to in-centre HD for non-autonomous patients.

Even with the additional cost of the assistance, assisted PD in developed countries is reported to be cheaper than in-centre HD, although costs may vary between countries. Assisted PD enables nephrologists to increase the use of PD in patients starting dialysis. Community-based nurses must be trained by nurses from the PD centre to perform the connection and the exit-site dressing, and to set up the cyclor in case of assisted APD. A 24-h 'hot line' to provide medical or nursing counselling to those involved in the patient's care is needed. The PD centre must deal with organizing the patient follow-up in the PD clinic and hospitalization in the nephrology unit whenever necessary. For assisted APD, only two interventions at the patient's home are necessary, whereas patients on assisted CAPD need four visits daily. In countries where assisted PD is fully covered by the health-care insurance, most of the patients on assisted PD are treated by assisted CAPD; patients' cognitive dysfunction and/or anxiety linked to the cyclor therapy may explain this preference.

In order to decrease the time spent by nurses at the patient's home, a non-disconnectable device with ultraviolet flash can be used. Patients on assisted PD must be reassessed regularly to see whether or not they have become competent to perform self-care PD. For patients on assisted APD, family assistance is associated with a lower peritonitis risks compared with nurse assistance. However, the results are equivalent when centres send one of their PD nurses for a visit at the patient's home on a regular basis; this emphasizes the fact that nurses in charge of assisted PD patients must be trained and re-trained by the nurses from the PD centre. In elderly patients, assisted CAPD is not associated with greater peritonitis risk compared with the family-assisted CAPD.

### **Indications for assisted PD**

Nurse- or health-care technician-assisted PD is indicated for ESRD patients who choose PD as RRT modality or in whom HD is contraindicated, who have no contraindication to PD, but are incapable to perform PD exchanges by themselves, and whose family members' quality of life is affected by the burden of caregiving.

Assisted PD may be indicated for patients starting dialysis or for self-care PD patients who have lost their autonomy.

### **Assisted PD for the unplanned dialysis starter**

The unplanned dialysis starter can be defined as a patient who starts dialysis without any vascular access or PD catheter. These patients usually start HD through a venous catheter. Recently, strategies to use PD for unplanned dialysis starters have been implemented. Assisted PD can be used for a short period of time pending patient education.