PERITONEAL DIALYSIS ADEQUACY IN ELDERLY PATIENTS

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Elderly patients are a diverse group with different comorbidities, life expectancies, and importantly, life expectations. Whilst there are clinical studies and guidelines setting minimum “targets” for small solute clearance and ultrafiltration in peritoneal dialysis (PD), escalating PD prescriptions to achieve Kt/V urea > 1.7 may not be possible in some patients without severe impact to quality of life, and conversion to hemodialysis (HD) may also be contrary to some patients’ wishes. Thus, for some patients, the type of PD (continuous vs intermittent nocturnal) and the intensity of dialysis (duration, fill volumes, number of exchanges, etc.) may be adjusted to maximize quality of life (and minimize symptoms caused by uremia) at the expense of the traditional adequacy targets. This principle applies when we determine how frequently to monitor a patient’s solute clearance and peritoneal membrane function. In some patients, we may also permit a more relaxed salt and water restriction through more liberal use of hypertonic glucose. However, it is important not to have a nihilistic view for all elderly patients but to remember that many elderly patients will be suitable for intensification of dialysis and modality switch. Age should not be used as a criterion to deny appropriate patients the planning required to ensure a smooth transition to HD using a fistula. Advanced end-of-life care planning is a useful tool to help clinicians individualize care to the expectations and desires of elderly patients.

OPINION ON HOW PERITONEAL DIALYSIS GUIDELINES ON ADEQUACY PERTAIN TO THE ELDERLY

Guidelines issued by organisations such as the International Society for Peritoneal Dialysis (ISPD) to improve care of patients treated with PD have historically proved very useful.

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Whilst the principles of existing ISPD guidelines remain universal, they must be interpreted and applied with caution; patient management must be individualized to accommodate their medical conditions and expectations. We are now treating an increasingly diverse range of patients with PD. Many health systems pay carers to deliver this form of dialysis to dependent patients who would not have been previously considered suitable. Strict adherence to the existing guidelines may not be appropriate but multidisciplinary discussions that include patients (and family) are important to ascertain objectives and priorities that are important for the individuals. We hope that this opinion review of PD guidelines and how they pertain to the specific group of frail patients who have high comorbidity and limited life-expectancy (often, but not exclusively elderly patients) can reassure clinicians, allied health professionals, and patients who may otherwise believe they are being “under-treated” or “neglected.”

GUIDELINE FOR SOLUTE CLEARANCE

The ISPD Guideline on targets for solute and fluid removal in adult patients on chronic PD (2006) (1) includes the statements:

1. For small solute removal, the total (renal + peritoneal) Kt/V urea should not be < 1.7 at any time (Evidence level A).
2. A continuous around-the-clock PD regime is preferred to an intermittent schedule whenever possible (Evidence level B).
3. For patients who rely significantly on residual renal function to achieve the minimal target level of small solute clearance, residual renal function should be monitored regularly and at an appropriate frequency (every 1 – 2 months if practicable, otherwise no less frequently than every 4 – 6 months) so that the PD prescription can be adjusted in a timely manner (Evidence level C).

Authors of the ISPD guidelines suggest that Kt/V should be ≥ 1.7 based on evidence of poorer patients’ survival and increased erythropoiesis-stimulating agents (ESA) usage. The studies to derive these conclusions were reviewed (Table 1) to estimate the number and proportion of patients aged > 65 and > 80 yrs. With the sole exception of the study by Yao (3), all were either randomized controlled trials or observational

TABLE 1
Studies Used to Derive ISPD Guidelines on Targets for Solute Clearance

Study	Design	Outcomes	Age of patients (Mean/SD)	Number (%) of patients older than	
				65 yrs	80 yrs
Paniagua (1)	RCT	Peritoneal Kt/V<1.74 (in 67%) } RR (death)=1.0; 95% CI 0.8–1.2 Peritoneal Kt/V>1.74 (in 67%) } hospitalisation same	47/14 (approx.)	97 (10%)	10 (1%)
Lo 2003 (2)	RCT	Kt/V<1.5 } no difference in mortality but greater withdrawn Kt/V: 1.5–2 } & EPO use Kt/V>2 }	59/13 (approx.)	102 (30%)	16 (5%)
Yao (3)	Observational	Univariate analysis (unadjusted for age) Kt/V<1.7 (10 deaths) } survival lower by log rank test ($p<0.05$) Kt/V: 1.7–2 (1 death) Kt/V>2 (3 deaths)	52/15	28 (19%)	4 (3%)
Lo 2005 (4)	Observational: Anuric Patients Statistical significance only in Females	Adjusted for age Kt/V<1.67=4.5 (22 patients); 95% CI 1.8–11.1 Kt/V: 1.67–1.87=1 (33 patients)–Reference group Kt/V>1.87=2.4 (35 patients); 95% CI 0.9–4.1	58/15	48 (32%) incl. males	11 (7%) incl. males
Bhaskaran (5)	Observational: Anuric Patients	RR if Kt/V<1.85=1.9 (18 CAPD, 3 APD); 95% CI 0.9–3.8 (adjusted for age) RR if CrCl<50=1.7 (10 CAPD, 5 APD); 95% CI 0.7–3.4 (univariate)	56/16	34 (28%)	7 (6%)
Jansen (6)	Observational: Anuric patients	High comorbidity was associated with a better technique survival RR if Kt/V<1.5=3.3 (15 patients); 95% CI 1.25–8.6 (adjusted for age) RR if CrCl<40=3.3 (13 patients); 95% CI 1.2–8.6 (adjusted for age)	53/17	33 (25%)	7 (6%)

ISPD = International Society for Peritoneal Dialysis; SD = standard deviation; RCT = randomized control trial; RR = relative risk; CI = confidence interval; EPO = erythropoietin; CAPD = continuous ambulatory peritoneal dialysis; APD = automated peritoneal dialysis; CrCl = creatinine clearance.

studies that adjusted mortality rates for a variety of factors that included age. Nevertheless, given the very small number of patients who were > 80 yrs, it is debatable if these recommendations remain valid for this specific cohort.

For many elderly patients who opt to have PD for lifestyle reasons, technique rather than patient survival may be more important. The observational study by Yao showed poorer technique survival if Kt/V < 1.7, but again the caveat is that only 4 patients in this study were > 80 yrs. Continuous PD regimes were felt to be preferable by the authors of the ISPD guidelines, and certainly this would assist patients achieving a Kt/V target of 1.7. But in the case of the elderly, escalating PD dose may be counterproductive and increase technique failure; increasing fill volume or instituting continuous regimes may increase discomfort or cause subcutaneous leaks or hernias.

We are not suggesting that increasing dialysis dose is not important, but for the elderly it may be more appropriate to emphasize the recommendation:

- For patients with signs and symptoms suggestive of underdialysis, a trial of increasing dialysis should be provided (Evidence level C).

If achieving a dialysis dose target is less relevant for elderly patients on PD, is it necessary for these patients to have their

residual renal function monitored every 1 – 2 months? It is certainly true that residual renal function is important for all patients irrespective of age. It is also true that anuria has been associated with other clinically important issues such as peritonitis, salt, and water overhydration, etc., but perhaps the requirement for such close monitoring (1 – 2 months) is not necessary if escalating dialysis prescription is not possible. Does this logic extend to reducing the frequency or even abandoning regular assessments of Kt/V in some elderly patients (and rely on signs of symptoms to determine when formal testing is required)? If different schedules of dialysis monitoring are implemented, it is important that there are no unintended decrements in overall care package (patients and their carers still need to have PD technique and home assessments, and be supported physically, socially and psychologically to the same or higher levels).

We should like to highlight the final recommendation by the authors of the ISPD guidelines on PD solute and fluid targets:

- The benefit of increasing the amount of peritoneal dialysate (either number of exchanges or volume of each exchange), or changing to hemodialysis, when these targets cannot be met should be balanced against the potential side effects, effects on the patient's lifestyle, and cost consideration (Evidence level C)

GUIDELINES FOR ULTRAFILTRATION AND FLUID MANAGEMENT

The ISPD Guideline on targets for solute and fluid removal in adult patients on chronic peritoneal dialysis (2006) (1) does not include specific suggestions about fluid management other than the statement:

6. Attention should be paid to both urine volume and the amount of ultrafiltration, with the goal of maintaining euvolemia. (Evidence level B).

We would agree with this statement but note that other societies have provided further recommendations. The UK Renal Association guidelines suggest:

- I. We recommend that dialysis regimens resulting in fluid reabsorption should be avoided. Patients with high or high average solute transport, at greatest risk of this problem, should be considered for APD and icodextrin. (1A)
- II. We recommend that dialysis regimens resulting in routine utilisation of hypertonic (3.86%) glucose exchanges should be avoided. Where appropriate this should be achieved by using icodextrin or diuretics. (1B)
- III. We recommend that treatment strategies that favour preservation of renal function should be adopted where possible. These include the use of angiotensin-converting-enzyme inhibitor (ACEi), angiotensin receptor blockers (ARBs) and diuretics, and the avoidance of episodes of dehydration. (1B)
- IV. We recommend that anuric patients who consistently achieve a daily ultrafiltration of less than 750 mL should be closely monitored and the benefits of modality switch considered. (1B)

In general, we feel these recommendations remain sensible for elderly patients undergoing PD. However, whilst very rigid salt/water restriction can minimize the use of hypertonic glucose solutions, this can have severe negative impact on patients' quality of life. More liberal use of these solutions may be appropriate for some elderly patients. Furthermore, the ultrafiltration threshold of 750 mL (for anurics) may be less relevant for the elderly. Clinical (albeit anecdotal) experience would suggest that many elderly patients have low dietary intake of food and fluid such that an ultrafiltration of 750 mL can be excessive.

INTEGRATED DIALYSIS CARE FOR THE ELDERLY

Principles of integrated care (8) still apply for elderly patients. However, cohorts of patients with high comorbidity and limited life expectancy will have different expectations and there will be different needs/indications for the transition from one modality to another. Whilst this section focuses on the transition of patients to hemodialysis, advanced end-of-life planning is particularly relevant for elderly patients. Planning and delivering supportive/conservative care is addressed separately in this special issue of *Peritoneal Dialysis International*.

Peritoneal dialysis has been used successfully to bridge the time between onset of end-stage renal failure (ESRF) and transplantation. For those who cannot be transplanted, the benefit of extended treatment with PD needs to be balanced by the risks that include encapsulating peritoneal sclerosis (EPS). In an attempt to achieve consensus on this subject, the ISPD published their position statement (9). We believe the principles laid out in this position statement remain equally true for elderly patients. But the reduced life expectancy of elderly patients needs to be considered as it has subtle implications on the risk/benefit balance of switching dialysis modalities. Patients particularly at risk of subsequent development of EPS are those with long PD vintage and adverse features such as high and rising peritoneal permeability, low ultrafiltration capacity, difficulty in fluid balance control, and requirement for high glucose concentration dialysate, as well as those with frequent episodes of peritonitis. Even these patients, however, may not develop EPS for several years if they remain on PD. On other hand, discontinuation of PD may be a trigger that initiates symptomatic EPS; hence the decision to switch modality for elderly patients with these parameters must be judged on whether life expectancy remaining on PD exceeds the risk of precipitating the disease (accepting that not only will risk of EPS increase but that ultrafiltration failure, fluid overload and inadequate dialysis may contribute to a patient's demise).

Some elderly patients will need to switch from PD to hemodialysis. This may be for social (lifestyle choice) as well as medical reasons. It is important that these patients should be prepared for the modality switch in the same way as if they were approaching ESRF. There are many lessons to be learnt from the recommendations from the Dialysis Advisory Group of the American Society of Nephrology (10), European Renal Best Practice (11), and the UK Renal Registry (12). A key message that is advocated by these groups is:

- In determining how early to begin preparation of patients for dialysis, it is useful to consider that in our experience it can take 1 – 3 months of iterative chronic kidney disease (CKD) education for patients to accept potential need for renal replacement therapy (RRT) (10).

We believe that this statement is equally, if not more, relevant for patients who are already established on dialysis but need to switch modalities (13). The possibility of (and underlying reasoning for) being switched to HD should be discussed with all appropriate PD patients (including elderly patients). Without trying to state the obvious, some elderly patients express strong opinions against HD, but this should not be assumed for all. In our experience, "trials" of HD can be helpful for a minority of elderly patients; multidisciplinary meetings with patients and their family are particularly useful in these difficult situations as they clarify the individual's priorities.

The debate about whether elderly patients undergoing HD should have a central venous catheter or an attempt to create an arterial-venous fistula is outside the scope of this group, whose expertise is limited to PD. However, we would endorse

the online curriculum devised by Oreopoulous and Wiggins for the ASN (14) that states:

- Given the clear advantage of the fistula over the catheter even in the elderly, catheters should be reserved for cases where the certainty of short survival is high.

On the other hand, an argument can be made for elderly patients with limited life expectancy to have a graft placement over a fistula creation (15). Equally contentious, a catheter may be the preferred initial access for an elderly patient who wishes to have a time-limited trial of HD before deciding whether to continue indefinitely.

If a fistula is to be created for an elective switch to HD, preparations need to take into account the mean time for arteriovenous fistula maturation (between 1 – 3 months). Moreover, incidence of primary fistulae failure is high and may be doubled in the elderly patients (16,17). Therefore, the first vascular access should be placed sufficiently early to allow enough time to either revise the initial access, or for a second access to be placed and mature prior to dialysis switch.

Other key points that have been highlighted by the Dialysis Advisory Group of the American Society of Nephrology (10) that are also relevant for PD patients suitable for switching to HD were:

1. Avoid cannulating upper extremity veins above the wrist.
2. Place hemodialysis vascular access at least 4 – 6 months prior to anticipated need.

A study of 60 patients treated in France who transferred from PD to HD was described by Boissinot *et al.* (18). Only 30% of patients switching modality were dialysing via a fistula after 2 months. Perhaps this should not be a surprise, as more than 50% had unplanned HD initiation with peritonitis being the most frequent cause. Increasing age has been identified as a risk factor for peritonitis in many (albeit not all) studies and is also an important predictor of PD technique failure. Hence, creating “backup” fistulae may be an option for elderly patients with good life-expectancy who are not suitable for transplantation.

It must be acknowledged that many of the suggestions are based on personal opinion and are presented in the hope that it will stimulate debate on this topic. An overriding theme that recurs throughout this opinion piece is that management decisions for elderly patients must be undertaken with their involvement. Due consideration must be given to *their* objectives and priorities. We should reassure patients and their family that deviations from published guidelines do not represent neglect nor negligence, as the evidence base is poor. Particularly relevant for this group of patients, we should support management decisions that focus on quality of life. We would, however, advocate that PD units should maintain accurate records of patients (irrespective of age) transferring to HD with particular emphasis on whether this was predicted (or predictable in retrospect) and if definitive HD access has been created. We would also propose that records should be kept of the outcome of any fistulae created on PD patients to determine the primary failure rate or if patients died or were transplanted before used. These are important

data that are required for us to develop continuous quality improvement programmes.

KEY POINTS

- Elderly patients constitute a diverse group of patients (irrespective of the age threshold).
- Care (including dialysis prescriptions) must be individualized according to patients’ expectations and wishes.
- The International Society for Peritoneal Dialysis guidelines for peritoneal dialysis (PD) Adequacy (solute clearance and fluid balance) will be appropriate for many elderly patients even though very few studies quoted have included patients with advanced age.
- Quality of life considerations mean that escalation of PD may not be appropriate for some elderly patients. In these cases, the frequency and intensity of monitoring solute clearance and peritoneal membrane function can be reduced.
- Principles of integrated care apply to elderly patients on PD although the focus may be more towards advanced end-of-life care planning rather than transplantation. However, appropriate elderly patients should not be denied the opportunity to undergo modality switch to HD with appropriate HD access planning.

DISCLOSURES

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