Monitoring patients on peritoneal dialysis

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GUIDELINES

No recommendations possible based on Level I or II evidence

SUGGESTIONS FOR CLINICAL CARE

(Suggestions are based on Level III and IV evidence)

- **Total (peritoneal plus residual renal) weekly Kt/V_{urea} and C_{Cr} measurement and a peritoneal equilibration test (PET) should be performed approximately 4 weeks after dialysis commencement, but no sooner than 2 weeks after dialysis commencement because of unstable peritoneal permeability at this stage (Level III evidence).**
- **Residual renal Kt/V and C_{Cr} measurements should be repeated at the following times:**
  - **i. every 2 months in automated peritoneal dialysis (APD) patients and every 4–6 months in continuous ambulatory peritoneal dialysis (CAPD) patients who are dependent on residual renal function to achieve small solute clearance targets, particularly those with a small 'safety margin' (e.g. patients treated with 'incremental' rather than 'full-dose' peritoneal dialysis),**
  - **ii. following a history of a substantial decline in urine output ,**
  - **iii. following unexplained fluid overload, and**
  - **iv. with clinical or biochemical evidence of worsening uraemia.**
- **Total (peritoneal plus residual renal) weekly Kt/V_{urea} and C_{Cr} measurements should be repeated at the following times:**
  - **i. every 6 months as a routine measure,**
  - **ii. with clinical or biochemical evidence of worsening uraemia, and**
  - **iii. within 4 weeks of any alteration in peritoneal dialysis (PD) prescription.**
- **Measurements of clearance in PD patients should be interpreted in light of a patient's clinical status, giving attention to the possibilities of patient non-compliance and errors in sample collection or laboratory measurement.**
- **PETs should be repeated annually or if there is clinical evidence of a change in transport status (e.g. a clinically significant decrease in ultrafiltration or unexplained fluid overload).**

- **Patients should have clinical assessments and measurements of plasma urea, creatinine and electrolytes every 2 months.**

Background

Small solute clearance is only one marker of wellbeing in patients on PD. Monitoring of PD should include some objective measurements of the adequacy of dialysis delivery, patient compliance, dialysis reliability, individual patient response to therapy and modification of membrane characteristics by the procedure. Unfortunately, there has been a tendency in the renal literature and in other guidelines to equate adequacy with small solute clearance measurements. Small solute clearance must, therefore, not be considered in isolation, but interpreted in the more global context of clinical and laboratory assessments of all the other manifold aspects of dialysis adequacy, including hydration status, blood pressure and lipid control, bone disease, anaemia, nutrition, etc.

Search strategy

Databases searched: MeSH terms and text words for peritoneal dialysis were combined with text words for renal clearance, peritoneal clearance, small solute clearance, creatinine clearance and peritoneal equilibration test and then combined with the Cochrane highly sensitive search strategy for randomised controlled trials. The search was carried out in Medline (1960 – October Week 2 2003). The Cochrane Renal Group Trials Register was also searched for trials not indexed in Medline.

Date of searches: 18 November 2003; 25 November 2003**.**

What is the evidence?

No randomised controlled trials (RCTs) are available which address this issue.

There is no available evidence as to the optimal frequency of monitoring for patients on PD.

The frequency of measurement of residual renal function (RRF) should be more frequent in patients whose ability to achieve total weekly small solute clearance targets depends on RRF. This should include patients on APD as there is variable evidence regarding the rate of decline of RRF. The basis for the recommended frequency of monitoring is discussed in the guideline titled “Selection of patients for APD versus CAPD”.

Peritoneal clearance measurements only need to be repeated once every 6 months since the available evidence suggests that such measurements tend to remain fairly stable. In the CANUSA study, where no formal attempt was made to change dialysis prescription, there was no significant change over 2 years in mean weekly peritoneal Kt/V_{urea} (1.67–1.70) and C_{Cr} (44.2–47.3 L/1.73 m^2) (Churchill et al 1996) (Level III evidence).

If dialysis prescription is changed to compensate for a drop in measured renal clearance, total (peritoneal plus renal) clearance should then be remeasured within a 4-week period to confirm that small solute targets have been achieved (Level III evidence).

Summary of the evidence

There are no RCTs on this topic. There is no available evidence as to the optimal frequency of monitoring for patients on dialysis. Peritoneal clearance measurements need only to be repeated if there has been a change in RRF, ultrafiltration, or alterations in peritoneal membrane function (Level III evidence).

What do the other guidelines say?

Kidney Disease Outcomes Quality Initiative:

1. Measures of Peritoneal Dialysis Dose

Guideline 3.
Frequency of Delivered PD Dose and Total Solute Clearance Measurement Within Six Months of Initiation (Opinion)
The total solute clearance (delivered PD dose plus residual kidney function) should be measured at least twice and possibly three times within the first 6 months after initiation of PD. For patients initiating dialysis for the first time and/or patients with substantial residual kidney function, the first measurement should be performed approximately 2 to 4 weeks after initiation of PD. For patients transferring from another renal replacement therapy to PD and/or for patients who do not have substantial residual kidney function, the first measurement of delivered dose of PD should be made by 2 weeks after initiation of PD. To establish a baseline, at least one and possibly two additional measurements will need to be performed in the subsequent 5 months. The frequency of measurement of residual kidney function depends on the PD prescription of incremental versus full dose.

Guideline 4.
Measures of PD Dose and Total Solute Clearance (Opinion)
Both total weekly creatinine clearance normalized to 1.73 m^2 body surface area (BSA) and total weekly Kt/V_{urea} should be used to measure delivered PD doses.

Guideline 5.
Frequency of Measurement of Kt/Vurea, Total C_{Cr}, PNA, and Total Creatinine Appearance (Opinion)
After 6 months, total Kt/V_{urea}, total C_{Cr}, and PNA (with all its components) should be measured every 4 months, unless the prescription has been changed or there has been a significant change in clinical status.

British Renal Association:

A peritoneal equilibration test (PET) should be performed after 4–8 weeks on dialysis, and when clinically indicated, e.g. when biochemical indices or loss of ultrafiltration raise suspicion of changes in peritoneal transport characteristics, or when therapy is changed to APD. (C)

A total weekly creatinine clearance (dialysis + residual renal function) of greater than 50 L/week/1.73 m^2 and/or a weekly dialysis Kt/V urea of greater than 1.7, checked eight weeks after beginning dialysis, are minima. Higher targets are desirable especially for high average and high transporters and APD patients. (B)

At present both Kt/V and creatinine clearance are acceptable measures of adequacy until evidence accumulates to show the superiority of one over the other. Achieving either target is acceptable; creatinine clearance is more difficult to achieve in anuric patients with below average peritoneal solute transport. (C)

These studies should be repeated at least annually, and more frequently if clinically indicated, particularly if suspicion arises that residual renal function has declined more rapidly than usual. (C)

Careful attention to fluid balance, especially in anuric patients, is essential. The use of icodextrin in the day-time dwell combined with APD to achieve both adequate solute clearances and fluid removal is recommended. (B)

Canadian Society of Nephrology:

Take the initial clearance measurements within 6–8 weeks of commencing peritoneal dialysis and plan to repeat these subsequently every 6 months. In the case of patients who are functionally anephric when they begin peritoneal dialysis, and so at high risk of underdialysis, take the initial clearance measurement within 2 weeks. In the cases of patients whose ability to achieve clearance targets depends on residual renal function, measure the urinary contribution to clearance every 3 months. In the case of patients who are clinically very stable and who are achieving clearance targets by peritoneal clearance alone, it may be reasonable to reduce the frequency of clearance measurements to once every 12 months. (Opinion)

In all patients, take any additional measurements any time unexplained and possibly uraemic symptoms or complications or unexpected alterations in biochemistry arise, or if the patient has a history of decreasing urine output or unexplained fluid overload. The clinician should also take additional measurements within 4 weeks of any alteration in the peritoneal dialysis prescription. (Opinion)

Repeat 24–hour collections if very unexpected results occur (e.g. a major change in urea or creatinine equilibration between blood and dialysate, a major increase or decrease in the residual renal component of clearance, an unusually high or low drain volume). Such findings often indicate inaccurate collections, patient non-compliance on the day concerned or laboratory errors, and should not be an indication to alter prescriptions.

Perform a PET within 6 weeks of initiating peritoneal dialysis, and repeat it when/if unexplained changes in peritoneal ultrafiltration or equilibration occur. (Opinion) Pay

particular attention to hydration, serum albumin and nutritional status in patients who are high transporters on peritoneal equilibration testing. (Opinion) Emphasise clinical detection and treatment of volume overload and hypertension in all patients on peritoneal dialysis. (Opinion)

European Best Practice Guidelines: No recommendation.

Implementation and audit

Measurement of peritoneal and renal Kt/V and C_{Cr} on a 6-monthly basis and reporting of results to ANZDATA should be encouraged.

Suggestions for future research

No recommendation.

Reference

Churchill DN, Taylor DW, Keshaviah PR. The Canada-USA (CANUSA) Peritoneal Dialysis Study Group. Adequacy of dialysis and nutrition in continuous peritoneal dialysis: association with clinical outcomes. J Am Soc Nephrol 1996; 7: 198–207.