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CLINICAL PRACTICE GUIDELINES FOR PERITONEAL ACCESS

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This current version provides a summary of recommendations for best practice in creating peritoneal access for patients on peritoneal dialysis (PD). A more detailed review of peritoneal access is available in the report from the Renal Association Working Party on Peritoneal Access (final version April 2008) available at www.renal.org.

These guidelines are evidence based where such evidence exists. The published literature was reviewed at www.ncbi.nlm.nih.gov/pubmed using the search term "peritoneal dialysis catheter," identifying 2320 references. Adding the term "trial" reduced this number to 216. These were individually reviewed to identify possible randomized controlled trials, meta-analyses, guidelines, and reviews that would be considered in the preparation of the document. The document has been reviewed by all authors and has been placed for consultation on the Renal Association Web site and discussed at the Clinical Guidelines Committee. It has also been reviewed by a consumer research panel run by Jane Ash (Special Projects Administrator, North and East Yorkshire and Northern Lincolnshire Comprehensive Local Research Network) and by renal patients in Sheffield, United Kingdom.

The evidence for these recommendations has been assessed using the modified GRADE system. The modified GRADE system defines both the strength of the recommendations of the guideline authors and the level of evidence upon which each of the recommendations is based. This grading system classifies expert recommendations as "strong" (Grade 1) or "weak" (Grade 2) based upon the balance between the benefits and risks, burden, and cost. The quality or level of evidence is designated as high (Grade A), moderate (Grade B), low (Grade C), or very low (Grade D) depending on factors such as study design, directness of evidence, and consistency of results. Grades of recommendation and quality of evidence may range from 1A to 2D.

The GRADE system was developed by an international group of guideline developers and methodologists to maximize the usefulness of clinical practice guidelines in the management of typical patients (1–7). Most guideline organizations recognize the need for a standard grading scheme and the GRADE system has been adopted by many leading organizations, including NICE, SIGN, KDIGO, ERBP, and KDOQI, as well as UpToDate (8,9).

FULL CLINICAL PRACTICE GUIDELINES FOR PERITONEAL DIALYSIS ACCESS

GUIDELINE 1: THE ACCESS TEAM

Guideline 1.1: The Access Team (1C): We recommend that each center should have a dedicated team in-

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volved in the implantation and care of peritoneal catheters.

Rationale: The access team should comprise nurses, nephrologists, and surgeons who have experience in peritoneal dialysis (PD). Each member of the team should understand the importance to the patient of successful access placement and the need for attention to detail in the reduction of complications (10).

GUIDELINE 2: TIMING AND COORDINATION OF REFERRAL AND SURGERY

Guideline 2.1: Timing and Coordination of Referral and Surgery (2B): We suggest that, whenever possible, catheter insertion should be performed at least 2 weeks before starting PD. Small dialysate volumes in the supine position can be used if dialysis is required earlier.

Rationale: There are two main patient groups requiring PD access:

1. Patients with progressive renal failure predicted to need dialysis: For these patients, access should be coordinated from the chronic kidney disease low clearance clinic. The objective is placement of access sufficiently early to enable the patient to train for PD in a timely fashion while residual renal function is sufficient, and to avoid the need for temporary vascular access for hemodialysis if there are problems with catheter function. It is not recommended that patients commencing PD have an arteriovenous fistula formed unless there is a plan to transfer to hemodialysis within a few months or some clinical doubt regarding the viability of PD in a given patient beyond a few months.
2. Patients with stage 5 chronic kidney disease presenting as uremic emergencies [late referrals; 23% of new patients in the UK (11)]: For these patients there should be a pathway that allows the choice of PD as a modality. This requires adequate patient education to be available to permit choice. The advantage of placing PD access in patients who have not had the opportunity to be prepared for renal replacement therapy is that the requirement for prolonged use of central venous access can be reduced. This has to be balanced against the potential for complications associated with the early use of PD catheters (12).

It seems appropriate to adopt the European Best Practice standard for the timing of PD catheter insertion: "Whenever possible, the catheter insertion should be performed at least 2 weeks before starting peritoneal dialysis. Small dialysate volumes in the supine position can be used if dialysis is required during this period" (13).

GUIDELINE 3: IMPLANTATION PROTOCOL

Guideline 3.1: Implantation Protocol (1A): We recommend that renal units should have clear protocols for perioperative catheter care, including the use of antibiotic prophylaxis.

Rationale: The following points should be included in the perioperative catheter care protocol:

- Preoperative: checking for hernias and screening for methicillin-resistant *Staphylococcus aureus* (MRSA) and nasal carriage of *S. aureus*; identifying a catheter of a suitable length; marking the exit site with the patient sitting or standing.
- Pre-implantation: preparing the bowel with laxatives; ensuring bladder emptying; administering prophylactic antibiotics; preparing surgical site according to NICE guidance (14).
- Post-procedure: flushing catheter and capping off using suitable dialysate; covering exit site with a suitable nonocclusive dressing and, if possible, not disturbing for 5 – 10 days; immobilizing the catheter; discharging patient home with supply of aperients and advice on recognizing potential complications. Once the catheter is placed and until healing is completed, the dressing changes should be done by a dialysis nurse using sterile technique.

Administration of prophylactic antibiotics is recommended to reduce the risk of catheter-site infection, peritonitis, and wound sepsis and there is randomized controlled trial (RCT) evidence for the use of vancomycin (15). The Cochrane Collaboration found four trials of intravenous antibiotics and found the evidence to be strong in preventing catheter insertion-associated early peritonitis but not tunnel or exit-site infection (16). This evidence is also reviewed in the ISPD peritonitis guidelines (17). The choice of antibiotic should be based upon local guidelines, with consideration given to efficacy, risks of selection of resistant organisms, and development of *Clostridium difficile* colitis.

GUIDELINES 4: THE IMPLANTATION TECHNIQUE

Guideline 4.1: The Implantation Technique (1B): We recommend that local expertise at individual centers should govern the choice of method of PD catheter insertion.

Guideline 4.2: The Implantation Technique (1B): We recommend that each PD unit should have the ability to manipulate or reimplant PD catheters when necessary.

Guideline 4.3: The Implantation Technique (1A): We recommend that urgent removal of PD catheters should be available where necessary.

Rationale: Catheter removal is indicated either acutely in the case of PD peritonitis or as a planned procedure, for example, following renal transplantation or switch to hemodialysis. For the planned procedure, catheter removal can be performed as a day case. Under certain circumstances, simultaneous removal and replacement has been described for certain indications, for example, localized exit-site infection or during remission following relapsing peritonitis (18). This should not be done for tunnel infection or active peritonitis.

Guideline 4.4: The Implantation Technique (1A): We recommend that timely surgical support should be available for the review of PD patients.

Rationale: There is no RCT evidence to support one method of insertion over another; however, the method needs be determined by patient characteristics. For more complicated patients, including those with previous significant abdominal surgery, a technique that involves direct vision is necessary, such as laparoscopic or open insertion (19).

Peritoneal access surgery is generally considered part of the overall requirement for dialysis access and should include facilities for both catheter insertion and catheter removal. Data from the UK Renal Registry indicate that the incident renal replacement population was 113 per million of the population in 2004, with 20% starting on PD (11). About two thirds of catheter insertions in the UK are performed using the open surgical technique and the majority of the others are done using the medical percutaneous technique.

GUIDELINE 5: FACILITIES FOR PD CATHETER INSERTION

Guideline 5.1: Facilities for PD Catheter Insertion (1A): We recommend that a dedicated area should be used for catheter insertion, with appropriate staffing, suction, oxygen, and patient monitoring facilities.

Rationale: The anesthetic requirement depends on the technique selected, which is influenced by the characteristics of the patient. Typically, for percutaneous or peritoneoscopic routes, sedation may be required (20). Conscious sedation needs to be managed according to local clinical governance procedures.

Guideline 5.2: Facilities for PD Catheter Insertion (2C): We suggest that no particular catheter type has been proven to be better than another.

Rationale: The Cochrane Review did not find any advantage for straight versus coiled catheters, single or double cuff, median or lateral incision (21). However, a RCT reported improved primary catheter function (22) and improved PD technique survival for straight versus coiled catheters (23). A further RCT reported that coiled catheters might have higher migration rates than straight catheters (24). These data relate to relatively small studies and we would not advocate at this stage that centers with good outcomes change their choice of catheter type until more information is available. Although subcutaneous burying of the catheter until use (Moncrief method) was not associated with a reduction in infectious complications (25), its use may have advantages for the relationship between the timing of catheter insertion and the start of training.

Guideline 5.3: Facilities for PD Catheter Insertion (2C): We suggest that a catheter of a suitable length should be used.

Rationale: It is good practice to make an assessment of the required length of the peritoneal catheter since a catheter of inappropriate length can lead to pain or impaired function (26,27). We draw attention to the publications by John Crabtree describing a method to determine the appropriate length for the PD catheter (27).

Guideline 5.4: Facilities for PD Catheter Insertion (2C): We suggest that PD catheters should be inserted as day case procedures in selected cases as long as this does not compromise the quality of care.

Rationale: The use of day case facilities has considerable advantages for the patient and resource utilization (28). However, local practices vary with respect to patient preparation and post-insertion care, and these should take priority over the length of in-patient stay (29).

GUIDELINE 6: TRAINING FOR PD CATHETER INSERTION

Guideline 6.1: Training for PD Catheter Insertion (1C): We recommend that PD catheter insertion training should be available to all trainees with an interest.

Rationale: Renal Association training committees should advise the inclusion of PD catheter insertion as an optional component of the curriculum for trainees, although this will not be taken up by all trainees (30). A procedure-based competency for PD catheter insertion should be included in renal medicine specialty training curricula.

Guideline 6.2: Training for PD Catheter Insertion (1A): We recommend that PD catheter insertion should not be delegated to inexperienced unsupervised operators.

Rationale: Successful peritoneal access is crucial and should be performed by an operator (surgeon, special-

ist nurse, or physician) with training and expertise in creating peritoneal access (10).

GUIDELINE 7: AUDIT OF PD CATHETER INSERTION

Guideline 7.1: Audit of PD Catheter Insertion (1B): We recommend that there should be regular audit at not less than 12-month intervals of the outcome of catheter insertion as part of multidisciplinary meetings of the PD team and the access operators.

Rationale: There is RCT evidence to demonstrate that audit can improve practice (31). The primary marker of successful outcome is primary catheter patency. Although we do not have a specific audit standard in this area, it has been recommended that > 80% of catheters should be patent at 1 year (censoring for death and elective modality change) (10). The following are audit standards for catheter-related complications:

- Bowel perforation: < 1%
- Significant hemorrhage: < 1%
- Exit-site infection within 2 weeks of catheter insertion: < 5%
- Peritonitis within 2 weeks of catheter insertion: < 5%
- Functional catheter problem requiring manipulation or replacement or leading to technique failure: < 20%

At least every 12 months, a combined meeting between surgeons (or other healthcare providers inserting PD catheters) and the nephrology team should be held to review PD catheter data.

Data to be collected and used in the audit should include

- Perioperative complications, including bowel perforation and/or significant hemorrhage (requiring transfusion or surgical intervention)
- Early infections: peritonitis and exit-site infections within 2 weeks of catheter insertion
- Dialysate fluid leak
- Catheter dysfunction at the time of first use that requires catheter manipulation or replacement or results in technique failure

SUMMARY

Clinical Practice Guidelines for Peritoneal Access (Modified GRADE of Recommendation and Evidence)

Guideline 1: Access team	
Guideline 1.1	We recommend that each center should have a dedicated team involved in the implantation and care of peritoneal catheters (1C).
Guideline 2: Timing	
Guideline 2.1	We suggest that, whenever possible, catheter insertion should be performed at least 2 weeks before starting PD. Small dialysate volumes in the supine position can be used if dialysis is required earlier (2B).
Guideline 3: Implantation protocol	
Guideline 3.1	We recommend that renal units should have clear protocols for perioperative catheter care, including the use of antibiotic prophylaxis (1A).
Guideline 4: Implantation technique	
Guideline 4.1	We recommend that local expertise at individual centers should govern the choice of method of PD catheter insertion (1B).
Guideline 4.2	We recommend that each PD unit should have the ability to manipulate or reimplant PD catheters when necessary (1B).
Guideline 4.3	We recommend that urgent removal of PD catheters should be available where necessary (1A).
Guideline 4.4	We recommend that timely surgical support should be available for the review of PD patients (1A).
Guideline 5: Facilities	
Guideline 5.1	We recommend that a dedicated area should be used for catheter insertion with appropriate staffing, suction, oxygen, and patient monitoring facilities (1A).
Guideline 5.2	We suggest that no particular catheter type is proven to be better than another (2C).
Guideline 5.3	We suggest that a catheter of a suitable size should be used (2C).
Guideline 5.4	We suggest that PD catheters should be inserted as day case procedures as long as this does not compromise the quality of care (2C).
Guideline 6: Training	
Guideline 6.1	We recommend that PD catheter insertion training should be available to all trainees with an interest (1C).
Guideline 6.2	We recommend that PD catheter insertion should not be delegated to inexperienced unsupervised operators (1A).
Guideline 7: Audit	
Guideline 7.1	We recommend that there should be regular audit at not less than 12-month intervals of the outcome of catheter insertion as part of multidisciplinary meetings of the PD team and the access operators (1B).

PD = peritoneal dialysis.

Audit Measures

1. Catheter patency: more than 80% of catheters should be patent at 1 year (censoring for death and elective modality change)

2. Complications following peritoneal dialysis catheter insertion:
   - Bowel perforation: < 1%
   - Significant hemorrhage: < 1%
   - Exit-site infection within 2 weeks of catheter insertion: < 5%
   - Peritonitis within 2 weeks of catheter insertion: < 5%
   - Functional catheter problem requiring manipulation or replacement or leading to technique failure: < 20%

DISCLOSURES

Ana Figueiredo has received speakers' honoraria from Baxter and travel sponsorship from Baxter and Fresenius. Bak-Leong Goh has received speakers' honoraria from Baxter. Sarah Jenkins has received speakers' honoraria and a travel grant from Baxter. David Johnson has received speakers' honoraria from Baxter and Fresenius and has participated in clinical trials with Baxter, Fresenius, and Gambro. He has been a consultant to Baxter and Gambro and has received travel sponsorships from Baxter and Fresenius. He is also the recipient of a Baxter Extramural Research Grant. Robert Mactier has received travel sponsorship from Amgen, Leo, and Roche and has participated in multicenter clinical trials sponsored by Amgen, Baxter, and Roche. He has participated in Advisory Board meetings for Amgen and Baxter. Dirk Struijk has received lecturing honoraria from Baxter and has participated in clinical trials with Baxter. Martin Wilkie has received speakers' honoraria from Gambro, Baxter, and Fresenius and has participated in clinical trials with Baxter and Fresenius.

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