Peritoneal Dialysis International, Vol. 26, pp. 625–632
Printed in Canada.

0896-8608/06 $3.00 + .00

ISPD GUIDELINES/RECOMMENDATIONS

PERITONEAL DIALYSIS PATIENT TRAINING, 2006

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Patient training is an essential component of a peritoneal dialysis (PD) program but no standards have been published to guide the education process. The Nursing Liaison Committee (the Committee) of the International Society for Peritoneal Dialysis (ISPD) has previously reviewed current standards of care for PD training throughout the world through a survey of nurses (1). Furthermore, we have reviewed the literature to determine the guidelines for PD training that are most likely to achieve the best outcomes for patients. We now establish the first set of ISPD recommendations for patient training.

REVIEW OF THE LITERATURE ON PATIENT EDUCATION FOR PD

There are numerous articles and workshops in English pertaining to patient training (2–35). Several textbooks in English have sections on training (36–41), and there are some articles in Japanese (42,43), Hebrew (44) (article unobtainable), French (45,46), Polish (47,48), and Spanish (49), but few references provide guidelines to the actual training process. Of the 46 references identified through a Medline search using the key words "peritoneal dialysis," "education," "patient," and "training," 22 were published between 1979 and 1986, in the early days of PD. Only 11 were published from 1987 to 2000, and 13 from 2001 to 2005. Past articles generally proposed a teaching plan to be essential and often listed subjects to be covered. Many point to the general notion that teaching PD requires special skills. The most comprehensive review of the components of a PD education program was based upon adult education principles taught by a nurse, use of simulation techniques for problem solving, and inclusion of an evaluation process (25). The authors credit a low peritonitis rate and low dropout rate to their well-organized teaching plan. A recently published article examines a multisensory approach to training for the learning disabled (32). Some are descriptive case studies of patient training (6,24,30). Kennedy describes a doll used as an aid for training in continuous ambulatory peritoneal dialysis (the CAPD doll); it is biologically accurate internally with a PD catheter inserted (27). Many studies emphasize the role of PD trainers and the need for a full-time permanent assignment to PD training (6,7,38). Special needs are addressed for diabetic patient training (11,48), peritonitis reduction through training (26), mentally handicapped patient training (12), and pediatric patient training with their special considerations (22,47). A survey of centers

***Perit Dial Int* 2006; 26:625–632** **www.PDIConnect.com**

KEY WORDS: Training; education; learning; teaching; concepts; skills; procedures.

[a] The authors are members of the International Society for Peritoneal Dialysis (ISPD) Nursing Liaison Committee. The guidelines have been approved by the ISPD Council and the Education and Standards Committee.

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Received 30 May 2006; accepted 5 June 2006.

caring for pediatric patients found lower peritonitis rates in programs with larger numbers of patients and with longer training time (50). Barriers to learning and approaches for those with low levels of literacy, the elderly, and issues of cultural diversity are addressed in on-line presentations by the Renal Education Association (33).

The principals of patient education have been detailed by nephrology nurse organizations such as the American Nephrology Nursing Association (ANNA) with their Core Curriculum (39), but there is little in the way of standards by which individual PD programs could evaluate their training program.

The ISPD Publications Committee published recommendations for training requirements of nephrology nurses in 1996, listing specific theoretical objectives and practical skills, but without specific standards for patient training (51).

ISPD GUIDELINES: PRINCIPLES OF PD TRAINING

WHO SHOULD BE A PD TRAINER?

A nurse should provide PD training whenever possible rather than a technician (*Opinion based*). While there are no studies evaluating the education or abilities of the trainer, nurses seem more likely to possess the qualities required. Previous ISPD recommendations have included a 6- to 8-week orientation in PD and assignment to a mentor who will observe the nurse performing patient education (51). Specific objectives of theoretical knowledge and practical skills have been outlined by the ISPD (51,52). The ratio of patient to nurse is, ideally, 1:1; however, the practice of 1 nurse training 2 – 3 patients at the same time has never been studied. The Committee recommends the 1:1 ratio until further research can demonstrate the effectiveness of group training (*Opinion*).

The nurse selected to provide PD training must have good communication skills, be innovative and consistent, and firmly believe in patient self-care. Since most health professionals have received no formal preparation for patient education, the trainer must be willing to develop proper training skills based upon the principles of adult learning. Formal preparation by education specialists in the principles of adult learning would be very desirable for the PD trainer. Some experience in general medical and surgical nursing is essential since the majority of PD patients have numerous comorbid conditions. The skills of a PD trainer will be augmented over a period of years in a PD program; however, the trainer should never be complacent about acquiring new skills and methods of training. Continuing education is very important for PD trainers so that their skills do not become stale and trainers do not stray from the principles of adult learning.

Mentoring from an experienced nurse can be very helpful for the new trainer. The Committee recommends that a new PD trainer be supervised for at least 1 patient training course before becoming an independent trainer (*Opinion*). The abilities of a PD trainer can be evaluated using the trainer learning objectives listed in Table 1. Mentoring is also helpful to the experienced nurse, as it requires a careful presentation of the principles of the education process. Individual trainers, and the PD program as a whole, should be assessed periodically for outcomes of patients whom they trained (peritonitis, catheter infection, protocol violations, clinic atten-

TABLE 1
Peritoneal Dialysis (PD) Trainer Learning Objectives

The PD trainer will be able to
- Provide an effective environment for learning
- Present an overview of the PD training course to the patient
- Prepare the learner for what they are to learn and how the learner and the trainer will know that learning has occurred
- Demonstrate steps of procedures with consistency for the learner
- Apply the concepts of adult learning
- Understand the difference between motor skills and procedures
- Encourage and support the learner through repetition and verbal cues
- Prevent the learner from practicing procedures until all steps have been learned in order
- Supervise the learner's practice until all steps have been mastered
- Provide immediate feedback during learner practice
- Understand not to teach theory during motor skill learning
- Restrict the educational content to three or four messages per hour
- Help the learner problem solve by defining problems and listing possible solutions
- Use questions to evaluate the learning process and guide the learner
- Understand that concepts involve recognition of symptoms
- Recognize that learners need repetition of new information in order for it to move from short-term memory to long-term memory
- Use pairs to help learners differentiate symptoms and concepts
- Recognize that information memorized is the easiest to forget
- Evaluate the effects of learning by tracking outcomes
- Understand that retraining is important as a form of repetition

dance, time on PD, deaths, transfers off PD). Much research is needed to determine the optimal method of training the trainer.

THE ROLE OF THE PHYSICIAN

The physician should provide the PD trainer with the opportunity to learn the theory and practical skills of PD as well as preparation for the educational responsibilities of training patients. Physicians should not assume that a nurse would have these skills. Additionally, assignment of an experienced mentor is imperative. In a new or small program, this may require the PD trainer to attend another center for mentoring. Industry-sponsored preparation of the PD trainer may be an excellent option but the physician is responsible for determining the quality of this educational curriculum.

WHO IS THE LEARNER?

The learner can be the patient alone, the patient with a partner, the partner only, or a third-party caretaker. The PD trainer should determine who is the most appropriate learner, with consideration for patient and family preferences and abilities. It is important to evaluate the learner on an individual basis. The learner should be allowed to establish his or her own pace of learning. When the patient is a learner, uremia and other medical illnesses may seriously complicate the learning process. Cognitive skills may be compromised in these patients, requiring much patience and repetition in training. Many patients will have disabilities and comorbid conditions that require careful adaptation of the teaching plan.

WHAT SHOULD BE TAUGHT?

A formalized program is the best method to prepare a patient for self-management of a chronic disease (36). This program includes procedures and problem-solving skills, concepts of PD self-management, emotional support, and guidance for behavioral changes. Self-management is one of the most well-defined purposes of patient education with the greatest potential for benefit.

The learner needs to know concepts and to perform specific motor skills. Procedures (such as an exchange) require both motor skills and concepts. The learning process is not advanced by simply conveying "facts" for memorization. A teaching plan must be established. It may be merely an outline or a more detailed course plan. The specifics of a teaching plan have been clearly outlined in *The Textbook of Peritoneal Dialysis* (38). All procedures should be available in written or pictorial form for patients. Unit protocols should be based upon published ISPD guidelines:

1. Overview of PD
2. Aseptic technique, hand washing, masking (optional)
3. Steps in exchange procedures
4. Emergency measures for contamination
5. Exit-site care
6. Complications (peritonitis, fluid balance, drain problems, constipation, exit-site infections, fibrin, leaks, pain, adding intraperitoneal medications)
7. Troubleshooting
8. Record keeping
9. Ordering supplies
10. Clinic visits/home visits
11. Holiday protocols/employment/hobbies/sports

A post-training test for the patient should be created to determine if the training objectives have been met. This test should include both concepts and skills testing by the trainer.

Appropriate teaching aids must be acquired, including easy-to-read materials, hands-on-training equipment, such as a mannequin or training apron with PD catheter; a blackboard, felt board, or paper board in the training room; and, optionally, video or audio tapes or access to the Internet. Materials used as supplements for training should be written in simple words and short sentences, in an uncluttered format, in a font large enough for easy reading, and with headers to organize the document. All-upper-case lettering will decrease readability. Illustrations should be simple and have captions. Documents created on the computer can be tested for readability and should not exceed grade 6 level. At this level, 75% of Americans will be able to read this reasonably well (37). This may need to be adjusted in other parts of the world for the appropriate literacy skills of the population in training.

WHERE SHOULD THE TRAINING OCCUR?

The training room needs a door for privacy and quiet. No other activities should be conducted in the room while a patient is in training. There needs to be good lighting with adequate work surfaces and a sink for hand washing. A chair in which the patient can rest is desirable. Training can be done at the clinic, in the hospital, at the patient's home, or at an alternate site. One study has shown improved outcomes for patients taught in their home compared to training at the clinic (19).

WHAT SHOULD BE THE DURATION OF TRAINING?

A recent international survey of the number of days and hours per day currently used by PD nurses around the world did not demonstrate any relationship to peritonitis rates (1). An international survey of pediatric training did, however, find that longer training time was related to lower peritonitis rates ($p < 0.01$) (50). There are no randomized studies comparing outcomes with duration of training. One study reported lower infection rates using a new curriculum with fewer total hours of training compared to a previous curriculum; however, it is not clear whether the new curriculum or the training time had the most influence (17). Thus, it seems reasonable to suggest that training must continue at least until the PD trainer determines that the patient can meet (at a minimum) the following objectives:

- The patient is able to safely perform all required procedures
- The patient is able to recognize contamination and infection
- The patient is able to list appropriate responses

While the Committee is unable to recommend a specific duration for training, we recognize the limitations imposed by healthcare agencies upon days of training. Clearly, further research in this area is needed.

HOW SHOULD THE PATIENT BE TAUGHT?

Always prepare the learner with what they are going to learn, what the trainer will be doing, what the learner will do, and how both of you will know that learning has occurred. In the self-efficacy theory of learning, the patient must believe he is capable of performing the required skills (39). This is accomplished with simple task repetition at each step of a procedure. It can be enhanced by encouragement ("Good, you are doing that correctly."), or support ("Be careful where you place your fingers."), or fear ("This kind of mistake could cause peritonitis."). Another component of self-efficacy is outcomes expectations; that is, once the patient can perform a procedure correctly, the objective is to continue performing that procedure as taught.

In creating an educational program, one must be clear about the goals and know what is to be taught and how it will be taught. It is best to restrict the educational content to three or four key messages per hour of instruction (39).

Structure and ritual in procedures gives security to both the learner and the teacher. In one-on-one education of the patient, the four basic considerations for the nurse are the time to teach, what to teach, how to teach it, and documentation of learning.

Often, personal experiences with learning are not helpful for the role of educator (37).

Role-playing is an effective way to rehearse new skills and to rehearse for future difficulties. Nurses may role-play with one another when trying out techniques for training. Patients may role-play with the use of the practice catheter to practice procedures. The PD trainer may need to be creative about other ways to teach, such as group retraining or problem solving, use of telephone and e-mail, story-telling, and Web-based training.

In developing a problem-solving approach in the training program, the patient needs help to define the problem, then to list possible solutions. The patient should select a solution, try it, and evaluate the results. If that solution does not work, the patient should be allowed to try another or to seek advice from the nurse about other solutions.

Practice is very important to the learner. This is how the learner accomplishes correct movements so that the muscles become "programmed." Practice allows the brain to learn to recognize errors and give feedback. Mistakes must be acknowledged as a fact of life and something to enhance learning.

The patient does not perform an exchange using their own catheter until all of the above steps have been mastered. This increases the likelihood that the patient will safely and successfully perform the exchange without contamination or error, and will increase patient confidence in their ability to achieve the goals of learning the procedure.

HOW ADULTS LEARN CONCEPTS

[Note: The following two sections on adult learning are derived primarily from a series of workshops given by educational psychologist Dr. Terry TenBrink (35).]

The cerebral cortex stores information. Memory learning requires repetition. Learners can memorize the time they are to do something, the supplies they need, and the parts of the equipment or machine to be used. Memorization does not mean understanding, however, so this must not be the only part of the learning process. The teacher can check the learner's progress by asking, "Tell me again the steps…?" In giving feedback to the learner, be careful not to get ahead of what they are doing, as the teacher then will be telling the learner rather than the learner processing the information. Questions from the teacher are a powerful learning tool. They allow evaluation of the learning process, help the learner to think, and guide the learner. Positive questions ("What

do you need to do next?) take less time for the learner to process than negative questions ("What do you need to avoid doing now?"). If asking a question, the teacher should allow some silence while the learner is processing the answer, particularly for more complicated, negative questions.

Teaching concepts such as peritonitis involves an understanding of what is sterile, what is clean, what is contaminated, and what are the signs of infection. Avoid repetitive listing of symptoms, as this will cause the learner to only memorize the list. Recognition of symptoms can be presented by the teacher as, "I will describe symptoms, and you guess which might be peritonitis." Using pairs of symptoms, initially describe one very likely to be peritonitis and one very unlikely to be peritonitis, such as belly pain and headache. If they guess correctly, to help them understand the concept, proceed with other pairs more difficult to differentiate. Cloudy bags can be shown to the learner in the same pattern of pairs, one very cloudy versus one crystal clear, then one very cloudy versus somewhat cloudy, then one very cloudy versus slight cloudy.

Learners cannot keep more than 7 ± 2 bits of new information in their short-term memory at a time (35). With repetition, this information can reach long-term memory and will be stored. The learner needs time to get information to long-term memory before going to the next set of learning tasks. Although information memorized is the hardest to learn, *it is the easiest to forget*. This is an important point for the teacher with respect to retraining, as learners often simply forget. Thus, learning about the signs of peritonitis during training may be long forgotten if they do not develop their first peritonitis until 2 years later.

HOW ADULTS LEARN MOTOR SKILLS (35)

Motor skills are stored in the cerebellum (Figure 1). When procedures are demonstrated initially from start to finish, the mind sees these things together and will store and later retrieve them together. An exchange is a procedure that involves a set of controlled, learned motor skills in a specific order (Table 2). Each part of a procedure may be taught and then reassembled in order.

Step 1, Cognitive Stage: The patient learns the steps of a PD procedure skill. They may recite the steps or read the steps until memorized in order using a written checklist. The mind is learning what it needs to know in order to teach the muscles how to react. Learners will not have "hands on" during this stage.

The learner observes repeated demonstrations by the trainer to allow the mind to memorize the steps necessary in the PD procedure. Each of the following may be repeated many times by the trainer before moving to the next:

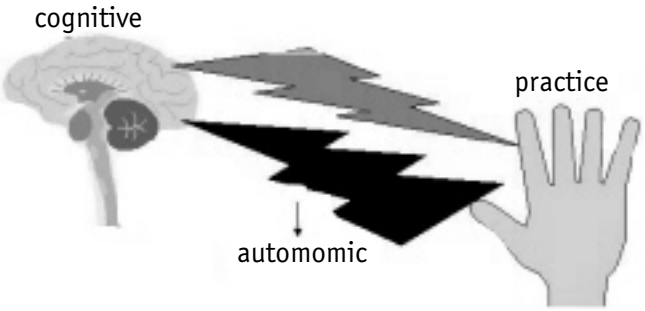

Figure 1 — Acquiring peritoneal dialysis procedural motor skills. Muscles learn to follow the brain's instructions through three distinct stages of learning.

TABLE 2
Teaching Motor Skills for Peritoneal Dialysis

Teaching motor skills
Step 1: Trainer demonstrates silently
Step 2: Trainer demonstrates while describing each step in detail
Step 3: Trainer demonstrates while describing only key words
Learning motor skills
Step 1: Patient describes or reads each step; trainer then performs steps
Step 2: Patient *does not* practice procedure until able to describe each step
Step 3: Patient practices the procedure using the practice apron with peritoneal dialysis catheter, describing each step as performed
Step 4: When able to perform Step 3 successfully, patient performs procedure using own catheter

1. The trainer demonstrates silently.
2. The trainer demonstrates while describing each step in detail.
3. The trainer demonstrates while describing only key words.

Step 2, Practice Stage: The patient describes or reads each step; then the trainer performs each step. The patient *does not* practice the procedure until able to describe each step.

Under supervision of the trainer, the patient begins to practice the procedure using a mannequin with a PD catheter, reciting each step as performed:

1. The trainer provides *immediate* feedback during practice.

2. The trainer states what the learner is doing correctly.
3. The trainer stops the learner when mistakes are made (not later):
   (a) "Whoops, back up..."
   (b) "Let's think of a way to help you remember..."
4. The trainer *redirects* the learner to a place in the procedure where no mistakes were made and has the learner retrace next steps correctly.
5. The trainer may guide the learner through problem areas:
   (a) "Keep your fingers on the blue section..."
   (b) "Always hold your transfer set in your left hand" (if the learner is right handed).

Avoid saying and/or showing "don't do this." Learners will simply retain that incorrect image and it will confuse the learning process.

Step 3, Autonomic Stage (or Automatic): The learner refines movements and is able to perform consistently and faster. Patterns will now be transferred from the cortex to the cerebellum.

There should be no teaching of "whys" during the motor skill learning. This should be done either before or after motor skill learning. If the learner asks why, the teacher can say, "Good question, we'll get to that after we finish with this."

When the procedure skill has reached the cerebellum (concepts and motor skills), the learner will be able to do other things while performing the procedure without making mistakes. This can be a test of the learner's abilities.

RETRAINING

Although there are no studies about retraining a PD patient, the Committee recommends retraining after peritonitis, catheter infection, prolonged hospitalization, or any other interruption in PD. Patients will quickly forget the steps of procedures when they are not performing them on a regular basis. At this time, the nurse can determine whether the patient has followed the clinic protocols and has correctly performed the steps of procedures. The trainer can also determine if the patient's abilities to perform procedures and understand concepts of PD have changed. These are essential assessments for preventing complications such as peritonitis. Retraining should be an opportunity for root cause analysis of a problem in an effort to prevent recurrence. Periodic retraining, particularly for connection procedures, should be performed on a regular basis for all patients, although there is no evidence of exactly when and how it should be done.

HOME VISITS

In some countries, home visits are required for patients receiving home therapies. A previous study has shown that many centers do not comply with the requirement due to staffing and economic constraints (53). In pediatric centers around the world, one study reported 60% of the centers surveyed offered home visits (50). There was no correlation between home visits and peritonitis rates, however. Common sense may dictate the need for home visits for PD patients, but there is little evidence in the literature to support this. The ISPD Nursing Liaison Committee strongly recommends the use of home visits as part of the overall care of PD patients, as home visits provide insight into the way patients adapt and function in their own environment (*Opinion*). Further research is needed to determine the timing and frequency of home visits with respect to patient outcomes.

IMPROVING OUTCOMES BASED ON PD TRAINING

Patient education, when done poorly, creates confusion and a loss of confidence for the learner and violates the ethics of patient education (32). To avoid this, outcome assessments of the education process should include periodic reassessments of patient technique and problem solving, tracking of outcomes such as peritonitis and catheter infections, and causes of hospitalizations, deaths, and transfers off PD. Trainers should be held responsible for reasonably foreseeable patient errors that could have been prevented by patient education (36).

The most striking study of the impact of a PD training program on outcomes involved an industry-sponsored theory-based curriculum (17). A well-structured program that focused on what the learner needed rather than what the teacher needed was implemented for 246 PD patients and compared to 374 with conventional training prior to the study. Training time was significantly longer for the new curriculum (29 vs 22.6 hours, $p < 0.001$), but retraining time was not different with the new curriculum (8.7 vs 12.5 hours, $p = 0.13$). The new curriculum resulted in lower exit-site infection rates compared to conventional training (0.22 vs 0.38/year, $p < 0.004$) but similar peritonitis rates (0.34 vs 0.44/year, $p = 0.099$). There were fewer hospital admissions in the new curriculum group (2.66/year) compared to the conventional group (3.74/year, $p < 0.0001$). Thus longer training time, particularly when associated with a well-structured curriculum, may be associated with improved outcomes.

Peritoneal dialysis training in the patient's home was studied at a single center and compared to previous experience with in-center training (19). In 84 patients trained at their home (47 on CAPD and 21 on automated PD), peritonitis rates fell from 0.5 episodes/year during the historical in-center training period to 0.24 episodes/year during the home training period (no statistical comparison was provided nor was time at risk reported). This suggests that improved outcomes could be derived from simply moving the location of training to the patient's home. Further research in a randomized trial is needed.

A third study of PD training involved a modified curriculum for patients with learning disabilities (32). Ten patients were randomly assigned to the standard training program or to the new curriculum after having their learning level determined using a diagnostic tool from the British Dyslexia Association. In this small pilot study, the new curriculum resulted in reduced training time (p = 0.01). Peritonitis rates were similar in the new curriculum (none in new curriculum vs 0.46 per year in the standard curriculum, p = NS). In a fourth study, using an international survey of training in 76 centers with pediatric patients, there was no correlation between the nurse-to-patient ratio and peritonitis rates (50). As previously noted, more training time was correlated to lower peritonitis rates.

These four studies are the only evidence in the literature of outcomes based on patient training for PD. Clearly, more studies are needed in the future. However, there is an indication from the published studies that the nature of the training program could have significant impact on patient outcomes. This highlights the need for guidelines and standards for patient training programs.

FUTURE RESEARCH

Clinical trials need to be done, particularly randomized studies, to assess different strategies for training. These may involve entire new curriculums or portions of the process. Outcomes must be prospectively recorded in order to evaluate differences and to control for appropriate variables. With only three trials currently in the literature, both comparing a new strategy with a retrospective strategy, there is a clear need for future prospective research.

If new strategies of adult learning are developed, they must be evaluated for appropriateness for PD patient learning. In the meantime, the current recommendations should provide a structure that new PD clinics should use to develop home training programs and that existing PD clinics should use to determine if they are meeting the guidelines.

There is a common misconception that *anyone* can train a home patient. Nothing is likely further from the truth. In fact, preparing patients to perform home dialysis safely and comfortably is a daunting task. It requires the trainer to develop new skills and to understand the complexities of adult learning in the uremic patient. It is a central component of a successful PD program with optimal outcomes.

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