The Importance of the Patient’s Training in Chronic Peritoneal Dialysis and Peritonitis

In a chronic disease, traineeship in the methodology to be used to treat oneself is a key part of success from the beginning and during long-term treatment. In chronic peritoneal dialysis (PD), peritonitis emphasizes, in a certain way, the result of the apprenticeship.

We set out to evaluate the relationship between the number of PD training lessons and the frequency of peritonitis. According to the number of lessons, we established three groups: A, up to 8 lessons; B, 9 – 13 lessons; and C, 14 or more lessons. We evaluated peritonitis rates and micro-organisms, and for the three groups, we compared (Kaplan–Meier method) peritonitis-free survival (PFS) at 1 year of treatment, with significance set at (log rank) \( p < 0.05 \).

The study enrolled 90 patients (mean age: 51.5 ± 15.33 years; 37 men). Respectively, groups A, B, and C included 27, 46, and 17 patients with an at-risk duration of 1535, 2879, and 665 patient–months (mean: 56.9 ± 44, 62.6 ± 47, and 39.1 ± 37.8 patient–months), of whom 35%, 37%, and 24% experienced no peritonitis, for peritonitis rates of 0.31, 0.37, and 0.47, with coagulase-negative Staphylococcus (CNS) peritonitis rates of 0.125, 0.12, and 0.235, and PFS rates of 76.9%, 80.4%, and 70.6%. The PFS was not significantly different between the groups (\( p > 0.05 \)).

During 1 year of treatment, all three groups experienced a satisfactory PFS. More frequent retraining should be considered in patients who needed more training lessons at the start of PD.

Key words
Patient training, peritonitis rate

Introduction
In peritoneal dialysis (PD), it is well known that continuous medical education undoubtedly contributes to outcomes, over time improving the various indices used to assess therapy. However, responsibility for PD treatment is absolutely shared with the patients: they are the main actors in their treatment, and their continuous education and traineeship in this self-treatment modality is a key part of success from the beginning and during long-term therapy. The learning capacity and skills of the patients vary, many times depending on their degree of education, but also on their comprehension and innate dexterity. In chronic PD, peritonitis emphasizes, in a certain way, the result of the apprenticeship.

In the present work, we reviewed our training records, aiming to evaluate the relationship between the number of PD training lessons and the frequency of peritonitis.

Methods
In our PD program, patients complete 2 or 3 training lessons before placement of the catheter. They learn the skills required to perform fluid exchanges and to understand the technique. After catheter implantation, training continues until all lessons are learned or until the nursing team considers that the patient is qualified to manage treatment alone.

Our training program includes a minimum of 8 lessons that cover these assessment topics: basic PD concepts, aseptic technique, exchange procedures, solutions, nutritional impact, importance of compliance, complications, exit-site care, supplies, home visits, and emergency protocols, among others. Material to practice at home and literature to read are given to deepen the knowledge acquired at the center.

The present retrospective study included all incident PD patients who were admitted to our PD program from August 4, 1993, to July 31, 2009, and who were undergoing continuous ambulatory PD or automated PD (APD) in their various forms. Patients were allocated to one of three groups according to the
number of lessons they needed to be qualified to start treatment for themselves: group A, up to 8 lessons; group B, 9 – 13 lessons; and group C, 14 lessons or more. For each group, we analyzed the overall peritonitis rate and the coagulase-negative Staphylococcus (CNS) peritonitis rate. The Kaplan–Meier product-limit estimation method was used to calculate the peritonitis-free survival (PFS) at 1 year of treatment. The first peritonitis episode during the first year of treatment was considered the endpoint. The PFS at 1 year of treatment was compared between the groups using the log-rank method, with significance set at \( p < 0.05 \).

We also analyzed the patients according to their degree of education: illiterate, primary school education, high school education, and college degree or technical education.

Results
The study enrolled 90 incident PD patients who had undergone treatment for at least 3 months. Table I summarizes, by group, the characteristics of the patients, the percentage of patients who never presented peritonitis during their time at risk, the rate of peritonitis, the rate of CNS peritonitis, and the PFS at 1 year of treatment. The groups showed no significant differences in PFS (\( p > 0.05 \), Figures 1 – 3).

Table II summarizes results by the degree of education of patients in the various groups.

Discussion
It is a well-known fact that continuous medical education optimizes outcomes in any branch of medicine, whether treatment is short- or long-term. Patient education in the various aspects of PD—and specifically training in the exchange procedures that patients execute at home—undoubtedly influence the diminution of the peritonitis risk and therefore mortality and technique failure.

Training protocols in PD programs are varied and, many times, are determined by the complexity of the facility, the forecast prevalence for hemodialysis and PD, and perhaps by the profile of the medical staff, among other factors. In recent years, the importance of programs for nurses who train patients has been emphasized, with the aim of improving outcomes in patients on PD, because, generally speaking, nurses have not been trained as teachers (1,2).

Chow and coworkers observed an interesting negative association, independent of known risk factors, between the length of time in practice on the part of the trainers and dialysis-related gram-positive peritonitis, suggesting that the continuing education of trainers may be beneficial if it is shown that updated courses can decrease the risk for gram-positive peritonitis (3).

No general consensus has been reached about training duration, number and duration of the lessons, and so on, with Bernardini et al. suggesting that training time does not appear to be linked to peritonitis rates (2). The capacity of patients to learn procedures is varied, but patient skill is not always linked to a degree of education, although some authors have observed better results according to the degree of education of their patients (4,5).

### Table I: Characteristics of the study patients

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Group A (up to 8 lessons)</th>
<th>Group B (9–13 lessons)</th>
<th>Group C (≥14 lessons)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>45.96±14.43</td>
<td>51.5±12.6</td>
<td>58±14.9</td>
</tr>
<tr>
<td>Sex (men/women)</td>
<td>6/21</td>
<td>21/25</td>
<td>10/7</td>
</tr>
<tr>
<td>Patient–months at risk</td>
<td>1535</td>
<td>2879</td>
<td>665.2</td>
</tr>
<tr>
<td>Mean time on PD (months)</td>
<td>56.9±44</td>
<td>62.6±47</td>
<td>39±37.8</td>
</tr>
<tr>
<td>Diabetes (%)</td>
<td>3.7</td>
<td>19.5</td>
<td>29.4</td>
</tr>
<tr>
<td>Without peritonitis (%)</td>
<td>35</td>
<td>37</td>
<td>24</td>
</tr>
<tr>
<td>Peritonitis rate</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overall</td>
<td>0.31</td>
<td>0.37</td>
<td>0.47</td>
</tr>
<tr>
<td>CNS peritonitis</td>
<td>0.125</td>
<td>0.12</td>
<td>0.235</td>
</tr>
<tr>
<td>PFS (%)</td>
<td>76.9</td>
<td>80.4</td>
<td>70.6</td>
</tr>
</tbody>
</table>

CNS = coagulase-negative Staphylococcus; PFS = peritonitis-free survival at 1 year of treatment.
In South America, where developing countries predominate, there is a wide gap in the degree of education within the population. A Brazilian study described a common characteristic of the country’s vast geography (6), in that education is often scanty in comparison with that in industrialized countries; however, in some of those countries, peritonitis rates in both continuous ambulatory PD and APD do not meet the standard recommended by the International Society for Peritoneal Dialysis and are a cause for concern (7–10).

In our PD program, the training protocol consists of at least 8 lessons, during which the patients should acquire the knowledge necessary to treat themselves. Nevertheless, some patients need more lessons to reach their training objectives, and the nursing staff defines when those objectives are met. Likewise, we pay attention to patients whose feelings of invincibility frequently cause them to minimize the exchange procedures, resulting in an infectious complication.

We observed very satisfactory PFS rates at 1 year of treatment in our three groups of patients. However, the patients who required more lessons (group C) showed peritonitis rates that, overall and for CNS, were higher than the rates in the other groups, and we know that the CNS organisms are most frequently found in patients whose exchange skills may be less evident. In groups A and B, approximately 50% of the patients had completed high school or superior education, but in the group that needed more lessons, only 24% had such higher education.

**Conclusions**

The observed results show that a higher degree of education contributed to a more efficient technique...
apprenticeship. Patients who need an extensive training duration will probably make more frequent mistakes during their time at risk on PD. Moreover, in long-term treatment, burnout can lead to an increased chance of mistakes, and complications can occur. Accordingly, the training itself is not only very important, but so is cyclical retraining in all patients—especially those who present learning difficulties that may jeopardize the continuity of their treatment.

Disclosures
The authors have no financial conflicts of interest to declare.

References
5 Chen TW, Li SY, Chen JY, Yang WC. Training of peritoneal dialysis patients—Taiwan’s experiences. Perit Dial Int 2008;28(suppl 3):S72–5.

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### Table II: Education level of the patients

<table>
<thead>
<tr>
<th>Degree of education</th>
<th>Group A (up to 8 lessons)</th>
<th>Group B (9–13 lessons)</th>
<th>Group C (≥14 lessons)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Illiterate (%)</td>
<td>—</td>
<td>2.17</td>
<td>—</td>
</tr>
<tr>
<td>Primary school (%)</td>
<td>48.1</td>
<td>47.85</td>
<td>76.48</td>
</tr>
<tr>
<td>High school (%)</td>
<td>44.4</td>
<td>30.43</td>
<td>11.76</td>
</tr>
<tr>
<td>College or technical education (%)</td>
<td>7.5</td>
<td>19.55</td>
<td>11.76</td>
</tr>
</tbody>
</table>