An International Study of Patient Compliance With Hemodialysis

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FOR THE PHYSICIAN, COMPLIANCE is measured by how well a patient adheres to a prescribed medical regimen, including compliance with appointments, medications, and diet. International differences in patient compliance have not been well characterized but could greatly alter the efficacy of various therapies and potentially explain differences in patient outcomes between countries.\(^1^,\(^2\)\) Differences in compliance could be partly responsible for inferior gross survival of patients undergoing dialysis in the United States compared with that of other developed nations.\(^3\) For this reason, an international comparison of patient compliance with hemodialysis regimens was undertaken.

METHODS

In 1995, an international comparison of hemodialysis populations and therapy was begun with a comparison of demographics and dialysis dosage among 4 dialysis centers in the southeastern United States, 4 centers in Japan, and 1 in Stockholm, Sweden. In early 1996, a comparison of compliance was undertaken. Between January and June 1996, information was prospectively collected on US patients regarding missed treatments that met the following criteria: (1) the patient spontaneously and voluntarily did not show up for a scheduled treatment; (2) no prior arrangements for missing the dialysis treatment were made; and (3) missed treatment was not due to absolute lack of transportation (eg, severe weather disturbances) or hospitalization. Similarly, information was obtained on missed treatments between February and April 1996 for patients from Japan and Sweden. Almost all US patients were eligible to receive free van transportation from local government support. In Sweden, free taxi service was provided, and in Japan, patients relied on public transportation or in some cases received a partially subsidized rate for taxi service.

To determine whether the findings of the prospective study were representative, a cross-sectional survey was carried out in each country, with nurses or nephrologists asked to determine the number of missed treatments in an average

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RESULTS

Over a 3-month period, there were 0 missed treatments per 100 patient-months for 84 patients in Sweden and 0 missed treatments per 100 patient-months for 194 patients in Japan. Over a 6-month period there were 699 missed treatments for 415 US patients (28.1 treatments per 100 patient-months or 2.3% of all treatments) (P<.001). One hundred forty-seven US patients (33.4%) missed at least 1 treatment. The Figure shows the frequency of missed treatments for US patients who missed at least 1 treatment. The top 10 patients who missed treatments missed fewer than 3 (4.2% of treatments); 7 patients missed at least 20 (27.8% of treatments). Table 1 shows the characteristics of patients who missed no treatments, missed between 1 and 3 treatments, and those who missed more than 3 treatments. While there was some difference in race and age in these categories, missing treatments was common for patients of all ages and races.

Results from the cross-sectional survey confirmed the marked difference in compliance between US patients and patients from Japan and Sweden (Table 2).

COMMENT

The results of this study demonstrate a markedly increased incidence of skipping dialysis treatments in US patients compared with patients from Sweden and Japan. While there are potential international differences in health care delivery and data collection that could lead to bias, the consistency of this finding by 2 methods as well as the magnitude of this difference suggest that there is a true international variation in patient compliance.

Importantly, the outcome measure chosen was a direct measurement of compliance. Other indirect measures of compliance—for example, blood pressure control—may be affected by how aggressively the patient’s physician treats these conditions and may also be affected by the underlying health of the patient. However, showing up for dialysis treatment is mainly dependent on the patient’s compliance, especially when transportation is available.

In the prospective study, noncompliance was present in all US patient groups, regardless of race, age, or duration of dialysis. Other prospective studies of compliance have noted similar findings. An estimated 4% of patients missed treatments in the cross-sectional study, while the percentage of patients who missed treatments in the US centers ranged from 12.5% to 16.5% for each month studied. There are several potential reasons for this difference. First, poor compliance at the US centers may, in part, have stimulated the development of this study. Another potential reason is the underestimation of compliance by health care personnel. A national prospective population-based survey of dialysis centers noted an incidence of 9% of patients missing treatments per month, while another cross-sectional survey of 860 patients with end-stage renal disease in New Jersey, Puerto Rico, and the Virgin Islands revealed that between 5.1% and 7.6% of patients missed at least 1 treatment each month.

What are the potential reasons for the increased rates of noncompliance among US patients undergoing dialysis? First, differences in the way dialysis is prescribed in the United States may make

Table 1. Characteristics of US Patients Missing Dialysis Treatments Over a 6-Month Period

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>0</th>
<th>1-3</th>
<th>&gt;3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age, y</td>
<td>58.6 (14.6)</td>
<td>56.4 (14.6)</td>
<td>50.1 (13.8)†</td>
</tr>
<tr>
<td>Time on dialysis, y</td>
<td>3.76 (3.16)</td>
<td>3.96 (3.81)</td>
<td>4.12 (2.25)‡</td>
</tr>
<tr>
<td>White patients</td>
<td>47.4</td>
<td>33.3‡</td>
<td>23.6‡</td>
</tr>
<tr>
<td>Men</td>
<td>51.8</td>
<td>45.3</td>
<td>44.4</td>
</tr>
</tbody>
</table>

*Age and time on dialysis are given as mean (SD); race and sex, as a percentage. †P<.05 for difference compared with patients who missed no treatments. ‡P<.001 for difference compared with patients who missed no treatments.

Table 2. Characteristics of Dialysis Centers Participating in the Cross-sectional Survey

<table>
<thead>
<tr>
<th>Region</th>
<th>No. of Centers</th>
<th>Patients Missing ≤1 Treatment*</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Japan</td>
<td>21</td>
<td>0</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Sweden</td>
<td>16</td>
<td>0.1 (3.0)</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>United States</td>
<td>49</td>
<td>4 (3.0)</td>
<td>. . .</td>
</tr>
</tbody>
</table>

*Data are given as estimated percentage (SD) in an average month; P values are for comparison with the US centers; ellipses indicate not applicable.
treatments less comfortable for patients, resulting in an increased apprehension of treatment and therefore increased absenteeism. In general, US patients receive a shorter treatment with higher blood flows, which may lead to increased incidences of cramping and hypotension. In earlier work with the same centers involved in the prospective study, we found higher blood flow rates and shorter dialysis times for US patients. Another important factor is differences between countries in patient autonomy. In the United States, patient autonomy has become increasingly emphasized in the health care profession, in lay publications, and most importantly on television. One result of this increased autonomy is the inability of the physician to influence poor decision making by the patient, which may result in noncompliance. Finally, large international differences in the selection process of patients for dialysis may contribute to compliance differences. For example, a noncompliant patient using illicit drugs may be more likely to be accepted for dialysis treatment in the United States than other countries. The patient’s noncompliant behavior is likely to continue while undergoing dialysis treatment. Differences in compliance are important and could contribute to differences in death rates between countries. Even an occasional missed treatment places the patient at a much higher risk of life-threatening conditions such as volume overload and hyperkalemia. Attempts to improve patient compliance through education and improved patient comfort during treatment could help improve the survival of US patients undergoing hemodialysis.

It is unlikely that international compliance differences are limited to patients undergoing hemodialysis. International compliance differences in other areas must also be studied to identify if they contribute significantly to differences in outcome.

Acknowledgment: We would like to acknowledge contributions to this article by Paulina Niculescu, MD, who died prior to its publication.

REFERENCES

I am imbued with two deep impressions; the first, that science knows no country; the second, which seems to contradict the first, although it is in reality a direct consequence of it, that science is the highest personification of the nation. Science knows no country because knowledge belongs to humanity, and is the torch which illuminates the world. Science is the highest personification of the nation because that nation will remain the first which carries the farthest the works of thought and intelligence.

—Louis Pasteur (1822-1895)