Missed Hemodialysis Treatments: A Modifiable But Unequal Burden in the World

Steven Menez and Bernard G. Jaar

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f the approximately 2.5 million patients with end-stage renal disease (ESRD) on some form of renal replacement therapy worldwide, the vast majority (in most countries) receive in-center hemodialysis.1 In the United

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States, the frequency of missed hemodialysis treatments, barriers to better adherence with scheduled treatments, and consequences of missed dialysis treatments have been described.2-5 For instance, Chan et al3 investigated potential reasons behind missed dialysis sessions in the United States over the course of 5 years using data from a large dialysis organization. These authors identified several factors, including day of the week (last session before the weekend), distance from home to the dialysis unit, and need for public transportation as important reasons for missed hemodialysis sessions. Patients who missed hemodialysis treatments were at increased risk for hospitalizations, emergency department visits, and intensive care unit admissions. In addition, the frequency of needing these services increased as the number of missed hemodialysis treatments increased.

In this issue of AJKD, Al Salmi et al6 have taken us one step further in our understanding of missed treatments on a more global stage. Using data from a well-established international prospective cohort of prevalent in-center hemodialysis patients, the Dialysis Outcomes and Practice Patterns Study (DOPPS), the authors evaluated the variation in, possible predictors of, and outcomes associated with missed hemodialysis treatments. Missed hemodialysis treatments (not due to inpatient stay) were assessed during a 4-month period in early 2012. Overall, the authors described a wide range of missed hemodialysis treatment frequency by country, ranging from <1% in Italy and Japan to 24% in the United States. Patients with missed hemodialysis treatments were younger and had shorter hemodialysis vintage and hemodialysis treatment times, but longer commuting times (>1 hour) to the dialysis center. Further, these patients also had lower achieved Kt/V, worse metabolic profiles (anemia, hyperphosphatemia, and secondary hyperparathyroidism), and worse reported patient outcomes (depression symptoms, burden of kidney disease, and lower mental capacity score). The authors indicated that in countries with missed hemodialysis treatment risk >5%, these missed treatments were independently associated with higher all-cause mortality, cardiovascular mortality, sudden cardiac death, and all-cause hospitalization.

In their study, Al Salmi et al identified a number of potentially modifiable risk factors that may be contributing to this differential adherence to hemodialysis therapy, including logistical factors, sociocultural factors, and active medical issues. In addition, this study highlights the wide variation in adherence to in-center hemodialysis treatment on an international level and provides much better understanding of the scope of the burden of missed hemodialysis treatments by country. The authors also observed that within countries, the percentage of patients with missed treatments varied significantly across different facilities.6

It is of paramount importance to better understand the reasons for the differences among diverse in-center hemodialysis facilities, as well as differences in the prevalence of missed treatments within countries. It is also essential to examine the different ways in which hemodialysis care is delivered and paid for across the globe to gain an understanding of how missed treatments can be reduced. As Chan et al3 point out, various avenues exist to facilitate improved adherence to hemodialysis treatment, such as rescheduling hemodialysis before inclement weather and around holidays and increasing flexibility for known upcoming time conflicts such as scheduled elective surgery or a physician’s visit. Certainly, some hemodialysis facilities are better equipped to accommodate these changes than others. On a larger scale, comparison between for-profit and not-for-profit hemodialysis facilities, or hemodialysis facilities in affluent versus resource-limited areas, may prove useful for implementation of strategies to address missed hemodialysis treatments.

Within the United States, demographic characteristics have been reported to vary greatly among 4 geographic regions (Northeast, South, Midwest, and West), and the prevalence of missed hemodialysis treatments varies significantly by region and by race/ethnicity.7 In a study by Obialo et al,7 the prevalence of missed or shortened hemodialysis treatments was lower in the Northeast region compared with the other regions and was higher in African Americans (21.5%), Hispanics (19.8%), and Native Americans (17.9%) compared with non-Hispanic whites (14.4%). Asians had the lowest prevalence of missed or shortened dialysis in this study at 9.8%. It is well established that dialysis patients in minority groups in the United States have a much higher prevalence of missed hemodialysis treatments; the reasons for this observation are complex and may be in part related to poor socioeconomic conditions, lower health literacy, and lack of trust in the health care system. Notably, in the same study, Obialo et al reported that patients at larger dialysis centers (>100 patients) had increased odds of missed or shortened dialysis treatments compared with those at centers with
fewer than 50 patients. Larger facilities may not have the resources needed (eg, extra staff and more social workers) to provide attention to patients at higher risk for nonadherence to hemodialysis treatment. Many studies have shown that younger age was also significantly associated with missed dialysis treatments; these patients typically have fewer comorbid conditions and overall feel healthier, which may lead them to believe erroneously that missing dialysis treatment has no health consequences. Further, recent DOPPS data have also shown that the occurrence of missed hemodialysis treatments has significantly increased between 1996 to 2001 and 2012 to 2015. The United States has one of the highest rates of missed hemodialysis treatments; however, missed hemodialysis treatment differences between the US geographical regions and internationally between countries are certainly difficult to explain. These differences are likely multifactorial and related to many factors, such as education, health literacy, health insurance coverage, access to care, location of the dialysis units, and transportation, to name a few. For example, missed hemodialysis treatments seem lower in the Northeast region of the United States, a region that is more urban and wealthier and in which patients travel shorter distances to their outpatient dialysis units. Ultimately, identifying high-risk patient populations may help target interventions to improve adherence to hemodialysis treatments.

Greater distance from dialysis centers may certainly play a role in missed hemodialysis treatments. Better location of dialysis centers in urban areas near public transport hubs (eg, metro stations and bus routes) or an increase in the number of dialysis centers in more rural areas could improve access to outpatient hemodialysis treatments and significantly reduce transportation time (and consequently increase adherence) to in-center hemodialysis treatments. An additional solution could be to increase the availability of free or discounted transportation services (eg, taxi vouchers) for patients with ESRD to and from their hemodialysis centers. Further, alternatives to in-center hemodialysis, namely home hemodialysis and peritoneal dialysis, should also be actively considered since the distance to dialysis facilities becomes much less of a concern.

Al Salmi et al propose that missed treatments serve as a marker for unmeasured indicators of poor health or sociocultural determinants of health. In surveys of 79 dialysis centers, transportation problems accounted for the majority (81.3%) of issues with hemodialysis adherence, whereas the second most-frequently cited reason was the perception that a few missed sessions would not affect health. Hence, health literacy plays a significant role in adherence to dialysis treatments or the lack thereof. Predictably, this has resulted in worse health outcomes, with poor health literacy being associated with increased hospitalizations and mortality attributed to missed hemodialysis treatments. Others have identified several barriers to successful hemodialysis treatment, such as appropriate staff training and experience and proper communication with patients. These issues were identified as some of the biggest concerns for patients on dialysis therapy. Improving education of patients on dialysis therapy, whether through staff-led teaching or peer counseling, may be another promising avenue moving forward. With access to more resources and staff training, dialysis centers may be able to offer greater patient counseling on the importance of dialysis adherence, adverse effects of missed dialysis treatments, and avenues for patient outreach for those who have missed dialysis treatments. Similar to the effects of improved health literacy, one

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**Box 1. Interventions That May Improve Adherence to In-Center Hemodialysis Treatments**

<table>
<thead>
<tr>
<th>Patient Level</th>
<th>Provider Level</th>
<th>Health System Level</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Education:</strong></td>
<td><strong>Staff-Related Issues:</strong></td>
<td><strong>Geography:</strong></td>
</tr>
<tr>
<td>Pre–end-stage renal disease education</td>
<td>Improved staff skills</td>
<td>Better dialysis facility location</td>
</tr>
<tr>
<td>Improve health literacy</td>
<td>Staff-led teaching</td>
<td>Increase no. of facilities in rural areas</td>
</tr>
<tr>
<td><strong>Social Support:</strong></td>
<td>Better staff to patient ratio</td>
<td>Transportation:</td>
</tr>
<tr>
<td>Peer mentoring program</td>
<td>Improve access to social workers</td>
<td>Place facilities close to transportation hubs</td>
</tr>
<tr>
<td>Group support</td>
<td>Improve access to available community resources</td>
<td>Free or discounted rates for public transportation</td>
</tr>
<tr>
<td>Targeted interventions to at-risk groups (minority groups, younger patients)</td>
<td>Patient counseling</td>
<td>Scheduling:</td>
</tr>
<tr>
<td><strong>Health Conditions:</strong></td>
<td>Communication:</td>
<td>Flexible schedule</td>
</tr>
<tr>
<td>Screen and treat depression</td>
<td>Improve patient communication</td>
<td>Opening hours (eg, offering early or late shifts)</td>
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<tr>
<td>Screen and treat alcohol abuse</td>
<td></td>
<td>Offering Home Dialysis:</td>
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<tr>
<td>Screen and treat substance abuse</td>
<td></td>
<td>Home hemodialysis</td>
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<tr>
<td>Pain management</td>
<td></td>
<td>Peritoneal dialysis</td>
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<tr>
<td>Quality-of-life assessment</td>
<td></td>
<td>Health Insurance:</td>
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<tr>
<td></td>
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<td>Provide affordable health insurance</td>
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might expect pre-ESRD education to improve patients’ outcomes, reduce anxiety, and potentially improve adherence to dialysis treatments.\textsuperscript{12}

In patients with ESRD, depression is prevalent (20%-40\%) and has been associated with poor outcomes.\textsuperscript{13} Identification and treatment of depression in dialysis patients may improve treatment adherence and reduce missed dialysis sessions, with improvement in patient-centered outcomes. Similar benefits could be observed for treatment or counseling of other associated health conditions, such as substance abuse.\textsuperscript{13} Though there are a number of barriers to adherence to dialysis treatments, many of these are modifiable by the interventions listed here and elsewhere.

Ultimately, missed dialysis treatments have a significant impact on mortality, morbidity, and resource use, in part due to increased emergency department visits and hospitalizations (including intensive care unit admissions) for urgent but often preventable hemodialysis treatments. The true emotional, physical, and financial burden of missed dialysis treatments may be underestimated in many studies.

Al Salmi et al undertook the daunting task of evaluating the prevalence and potential reasons for differences in the occurrence of missed hemodialysis treatments around the world. A variety of patient-level, provider-level, and health system–level factors likely affect adherence to in-center hemodialysis treatments. Multilevel interventions targeting individual patients, patient–provider relationship/communication, and the process of care delivery should help improve overall dialysis treatment adherence, particularly missed hemodialysis treatments (Box 1).

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