Although medication non adherence is common in all populations, including those on chronic dialysis, the reasons for medication noncompliance in dialysis patients have rarely been examined. We surveyed 54 chronic dialysis patients (15 on peritoneal dialysis, 39 on hemodialysis), asking about their social and financial situations, medication coverage, and reasons for possibly not obtaining all prescribed medications. The study population was 56% female, 52% African American, 67% over 50 years of age, 27% diabetic, and 61% on dialysis for more than 2 years. One patient was unemployed, 33 were retired, 15 were on disability, and 5 were employed. A majority (63%) had a household income of $25,000 or more annually. Most (70%) had some medication coverage through one or more health plans (53% Medicare, 14% Medicaid, 31% private) or a local pharmacy (31% UVA pharmacy program for the medically indigent). However, 39% still spent more than $100 monthly on medications. Co-pays per prescription ranged from nothing (2 patients) to $25 or more (16 patients), with half having a co-pay of more than $11 per prescription. Most (69%) took 11 or more medications daily. Among all our study patients, 91% reported that they knew their medications and the reasons that those medications were prescribed. The choice not to fill a prescription was made by 30% of patients either because they had no money (67%) or no ride to the pharmacy (17%). When asked if they ever chose not to take specific medications, 11 of 53 respondents (21%) said yes because of side effects [4 (36%)] or cost [3 (27%)], or because they already take too many medications [2 (18%)]. Most respondents (91%) reported discussing their medications with their doctors, and a majority (65%) had these discussions at least monthly.

We conclude that inadequate prescription coverage, lack of transportation, and medication cost are primary contributors to medication noncompliance among chronic dialysis patients. Patients report knowing their medications and the reasons that those medications are prescribed, and having ample opportunities to discuss their medications with their physicians. Lack of patient education therefore does not seem to be an important factor in medication nonadherence.

Key words
Noncompliance, hemodialysis (HD), nonadherence, ESRD

Introduction
Noncompliance with prescribed treatment, especially medications, by patients increases the cost of healthcare and the likelihood of admission to the emergency room and hospital, and can lead to additional illnesses or exacerbation of underlying disease. Interventions to reduce noncompliance with prescribed medications have generally been unsuccessful (1).

In the dialysis population, noncompliance with medications and treatment may contribute to complications of end-stage renal disease. Although noncompliance or nonadherence in the chronic dialysis population has been well documented (2–10), little has been done to examine the reasons for medication noncompliance in dialysis patients. In the general and elderly populations, medication costs influence restriction of medications and nonadherence with prescribed medications (11,12). Similar data do not exist for chronic dialysis patients.

We therefore surveyed chronic dialysis patients and asked the reasons for noncompliance with prescribed medications. We also asked a series of questions to determine current income, cost for outpatient medications, and financial assistance for
medication coverage for these patients. We wanted to assess the reported reasons for medication noncompliance partly to determine whether the upcoming Medicare Prescription Program (Medicare Part D) may affect some of our patients’ coverage for prescribed medications and whether it may potentially enhance medication compliance among our dialysis patients.

Patients and methods
The University of Virginia (UVA) Health System Kidney Center is located in Charlottesville, Virginia, and cares for about 130 patients receiving hemodialysis and peritoneal dialysis.

Hemodialysis patients are counseled on a monthly basis regarding compliance with their medication regime. The counseling occurs during routine rounds by the treatment team, which includes nephrologists, a nurse practitioner (if available in the unit), nurses, a nutritionist, and a social worker. In addition, the patient’s primary nurse reviews the type and dosage of medications and compliance during a monthly medication review with the patient.

Peritoneal dialysis patients are seen monthly and a review of the current medication list is conducted during each visit by either a nurse or a nephrologist.

All hemodialysis patients dialyzing in the Kidney Center Hemodialysis Unit were asked to complete the survey during a routine hemodialysis treatment. Peritoneal dialysis patients completed the survey during a routine clinic appointment. Patients who were not cognizant of date, time, and place, and those who were under 18 years of age or were prisoners were excluded. The study and survey instrument were described, and informed consent was obtained from each patient by the primary investigator (CCD). The study was conducted with the approval of the Human Investigation Committee of the University of Virginia Health System. Only patient responses to survey questions were included in the study; survey answers were not verified by review of medical records.

The survey included information on demographics, income, literacy, daily living skills, type of housing, transportation options, types of insurance, prescription drug coverage, cost of medications, ability or willingness to obtain medications, pharmacy options, patient’s choice to take medications, discussion with the doctor regarding medications, and cause of end-stage renal disease (ESRD).

Results
Of the 54 study patients, 15 were peritoneal dialysis patients, and 39 were in-center hemodialysis patients. Nineteen patients refused to complete the survey. Table I lists the characteristics of the study patients.

Hypertension was the most-reported cause of ESRD (23 patients, 34%), followed by diabetes (18 patients, 27%), and polycystic kidney disease (7 patients, 10%). Most study patients (70%) stated that they had medication coverage through one or more health plans (53% Medicare, 14% Medicaid, 31% private insurance). However, 39% still spent more than $100 monthly on medications. Co-pays per prescription ranged from nothing (2 patients) to more than $25 (16 patients), with half of the patients paying a co-pay in excess of $11 per prescription (Table II).

The UVA hospital provides indigent care through a state-subsidized program to which patients can apply for a financial discount on their hospital and medication costs. Of the surveyed patients, 67% stated that they had no discount at UVA, and thus 62% used a local pharmacy for prescribed medications. If the patient did have a UVA pharmacy discount, 44% paid either nothing for their medications or a $3 co-pay per prescription.

Patients were asked questions about their methods for obtaining prescribed medications. Most (84%) stated that they were independent and did not rely on others for assistance in obtaining medications; 66% themselves arranged for their prescriptions to be filled. However, 22% reported forgetting to have their prescriptions filled, and 30% (16 patients) reported choosing not to have prescriptions filled on occasion. Each respondent could specify multiple reasons for failing to have prescriptions for medication filled. “Do not have the money” was the most common reason (67%)

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>[n (%)]</th>
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<tbody>
<tr>
<td>Women</td>
<td>30 (56)</td>
</tr>
<tr>
<td>African American</td>
<td>28 (52)</td>
</tr>
<tr>
<td>Married</td>
<td>20 (37)</td>
</tr>
<tr>
<td>Age &gt; 50 years</td>
<td>36 (71)</td>
</tr>
<tr>
<td>Grades 9 – 12 education</td>
<td>29 (53)</td>
</tr>
<tr>
<td>Lived with at least 1 family member</td>
<td>28 (52)</td>
</tr>
<tr>
<td>Able to drive themselves</td>
<td>24 (44)</td>
</tr>
<tr>
<td>Hemodialysis</td>
<td>39 (72)</td>
</tr>
<tr>
<td>Peritoneal dialysis</td>
<td>15 (28)</td>
</tr>
</tbody>
</table>
of all responses), followed by “do not have ride to pharmacy” (17% of all responses). Of 53 responding patients, 11 (21%) reported consciously choosing not to take specific medications. Patients reported choosing not to take a specific medication because of side effects (8 patients) and cost (6 patients), and because they were taking too many pills already (4 patients).

Most of the respondents (69%) were taking 11 or more medications daily (Table II). Among our study patients, 91% reported discussing their medications with the doctor, and 65% said that such discussions occurred on at least on a monthly basis. Most patients (91%) stated that they knew each of their medications and why each one was prescribed. Even though patients spoke with the doctor and knew their medications, at least 39% occasionally forgot to take their medications, even with the assistance of a pill box.

Discussion and conclusions

We conclude that inadequate prescription coverage, lack of transportation, and medication costs are important contributors to medication noncompliance among chronic dialysis patients. Patients report knowing their medications and the reasons that those medications are prescribed, and they indicate having ample opportunities to discuss their medications with their physician. Lack of patient education therefore does not seem to be an important factor in medication nonadherence in our patients.

Many of our patients reported having medication coverage as part of their overall health care insurance (Table II). However, the number of daily medications (typically more than 11) and the high cost of prescription co-pays, coupled with relatively low household income, makes lack of funds the most common reason for medication noncompliance among our patients. The new Medicare prescription plan may reduce out-of-pocket expenses for some of our patients, but the detailed income assessments required by these plans may limit enrollment by some patients. Despite having a local pharmacy plan that significantly reduces patient cost and prescription co-pays, many of our patients have never enrolled in the plan in part because of the information required on plan applications and the required financial assessment.
For some dialysis patients, disability income exceeds potential earnings from employment; patients with primarily low-wage employment opportunities may find it financially advantageous not to work. Moreover, “under the table” payment for certain types of employment can thereby go unreported. Screening for the UVA hospital and pharmacy benefit plan necessitates reporting all income; some patients therefore choose not to enroll in the plan. Experience with the Medicare Prescription Plan may be similar and should be anticipated. As occurs in other populations (11,12), medication compliance in chronic dialysis patients is clearly influenced by medication costs (13, Table II).

Our study may not reflect the experience of all chronic dialysis patients. Some patients refused to complete the survey. Thus our study sample may not be representative of our dialysis population in income, medication coverage, knowledge, or compliance patterns. Our surveys were anonymous, and so we were not able to examine the veracity of the patient responses.

Noncompliance is well recognized among chronic dialysis patients on both hemodialysis and peritoneal dialysis (2–10). The demographics of our surveyed population (Table I) generally reflect the overall dialysis population (14). Although patients overwhelmingly reported knowledge of their medications, no objective measures of patient knowledge or medication compliance were performed. Our study may therefore not only be based on a biased sample, it may also rely on less-than-truthful patient responses.

Despite our study’s limitations, the results of the survey highlight the importance of medication cost and co-pays for prescriptions despite existing medication coverage from health care plans.

Attempts to enhance patient compliance with medications often focus on patient education and the patient–physician relationship (15,16), but lack of patient education or of an opportunity to discuss the need for medications with physicians seem to be unimportant and uncommon reasons for medication noncompliance in our chronic dialysis patients. The Medicare Prescription Coverage Program may alleviate some of the financial burden of medications for some patients, but we await its implementation to assess the effects on medication noncompliance. Additional study of patient-reported factors contributing to medication noncompliance may be helpful in developing innovative strategies to enhance adherence.

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