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Survey of determinants and effects of timing of referral to a nephrologist: the patient's point of view

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Abstract

Introduction: **We conducted a survey interviewing end-stage renal disease (ESRD) patients just after they began chronic dialysis (CD) to describe characteristics and factors associated with early (ER) and late referral (LR), and to analyze the consequences of timing of referral to a nephrologist.**

***Methods*: We interviewed 673 patients via telephone starting CD between 2004 and 2006 in Lazio, Italy, to collect information about the year before CD. Multiple logistic regression was performed to evaluate the factors associated with LR.**

***Results*: We found that 22% of patients reported being LRs. A lower probability for LR was found for older age, family history of renal diseases, abnormal test for renal functions, presence of hypertension, married status and awareness of a nephrology outpatient center near home. LR patients had a lower frequency of hepatitis B virus (HBV) vaccination (14.9% vs. 41.7%), arteriovenous fistula (31.8% vs. 75.6%) and information about renal replacement therapy modalities (33.8% vs. 72.6%), and they more often started CD in an emergency (85.8% vs. 41.5%).**

Conclusions: **The percentage of self-reported LR was lower than reported in other studies. However, many patients started CD in an emergency, with a catheter as first vascular access, without vaccination against HBV and without the possibility of choosing their dialysis modality. Individual conditions facilitating contact with medical care (older age and presence of comorbidities) seem to be associated with a lower probability of LR. These findings emphasize the importance of predialysis patient training, confirming the important role that information plays in health service access, to improve early and long-term dialysis outcomes.**

Key words: *Chronic dialysis, Outcomes, Referral, Survey, Telephone questionnaire*

Introduction

Late referral (LR) to a nephrologist can be defined as "when management could have been improved by earlier contact with renal services" (1). LR to a nephrologist in patients with chronic kidney disease (CKD) may lead to suboptimal care before end-stage renal disease (ESRD) and many undesirable consequences: less effective treatment of anemia and comorbidities (e.g., diabetes and hypertension), more frequent use of catheters rather than arteriovenous fistula as first vascular access, increased risk of hospital admission after beginning chronic dialysis (CD) and of death (1-12).

Most studies conducted regarding referral practices have collected information from doctors or from data from an ESRD Registry (3, 5-7, 13-18). Few studies have investigated this issue from the patient's point of view (19).

We conducted a survey interviewing ESRD patients just after they began CD, to describe the characteristics and factors associated with early referral (ER) and LR, and to analyze the consequences of timing of referral to a nephrologist.

Subjects and methods

Study design, setting and population

The survey was conducted by the Agency for Public Health of the Lazio Region (ASP), between 1 February 2005 and 31 July 2006, in Lazio, a region of Italy that includes the city of Rome and has about 5.5 million inhabitants. At the time of the survey there were 90 active dialysis units in Lazio; 74 of them agreed to participate, representing 83% of the patients who started CD in the period considered.

To be eligible for the study a patient had to be at least 18 years old, with a dialysis vintage between 3 and 9 months; we chose a period of at least 3 months to reduce the psychological problems related to starting dialysis, and of a maximum of 9 months to reduce medical history recall bias.

We excluded subjects with severe cognitive impairment, since the survey was based on self-reported information. The nephrologist who treated the patients in the dialysis unit selected the inclusion criteria and informed patients about the aims of the study, and they provided written consent.

Thus, we considered for the study 1,376 patients who started CD between 15 May 2004 and 15 April 2006 who were not already reported as deaths, or had undergone a transplant or been transferred outside the region at the moment of the survey.

From 1,376 CD incident patients, we then excluded: 337 patients (24.5%) with severe cognitive impairment; 157 (11.4%) who refused to participate; 114 (8.3%) who died before the planned interview; and 92 (6.7%) who moved outside the region and were unreachable before the planned interview.

We interviewed the remaining 676 patients, but excluded 3 subjects from the analysis who did not complete the questionnaire, leaving a total of 673 considered for the statistical analysis (these patients had started CD from 14 November 2004 to 7 April 2006).

The questionnaire

The questionnaire was structured into 5 sections focused particularly on the year before CD had begun, collecting detailed information about sociodemographic characteristics, habits and lifestyles, family and personal anamnesis, history of predialysis and first year of dialysis.

This questionnaire was previously tested among 10 CD patients treated at 1 dialysis unit in Rome, also to verify the length of the interview (30 minutes).

The questionnaire was administered, *via telephone at the patients' home,* by trained personnel from the ASP. The answers were automatically recorded using computer-assisted telephone interviewing (CATI), a telephone survey technique in which the interviewer follows a script from a software application. The software is able to customize the flow of the questionnaire based on the answers provided, controlling data accuracy for illogical answers with built-in branching logic (20).

Late referral definition

We defined LR patients as those who had not been regularly referred to a nephrologist in the year before CD began. We considered as "regularly referred" a patient visited by a nephrologist at least once every 3 months in the previous 12 months. We considered a period of 12 months as adequate to describe the role of individual and health service characteristics in early access to renal services for ESRD care. According to this definition we included in this group also the patients who had been lost to follow-up (if they had been seen by a nephrologist in the year before CD start) and patients who had had a diagnosis of ESRD in an emergency.

Statistical analysis

We performed a chi-squared (χ_2) test to evaluate differences in proportions of the characteristics between the ER and LR groups. We also calculated differences in mean and median values between the 2 groups with parametric and nonparametric tests of hypotheses, as appropriate.

To evaluate the factors associated with LR, we performed a multivariate logistic regression, simultaneously adjusted for all variables considered in the model. Variable selection for the model was performed through an automatic backward stepwise selection, removing from the model all variables with a p value >0.20 (21).

The statistical analysis was performed using Stata software (22).

Results

Sociodemographic characteristics

On average, LR subjects were younger than ER subjects when CD started (60.3 [SD 15.1] years vs. 63.4 [SD 13.9] years; p=0.02) and were less likely to be married (55.7% vs. 67.8%, p<0.01).

No statistically significant differences between the ER and LR groups were found in the percentage of subjects who lived alone (9.7% vs. 12.8%, p=0.27), had a low education level (66.3% vs. 68.2%, p=0.66) or were employed (15.2% vs. 15.5%, p=0.93).

Habits and lifestyle

The percentage of patients who reported not having drunk alcohol in the last year was 43.2% for wine, 63.6% for beer and 87.9% for spirits. Among declared drinkers, average consumption per day was: 1.7 (SD 1.1) glasses of wine (175 mL), 1.0 (SD 0.2) cans of beer (330 mL) and 1.0 (SD 0.1) shot of liquor (60 mL). We did not find any differences in wine or beer consumption (p=0.68, p=0.22, respectively) between the groups; however, LRs on average consumed more spirits (p=0.03) than ER subjects: 0.18 (SD 0.40) vs. 0.11 (SD 0.32) shots of liquor.
No statistically significant differences between the ER and LR groups were found in the number of cigarettes smoked (10.7 [SD 7.3] vs. 14.7 [SD 11.1] cigarettes per day; p=0.14) or in the number of analgesics taken for at least 2 years before dialysis (1.3 [SD 1.5] vs. 2.1 [SD 2.8] pills per day; p=0.18).

Family and personal anamnesis

LR patients were older than ER patients when renal disease was first diagnosed (56.0 [SD 19.0] vs. 52.1 [SD 18.6] years; p=0.01) and had a lower proportion than ER patients of family history of renal disease (16.9% vs. 27.6%; p=0.01).
Table I shows some information about family and personal anamnesis in the ER and LR groups. No statistically significant differences were found in history of renal problems in childhood or for those first diagnosed with renal disease.
Among LR subjects we found a lower proportion of awareness of abnormal blood or urine tests for renal function, without statistically significant differences between who prescribed them and the reasons for these tests. The reasons for the first referral to a nephrologist were different between the ER and LR groups.

Clinical history in predialysis

Table II illustrates some clinical information about the last year before CD. LR patients reported a lower percentage than ER patients of dyspnea and itching symptoms before starting dialysis. We also found a quite significantly lower percentage of LR patients who suffered from kidney stones and weakness compared with ER patients.
LR patients also reported a lower percentage of hypertension, and fewer of them were followed by a cardiologist and/or nephrologist. The majority of patients reported being examined by a cardiologist at least once a year, but the percentage was lower among LR patients.
More LR than ER patients reported being diagnosed and treated for diabetes by a GP; a lower proportion had been treated by a diabetologist. Fewer LR than ER patients reported anemia and recombinant human erythropoietin treatment before starting dialysis.

Determinants of timing of referral to a nephrologist

We found that 148 out of 673 patients (22.0%) were LR, according to our definition. LR patients reported having been visited by a nephrologist just before CD start (median time 0), and the median number of visits by a nephrologist in the last year was 0. In contrast, ER patients reported having been examined for the first time by a nephrologist a median 5 years (interquartile range [IQR] 2-13) before CD began and a median 12 times (IQR 4-12) over the last year.
Patients reported the following reasons for late referral: in 115 (77.7%) the diagnosis of ESRD occurred when they entered dialysis, 30 (20.3%) were not aware of renal problems, 22 (14.9%) did not have CKD diagnosed and 8 (5.4%) ignored physicians' recommendations; 12 (8.1%) reported being treated by another type of specialist, and only 1 had difficulty in finding a nephrologist.
Table III shows the results of the logistic regression models to evaluate the factors associated with LR. We found a lower probability for patients who were older, had a relative with renal disease, had urine and blood tests positive for renal diseases, were hypertensive, had knowledge of a nephrology outpatient center near home, were married or consumed less wine.

Effects of timing of referral to a nephrologist

Table IV shows some clinical characteristics and information received by patients before CD and their ER or LR status.
A higher proportion of LR patients than ER patients started an unplanned CD; among them, 67.8% were aware of their kidney problems (data not shown in table).
Fewer LR than ER patients had fistulas as vascular access and had been vaccinated against hepatitis B virus (HBV). Overall, 66.0% of patients had a vascular or peritoneal access ready to use at the beginning of dialysis; 95.6% of patients who started CD with a venous catheter as vascular access reported that the cause was late referral to a nephrologist (data not shown in table).
Among 432 patients not vaccinated for HBV before CD, 25.8% reported that vaccination had not been proposed, and 23.3% that late referral was the cause (data not shown in table).
LR patients received less information than ER patients about possible ESRD treatment methods (i.e., peritoneal dialysis, hemodialysis or transplantation), considered information useful in choosing the modality of dialytic treatment and reported that their choice of therapy was based on personal conviction instead of physician decision. Overall, 72.0% of

TABLE I
INFORMATION ABOUT FAMILY AND PERSONAL ANAMNESIS OF PATIENTS IN EARLY AND LATE REFERRAL GROUPS

		Early referral (n=525)		Late referral (n=148)		p Value
		Number	%	Number	%	
Family history of renal disease	Yes	145	27.6	25	16.9	0.01
Family history of dialysis/transplantation	Yes	51	9.7	10	6.8	0.27
Renal problems in childhood	Yes	56	10.7	10	6.8	0.16
Who first diagnosed renal disease	General practitioner	60	11.4	15	10.1	0.32
	Nephrologist	296	56.4	86	58.1	
	Other doctor	97	13.7	20	18.2	
	Don't recall	72	18.5	27	13.5	
Awareness of abnormal urine or blood tests for renal functions	Yes	412	78.5	65	43.9	<0.001
Who prescribed urine or blood tests for renal functions	General practitioner	169	41.0	26	40.0	0.54
	Nephrologist	153	37.1	21	32.3	
	Other doctor	90	21.8	18	27.7	
Reason to check renal functions (more than 1 answer was possible)	Check-up	354	85.9	53	81.5	0.35
	Weakness	103	25.0	21	32.3	0.21
	Hypertension	98	23.8	9	13.8	0.07
	Hematuria	45	10.9	6	9.2	0.68
	Diabetes	40	9.7	3	4.6	0.18
Reason of the first referral to a nephrologist (more than 1 answer was possible)	After an abnormal urine or blood result	143	27.2	12	8.1	<0.001
	Sent by GP	115	21.9	9	6.1	<0.001
	Sent by another specialist	65	12.4	9	6.1	0.03
	Because he/she did not feel well	26	5.0	1	0.7	0.02
	After hospital admission	65	12.4	112	75.7	<0.001

TABLE II
CLINICAL INFORMATION ABOUT LAST YEAR BEFORE START OF CHRONIC DIALYSIS IN EARLY AND LATE REFERRAL GROUPS

		Early referral (n=525)		Late referral (n=148)		p Value
		Number	%	Number	%	
Symptoms*	Lack of appetite	190	36.2	58	39.2	0.50
	Vomiting	154	29.3	45	30.4	0.80
	Dyspnea	290	55.2	66	44.6	0.02
	Weakness	363	69.1	91	61.5	0.08
	Itching	237	45.1	53	35.8	0.04
	Nausea†	133	30.4	43	33.9	0.36
History of kidney stones	Yes	98	18.7	18	12.2	0.06
Hypertension	Yes	469	89.3	106	71.6	<0.001
Who diagnosed hypertension	General practitioner	193	41.2	51	48.1	0.59
	Cardiologist	48	10.2	11	10.4	
	Nephrologist	53	11.3	10	9.4	
	Other	175	37.3	34	32.1	
Who manages hypertension (more than 1 answer was possible)	Cardiologist	60	12.8	5	4.7	0.02
	Nephrologist	453	96.6	98	92.5	0.05
	Other doctor	24	5.1	9	8.5	0.18
Therapy for hypertension	Yes	386	82.3	85	80.2	0.61
Visited by a cardiologist at least once	Yes	357	76.1	63	59.4	<0.001
Diabetes	Yes	134	25.5	42	28.4	0.49
Who diagnosed diabetes	General Practitioner	55	41.0	26	61.9	0.05
	Diabetologist	22	16.4	6	14.3	
	Other doctor	57	42.6	10	23.8	
Who manages diabetes	General practitioner	27	20.1	15	35.7	0.09
	Diabetologist	94	70.1	22	52.4	
	Other doctor	13	9.8	5	11.9	
Therapy for diabetes	Yes	125	93.3	40	95.2	0.65
Which therapy for diabetes	Only insulin	28	22.4	7	17.5	0.25
	Only oral hypoglycemic	30	24.0	15	37.5	
	Both	67	53.6	18	45.0	
Anaemia	Yes	327	62.3	77	52.0	0.02
Therapy for anaemia	Yes	231	70.6	30	39.0	<0.001
Who prescribed therapy for anemia	Nephrologist	225	97.4	28	93.3	0.22
Admission to a hospital	Yes	327	62.3	83	56.1	0.17

*All of the symptoms lasted for 3 months on average before starting dialysis, except for vomiting (2 months).
†Missing data in 108 patients regarding nausea.

TABLE III
FACTORS ASSOCIATED WITH LATE REFERRAL: RESULTS OF LOGISTIC REGRESSION

Variable	Crude OR	95% confidence interval	p Value	Adjusted OR	95% confidence interval	p Value
Age (1 year)	0.99	0.97-1.00	0.02	0.98	0.96-0.99	0.01
Married						
No	1.00	-		1.00	-	
Yes	0.61	0.42-0.89	0.01	0.52	0.33-0.83	0.01
Smoking habits						
Never	1.00	-		1.00	-	
Current smoker	1.15	0.69-1.94	0.59	0.80	0.43-1.49	0.49
Former smoker	1.09	0.72-1.66	0.67	1.31	0.78-2.19	0.31
Wine (175-mL glass)	1.11	0.96-1.28	0.18	1.23	1.03-1.47	0.02
Family history of renal disease						
No	1.00	-		1.00	-	
Yes	0.53	0.33-0.85	0.01	0.59	0.34-1.00	0.05
Renal problems in childhood						
No	1.00	-		1.00	-	
Yes	0.59	0.29-1.18	0.13	0.64	0.29-1.39	0.26
Don't remember	0.38	0.11-1.27	0.12	0.37	0.10-1.43	0.15
Abnormal urine or blood tests for renal functions						
No	1.00	-		1.00	-	
Yes	0.21	0.15-0.32	<0.001	0.21	0.14-0.32	<0.001
Hypertension in the last year						
No	1.00	-		1.00	-	
Yes	0.30	0.19-0.47	<0.001	0.45	0.26-0.76	0.003
Dyspnea in the last year						
No	1.00	-		1.00	-	
Yes	0.65	0.45-0.94	0.02	0.72	0.47-1.10	0.13
Hospital admission in the last year						
No	1.00	-		1.00	-	
Yes	0.77	0.53-1.12	0.17	0.69	0.45-1.06	0.09
Aware of nephrology outpatient center						
No	1.00	-		1.00	-	
Yes	0.23	0.14-0.36	<0.001	0.23	0.14-0.38	<0.001

OR = odds ratio.

TABLE IV
CLINICAL CHARACTERISTICS AND INFORMATION RECEIVED BY PATIENTS IN EARLY AND LATE REFERRAL GROUPS

		Early referral (n=525)		Late referral (n=148)		p Value
		Number	%	Number	%	
Unplanned chronic dialysis start	Yes	218	41.5	127	85.8	<0.001
Fistula as vascular access ready to use	Yes	397	75.6	47	31.8	<0.001
HBV vaccination	Yes	219	41.7	22	14.9	<0.001
Received information on modalities of renal replacement therapy	Yes	381	72.6	50	33.8	<0.001
Received information on hemodialysis	Yes	375	71.4	47	31.8	<0.001
Received information on peritoneal dialysis	Yes	254	48.4	20	13.5	<0.001
Received information on renal transplantation	Yes	202	38.5	23	15.5	<0.001
Information on possible modality of renal replacement therapy useful for choice	Yes	337	89.6	38	79.2	<0.001
Reason for choice of modality of renal replacement therapy (more than 1 answer was possible)	Doctor's decision	349	66.5	131	88.5	<0.001
	Personal conviction	191	36.4	18	12.2	<0.001
	Lack of help for peritoneal dialysis at home	34	6.5	3	2.0	0.04
	Family problems	32	6.1	1	0.7	0.01
	Work problems	20	3.8	3	2.0	0.29
	Distance from dialysis center	10	1.9	0	0.0	-
Reason for choice of dialysis center (more than 1 answer was possible)	Distance from house	309	58.9	76	51.4	0.10
	Already in care	216	41.1	42	28.4	<0.01
	Nephrologist's advice	139	26.5	27	18.2	0.04
	Short waiting list	45	8.6	23	15.5	0.01
Visit to the center before chronic dialysis	Yes	227	43.2	25	16.9	<0.001
Aware of the existence of a nephrology outpatient center near home	Yes	255	48.6	26	17.6	<0.001

patients considered information adequate, 26.1% quite adequate and 1.9% inadequate. A nephrologist communicated information about hemodialysis in 97.4% of cases, about peritoneal dialysis in 98.2% and about renal transplantation in 96.9% (data not shown in table).

A statistically significant difference was found between ER and LR groups about the reasons for choosing a particular dialysis center. LR patients were less likely to be aware of the existence of a nephrology outpatient center in the area where they lived and were less likely to visit the center before starting dialysis (p<0.001). The median distance between home and dialysis center was 8 km (IQR 4-18). The median time taken to reach the dialysis center was 20 minutes (IQR 10-30), without statistically significant differences between the groups.

Discussion

This survey found that 22% of subjects (LR) reported not having regularly visited a nephrologist the year before chronic dialysis began. We found several differences between ER and LR patients regarding family and personal anamnesis, presence of symptoms and comorbidities, clinical conditions and information received about renal replacement therapy (RRT).

The percentage of LRs was lower than in previous studies: in Europe, the percentage varies from 36.0% to 89.5% (9, 11). However, comparisons are difficult, because of different definitions of referral timing, frequency of visits to a nephrologist and sources of information (patient report, medical records, administrative data) (3, 5-10, 13-18). We used a more restrictive definition of LR than that of other studies, and this choice may partly explain our better findings.

LR has a minimum time required for dialysis vascular access formation and preparation of patients, while it is difficult to define a maximum time (19, 23). We studied 1 year before CD because it is long enough to obtain information associated with referral and short enough to minimize recall bias.

A regular referral to a nephrologist requires an adequate period to be evaluated; in fact, we did not consider as early referral those patients who had been lost to follow-up, or if they had been seen by a nephrologist in the year before CD start.

We confirm differences between the referral pathways for ER and LR patients. As expected, a higher percentage of LR patients (75.7% vs. 12.4%) were first referred to a nephrologist after a hospital admission. In addition, a nephrologist was contacted after an abnormal urine or blood test in 27.2% of ER compared with 8.1% of LR patients (15, 24). Patients with abnormal blood or urine tests, who did not feel well, and patients with symptoms such as itching and dyspnea, or who had suffered from kidney stones, were most often ERs.

Older age, a family history of renal disease and suffering from hypertension were associated with a lower probability of LR: conditions that could promote more frequent access to medical care. We did not find an association with diabetes, though ER patients were more likely to have been treated by a diabetologist.

Our study supports the hypothesis that the elderly and the presence of several comorbidities were associated with ER (7, 25), while other studies found the opposite (9, 10, 12-14, 24, 26).

We hypothesize that LRs could underreport some comorbidities, because they are less likely to be aware of them and of the relationship between comorbidities and CKD (7). Hypertension, diabetes and CKD commonly coexist in the same individual, and a coordinated approach to manage these conditions may reduce adverse outcomes in higher risk patients, such as the elderly and people with lower socioeconomic status, optimizing treatment of these diseases in these more vulnerable populations (27).

Most patients contacted a nephrologist through another medical professional. We found that the percentage of patients who were sent to a nephrologist after a hospital admission was lower in the ER than in the LR group (12.4% vs. 75.7%). Furthermore, it is of note that only 6.1% of LR patients reported the reason for their first visit to a nephrologist to be due to an indication by a GP. These considerations suggest a lack of communication and coordination between referring physicians and renal specialists (9-11, 16). Referring those with a complicated medical history to a nephrologist is considered useless (5, 15), presuming a limited benefit of RRT in older patients (7, 9, 12), the fear of losing clinical responsibility for a chronic patient and the less likely opportunity to establish regular contact with a nephrologist, as this type of specialist is less common than others (26).

The GP plays a key role in this situation, particularly in Italy, where the National Healthcare System requires a GP prescription before consulting a specialist. A recent Italian study found that physician awareness of CKD is dramatically low, and this represents a barrier to identifying patients at high risk for CKD for screening (28). This finding puts the emphasis on GP training, which unlike some disease-related causes of LR, is an avoidable cause of referral delay (1).

We found that 85.5% of LRs (127 out of 148) were "unavoidable" according to Roderick's definition (insidious evolution of chronic renal failure, acute irreversible renal failure and late presenters), a percentage higher than the 51% reported by Roderick et al (19). Considering all patients (ERs and LRs), the percentage of "unavoidable" LRs were similar (about 19%), because we had a lower prevalence of LRs (22%); considering the whole sample, the results were also similar (19). Obviously there are also a proportion of ER patients who suffered from unavoidable conditions similar to LR patients, associated with a sudden worsening of chronic renal failure (19).

LR patients were less likely than ER patients to receive erythropoietin (4, 9, 14), HBV vaccination before the start of dialysis and information on RRT; and they were more often started on chronic hemodialysis in an emergency

(9, 12, 16) and were more likely to have a catheter as first vascular access (11, 14, 18).

The observation of 41.5% unplanned CD starts among ER patients, may be partly explained by the cases of patients who suffered from an unexpectedly more rapid progression of kidney disease. It is of note that the percentage of patients who started CD without a functioning permanent vascular access (34.2%) was similar to that in the DOPPS study (35.7%) which referred to patients who were first visited by a nephrologist ≥4 months CD start (29).

In general, ER patients appear to be more aware and participate more actively in choosing RRT modality: they were more likely to be aware ($p<0.001$) of the existence of a nephrology outpatient center nearby and to have visited the dialysis center before starting dialysis. Most of the 375 patients (63%) who received information on RRT modalities considered them useful to make a decision regarding dialytic treatment, both in the ER (89.6%) and the LR group (79.2%). ER patients more frequently than LR patients reported that the choice of dialysis modality depended on their preference (36.4% vs. 12.2%) rather than on physician decision (66.5% vs. 88.5%).

These findings emphasize the importance of predialysis patient training based on the knowledge of the specialist and skills of the staff providing the care, confirming the important role that information plays in health service access.

An original aspect of our study is that we collected information directly from the patients and not from medical records, enabling us to explore the patient's point of view about access to predialysis renal care. Furthermore, we collected complete data on the habits and lifestyles of patients during the predialysis period. These factors allowed us to investigate the relationship between LR status and these variables, an issue that few studies have explored. Another strength of our study includes the extensive coverage of the region's population of patients who started CD and the large size of the sample.

Our study has some limitations. First, we excluded the patients with severe cognitive impairment and those who died before the interview; as a consequence, there was a potential selection bias, because the patients enrolled were in better health. This may have led to an underestimation of LR, generally more frequent among patients in poor health. However, as the overall percentage of LRs reported by the Registry the Lazio Dialysis Registry was similar to that estimated in this study (20% vs. 22%), we feel that this potential bias does not seem to influence the results.

Second, information on the timing of referral was derived from a patient questionnaire and could have been affected by recall bias. In fact, we do point out that it can be dangerous to ask "medical" information of patients. However, we are confident about our findings regarding nephrologist referral, because they are similar to the data from the Lazio Dialysis Registry, which collects information on all patients undergoing CD in the Lazio region including all patients enrolled in our study (30). In the same period of our study we found a substantial overlap (between the 2 sources) in the percentage of LR patients (20%) defined as "referred to a nephrologist within 6 months before start of CD" based on information established by the nephrologist.

Another limitation of our study was a potential bias related to nonrespondents (4). However, we observed that the characteristics of our subjects were similar to those notified to the Lazio Dialysis Registry.

Conclusions

The percentage of self-reported ER patients (78%) we found was higher than that found in most other studies (9, 11). This may reflect the fact that in Italy a free of charge access to health care services is warranted. However, we observed that 41% of them started CD in emergency conditions, 24.6% had a catheter for vascular access and 58.3% were not vaccinated against HBV.

Moreover, though 88.4% of patients considered information on RRT useful in choosing a dialysis modality, only 31.1% reported having chosen their dialysis modality, and 26.7% received information about all RRT modalities, in both the ER and LR groups. The finding that is particularly worrying is that a very low proportion of patients received information about peritoneal dialysis (40.4%) and renal transplantation (33.4%).

These results could also reflect a different possibility of offering all RRT modalities in dialysis centers in the Lazio region, where only public centers (about half of the total) are authorized to treat patients with peritoneal dialysis. Thus, another possible explanation could be related to center's or doctor choice rather than patients' information.

ER patients should receive a sufficient amount of information from their nephrologist to allow a certain degree of independence and to become knowledgeable about all aspects of dialytic treatment. Our findings suggest the need to raise awareness among nephrologists about some aspects of patient care, such as providing information on all RRT modalities (11, 16). A recent study that focused on patients' views regarding choice of dialysis modality concluded that in the absence of absolute clinical contraindications, the choice should be the modality that best accommodates patient and family preferences, considering their daily activities and lifestyles, with the necessary pro-

fessional support, and appropriate and timely education, especially to encourage the greater use of modalities other than hemodialysis (31).

We are conscious that our study, focused on patient's impressions, is likely more reliable about fistulas, HBV vaccination, etc, which may be reflected more appropriately in our approach than information received on RRT and how effective the predialysis treatment has been.

Finally, we found that the presence of a family or personal history of renal problems and some comorbidities facilitated access to health care services and was useful in the early detection of renal disease and in the reduction of LR. These findings highlight the need to implement training programs for GPs to improve their knowledge of CKD and to validate the importance of co-management and the timely referral of these patients, to improve early and long-term dialysis outcomes (8, 9, 16).

Appendix

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