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An update on the referral pattern of patients with end-stage renal disease

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An update on the referral pattern of patients with end-stage renal disease. This article first describes the epidemiology and reasons of late referal to the nephrologist of patients suffering from end-stage renal disease (ESRD). Depending on the definition, between 25 and 50% of worldwide ESRD patients are referred very late. Second, the relation of late referral to the quality of pre-ESRD care, its impact on the selection of dialysis modality, on the time of start of dialysis and on the use of an adequate vascular access, are discussed. Finally, the economic aspects of late referral are described and ways to improve the referral pattern are proposed.

The incidence of end-stage renal failure (ESRF) is rising exponentially both in Europe and the United States [1–3]. One reason for this phenomenon is an increasing number of patients starting renal replacement therapy (RRT), but improving survival of patients on RRT may also contribute. The age threshold of elderly patients considered suitable for dialysis has also risen continuously. In the United States, over 30% of those on the RRT program are aged older than 65, while in some European countries, like Germany and Greece, this percentage is over 50% and 40%, respectively [3].

All over the world, where at least some data are available, between 20% and over 50% of those patients taken onto dialysis require RRT within days or weeks. The most important reason for this late start of RRT is a delayed referral of the patient to the nephrology units.

This article will attempt to describe the most recent epidemiology and possible reasons for this phenomenon, as well as the associated negative medical and socio-economic consequences, and try to explore ways to improve the referral pattern over the coming years.

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Key words: patient referral, pre-ESRD care, vascular access, dialysis initiation.

EPIDEMIOLOGY OF LATE REFERRAL FOR ESRD

Table 1 is a summary of some selected data. It should be noted that the definition used in several of the articles is not uniform, explaining some of the differences in referral patterns in the different countries.

It is also remarkable that there has been no improvement over the years in these figures, despite previous attention to the problem of late referral (LR) with all its associated higher morbidity, mortality, and negative economic side effects [4–8].

Although more recent articles [9–13] have found that both early and late patient survival were lower in late-referred patients, this has not been universally found [14–16]. However, almost all studies describe a higher co-morbidity in the late-referred patients, necessitating longer duration of the initial hospitalization.

REASONS FOR LATE REFERRRAL

One explanation may be the insidious evolution of chronic renal failure in the majority of the patients. In some patients, renal insufficiency only becomes obvious with the appearance of frank uremic symptoms, leading to consultation with a physician. This type of problem can only been avoided by regular screening of renal function in otherwise asymptomatic patients, which is economically unrealistic. However, some categories of the population may be considered to be at high risk for developing renal insufficiency, such as patients aged 50–75 years who have either hypertension or diabetes. A recent retrospective study has explored the possibilities of screening such patients [17]. Primary care case notes and computer records in 12 general practices from inner and greater London were audited to see whether patients had their blood pressure measured and urine tested for protein within 12 months, and plasma creatinine measured within 24 months. A total of 16,855 patients were aged 50–75 years. From this age group, 2693

Table 1. Recent publications on late referral in several countries

Reference	Country	Time period	Definition of LR	Fraction of population %
[30]	USA	Oct 92–Dec 97	<4 months	20
[61]		Oct 95–June 96	<1 month	25
			1–4 months	15
[49]		1990–1994	no nephrol care	57
[16]		Jan 90–April 97	<1 month	
[64]	European survey	Jan 93–Dec 95	<1 month	35
[65]		Jan 96–Dec 97	<1 month	35
[8]	France	Jan 89–Dec 91	<1 month	29
[15]		Jan 89–Dec 96	<4 months	31
[11]	Scotland	Oct 97–Sept 98	Unplanned	24.2
			Unrecovered ARF	10.7
			Acute-on-chronic	11.8
[55]	The Netherlands	Jan 97–May 99	Below DOQI guidelines	37
[9]	Spain	1996–1997	<6 months	23
[35]	Brasil		<1 month	57

(15.5%) patients were identified as being either hypertensive or diabetic, or both. Of the 2561 records audited, 1359 (53.1%) contained a plasma creatinine measured within 24 months, and 11% (150) of these had a value of >125 μmol/L. This equates a prevalence of renal insufficiency with >110,000 patients per million in this group, but only 42 patients (28%) had been referred to a nephrologist. Of records audited, 73% contained a blood pressure measurement and 29% contained a test for proteinuria within 12 months. It is clear that a complete referral of all appropriate patients would overwhelm the available renal services in that area. However, this large population could be managed in the community, but clinical care pathways need to be developed to screen, investigate, and manage these patients at risk. Realistically, such protocols could be supervised by practice and community nurses.

A similar study was recently performed in Canada [18] and included 2781 outpatients referred by community physicians to an urban laboratory network for serum creatinine (S_{Cr}) measurement. Glomerular filtration rates (GFR) were estimated using the Cockroft-Gault formula, in view of the well-known fact that many patients can have significantly decreased GFR with normal range S_{Cr} values, making the recognition of renal dysfunction more difficult. The study patients were grouped according to the concordance of S_{Cr} level abnormalities (abnormal >130 μmol/L) with significantly abnormal clearance values (abnormal ≤50 mL/min). The Cockroft-Gault value of ≤50 mL/min was chosen to reflect substantial renal impairment in all age groups. Of the 2781 outpatients referred, 2543 (91.4%) had normal S_{Cr} levels. Of these patients, 387/2543 (15.2%) had a calculated GFR ≤50 mL/min, representing substantially impaired renal function. Analysis of historical available laboratory data for patients with abnormal S_{Cr} and abnormal Cockroft-Gault values showed that 2 years prior to the study period, 72% of this group had abnormal S_{Cr}, while 18% had normal S_{Cr} with abnormal Cockroft-Gault values; 10% had normal S_{Cr} with normal Cockroft-Gault values. Thus this study documents the substantial prevalence of significantly abnormal renal function among patients identified by laboratories as having normal-range S_{Cr}.

Although the inclusion of calculated estimates of GFR in routine laboratory reporting may help to facilitate the early identification of asymptomatic patients with incipient renal impairment, one should realize the problems associated with the use of serum creatinine as measurement of renal function. These problems are well known to the nephrologist but not to other practitioners, including general practitioners and non-nephrology specialists. The serum creatinine concentration increases as the GFR declines; however, creatinine levels are affected by many factors beyond the GFR. In addition to the confounding effect of the tubular secretion of creatinine when renal function deteriorates, creatinine production also varies significantly depending on both muscle mass and dietary factors. These differences lead to significant, GFR-independent, inter-individual variations in serum creatinine levels. As a result, for individuals with low baseline values, it has been estimated that serum creatinine may increase by up to 13 standard deviations beyond the individual's personal reference range before exceeding the upper limit of normal for the population [19–21]. This highlights one of the major limitations of serum creatinine in clinical practice. Thus, although repeated determinations are quite useful for tracking changes in GFR with time, a single serum creatinine value is a relatively insensitive screening test for the presence of mild to moderate decrements in filtration function.

As pointed out by Jungers [22], most of the measures aimed at preventing or slowing renal insufficiency could and should be implemented primarily upstream of the

nephrologist, i.e., by general practitioners, internists, diabetologists, cardiologists, urologists, geriatricians, and more generally by all health care providers. Early therapeutic intervention is especially desirable in high-risk groups, namely diabetic and hypertensive patients, certain ethnic minorities, or patients with systemic disease.

One may expect that targeted intervention in well-defined populations particularly at risk of developing renal disease and progressive renal insufficiency, such as diabetic and/or hypertensive patients, will result in significant savings in terms of health for patients and costs to the community. Evidence has been provided that search for microalbuminuria allows the detection of the initial step of renal involvement. At this stage, therapeutic intervention by means of stringent blood pressure control, electively using angiotensin II neutralizing agents, stops or retards evolution to macroalbuminuria and progressive renal failure. Even in patients with established renal insufficiency, treatment with angiotensin-converting enzyme inhibitors (ACEIs) or angiotensin receptor blockers [23–27] has been shown to slow progression significantly in diabetics and non-diabetics with overt nephropathy, and the same is true for patients with essential hypertension. Guidelines for prevention and optimal treatment of diabetic and/or hypertensive nephropathy already exist and could easily be implemented by every informed physician.

Another reason for the LR may be that some patients may have consulted a non-nephrologist but have been referred to a nephrologist too late; this can occur for a variety of reasons. For example, the treating physician may not be aware of the severity of the disease or of the importance of adequate pre-end-stage renal disease (ESRD) care. There may be inadequate communication between the non-nephrologist and the renal physician; and in private institutions, there may be fear of loss of the patient, or reluctance to alarm the patient and his family.

In some European countries, it has been suggested that medical plethora might play an important role in the problem of LR [28].

In a study conducted some years ago in several Flemish centers in Belgium, it appeared that the largest number of lately referred patients were last seen by cardiologists, endocrinologists, and general internists, and to a lesser extent by general physicians [29]. Some of the patients were followed by these specialists for preexisting moderate chronic renal failure and had a unexpectedly rapid deterioration of renal function as a result of iatrogenic diagnostic or therapeutic procedures.

Socio-economic reasons may be another explanation of LR. In a study by Arora et al [30], there were significant differences in insurance coverage between the early and LRs. Patients covered by health maintenance organizations were more likely to be referred late than patients covered by Medicare.

A recent US study [31] found by multivariate analysis, that women, Hispanics, and Asians compared with Caucasians, uninsured patients compared with those privately insurance, and employed patients were more likely to start dialysis late. Certain nonclinical patient characteristics, notably female gender, race, and lack of insurance, are thus related to an increased likelihood of late initiation of dialysis. These factors may reflect reduced access to care.

It is also possible that some LR patients are in fact hidden nonreferrals, admitted in emergency often because of pressure by the family. Kahn et al [32] in the United Kingdom and Mendelssohn et al [33] in Canada found that a substantial number of ESRD patients was not referred, the number increasing with age and co-morbid conditions. This suggests that probably many physicians decide for themselves whether RRT should or should not be used in a patient with certain co-morbid conditions without previously asking advice of a nephrologist.

It was found in Italy that the trend for LR was higher in elderly patients. Therefore, it is difficult to foresee the possible expansion of the dialytic pool in elderly patients. Some of these frail or even seriously ill old patients may still appear in a dialysis unit where RRT is started in an attempt to improve their general condition. In some of these patients, RRT is indeed futile, explaining the relatively high number of deaths from withdrawal of dialysis in this category [6].

Finally, some patients suffering from acute renal failure do not recover and remain dialysis-dependent.

RELATION OF LR TO QUALITY OF PRE-ESRD CARE

Theoretically, timely referral of patients with chronic renal failure (CRF) to a nephrologist is likely to result in an improved clinical condition and better preparation for initiation of dialysis. Indeed, data from Europe [6, 7, 9, 32, 34] and South America [35] have shown that delayed referral is associated with a higher prevalence of uremic complications at the initiation of dialysis, with increased hospitalizations and higher cost of care.

A study in the United States by Arora et al [30], found that 22% of the patients were LRs. There were no differences in age, gender, race, and cause of ESRD between early referral (ER) and LR patients. However, compared with ER, LR patients were more likely to have hypoalbuminemia (56% vs. 80%), hematocrit <28% (33% vs. 55%), and predicted GFR <5 mL/min per 1.73 m^2 (17% vs. 40%) at the start of dialysis, and less likely to have received erythropoietin (40% vs. 17%) or have a functioning permanent vascular access for the first

hemodialysis (40% vs. 4%). However, pre-ESRD care among patients treated by a nephrologist for more than 4 months before initiation of renal replacement therapy was also less than ideal. Even among ER, 56% had hypoalbuminemia, 33% had a hematocrit <28%, only 40% had received predialysis erythropoietin, only 40% had a functioning permanent vascular access for the first dialysis, and 17% started dialysis at a predicted GFR <5 mL/min per 1.73 m^2. It is possible that the 4-month cutoff that was used in this and other studies to define ER may be too liberal. Optimal pre-ESRD care would probably require referral to the nephrologist at an even earlier time point in the course of progressive renal disease.

The National Institutes of Health (NIH) Consensus Conference of 1993 recommends that patients with CRF be referred to a renal team when the serum creatinine has increased to 1.5 mg/dL in women and 2.0 mg/dL in men [36]. The median interval between the first encounter with the nephrologist and start of dialysis was 25 mo among patients in the ER group. Consequently, an alternative interpretation of these data could be that pre-ESRD care of patients treated by nephrologists, too, is less than ideal. The patient-, physician-, and system-related factors behind this observation are currently unclear. It is concluded that also in the United States, LR to the nephrologist is associated with poor pre-ESRD care, but that ER not always guarantees optimal pre-ESRD care. This is further illustrated by the study of Nissenson et al [37]. Among the >200,000 patients who were enrolled in a health maintenance organization between 1994 and 1997, a cohort of 1,658 patients who exhibited at least two gender-specific, elevated creatinine concentrations, separated by at least 90 days, were identified. The proportions of patients with creatinine values of <2.0, 2.0–2.9, 3.0–3.9, and ≥4.0 mg/dL were 73%, 17%, 3%, and 7%, respectively. The majority of patients were treated by a primary care physician until the creatinine values reached 3.0 mg/dL, at which time a nephrologist was consulted. Care tended to be transferred to the nephrologist when the creatinine reached 4.0 mg/dL. Only 7.4% of patients received erythropoietin, but its use increased as creatinine increased. Erythropoietin was unlikely to be prescribed unless the patient had visited a nephrologist. Fewer than 50% of all patients with chronic kidney disease and fewer than 20% of patients with creatinine values of ≥4.0 mg/dL received an ACEI. Nephrologists were not more likely to prescribe these drugs than were primary care physicians. Diabetic patients were more likely to receive angiotensin-converting enzyme inhibitors than were nondiabetic patients, but use of these drugs was quite low even among diabetic patients with nephropathy.

Also in Europe, a recent survey revealed serious shortcomings in the management of renal anemia of pre-ESRD patients [38]. The ESAM trial on management of renal anemia indicated that only a small proportion of patients (11%) began treatment with erythropoietin before dialysis; that patients had low levels of hemoglobin at the start of erythropoietin (<9 g/dL), and that low target levels were achieved after treatment. At least based on this and the above-mentioned surveys, pre-ESRD care everywhere in the world is far from adequate [39].

IMPACT OF LATE REFERRAL ON THE SELECTION OF DIALYSIS MODALITY

ER has also been shown to empower the patient in making therapeutic decisions based on pertinent information and to affect the selection of specific dialytic modalities. Many reports have indicated that ER to a nephrologist, combined with a responsible, well-balanced presentation of all therapeutic options, is associated with a higher selection of peritoneal dialysis as initial therapy [9, 10, 16, 40–44]. More significantly, among patients referred to a nephrologist with no specific medical indications for peritoneal or hemodialysis, 50% of them selected peritoneal dialysis after an impartial introduction to both therapies [45]. ER provides the time for education before frank uremia ensues, allows the patient to participate in choosing the modality of therapy that best suits his or her individual lifestyle, and promotes self therapy, all of which should have a significant impact on quality of life and cost of treatment.

In LRs, sometimes arriving in an emergency situation, the reasons to start RRT are often a pulmonary edema or other serious uremic symptoms. In such cases, an urgent hemodialysis session results in a prompt correction of clinical status. Moreover, motivating a patient to start with peritoneal dialysis takes time and persuasive talent from the dialysis team and confidence and comprehension from the patient, which are often absent in the LR patients. The impact of intensive education and information on modality choice has previously been demonstrated [44, 46].

A Canadian study has assessed that even in ER patients, the cost/benefit of a pre-ESRD treatment-education program is in favor of such a multidisciplinary approach because of the significantly fewer urgent dialysis starts, more outpatient training, and fewer hospital days in the first month of dialysis in the "educated" patients [47].

REFERRAL PATTERN AND MOMENT OF START OF DIALYSIS

There are no uniform objective criteria for the initiation of long-term dialysis therapy. Nephrologists initiate dialysis treatment in most cases on the basis of the observed evolution of uremic symptoms and laboratory

investigations, such as plasma creatinine concentration and creatinine clearance (C_{Cr}) [48]. However, the evolution of uremic symptoms varies from patient to patient [49], so there is substantial variation in timing of dialysis initiation [50–52]. The study by Obrador et al [52] revealed that there is wide variation in renal function at the initiation of dialysis in the United States. ESRD population, and a substantial fraction of patients (23%), start dialysis at levels of predicted GFR below 5 mL/min.

In an attempt to improve the quality and outcome of dialysis care, the US National Kidney Foundation Dialysis Outcomes Quality Initiative was established [53]. And, according these guidelines, dialysis should be started when renal Kt/V_{urea} falls below 2.0/week. This value equals a C_{Cr} of about 14 mL/min. A lower Kt/V_{urea} would be acceptable only when the protein equivalent of total nitrogen appearance normalized to body weight (nPNA) falls below 0.8 g/kg per day. It would intuitively be expected that LR patients, compared with ERs, would start RRT at lower residual GFR; this was the case in some [9, 30, 44] but not all studies. Various US studies showed a mean estimated GFR at onset of dialysis between 7.1 and 7.4 mL/min, [52, 54] and a European multicenter study described a mean C_{Cr} of 7.4 mL/min at the start of dialysis [10]. In a UK study, Kt/V_{urea} was 1.05 (SD 0.4) per week at the initiation of dialysis [51]. A recently published prospective cohort study in the Netherlands [55] found that better residual renal function at the start of dialysis was associated with better survival, but only a small beneficial effect of the DOQI guideline for the optimum time to initiate dialysis was found with an observed gain in survival time of only 2.5 months in the first 3 years after the start of dialysis. The mean Kt/V_{urea} at start of dialysis was 1.3 (SD 0.6) per week. The authors concluded that an earlier start of chronic dialysis in patients with ESRD than currently applied in the Netherlands (and probably in other industrialized countries) is not warranted. A previous analysis [56], based on the same Netherlands Co-operative Study on the Adequacy of Dialysis (NECOSAD) database, had shown that, despite the low residual renal function at start of dialysis in the Dutch patients, the large majority of them showed a good nutritional status, probably explaining the lack of clear impact of late initiation of RRT in these patients.

It should be mentioned that it is very difficult to exclude an important so-called lead-time bias in many of these studies. It is clear, however, that all the values of either C_{Cr}, residual GFR, or Kt/V_{urea} at start of dialysis that are currently reported in the literature are far below the recommended "healthy start" DOQI guidelines.

The recent DOPPS registry compared renal function at the time of initiation of hemodialysis between Europe and the United States from 1998–1999. It showed that the mean estimated glomerular filtration rates among incident patients in 1998 were 8.4 mL/min in Europe and 11.1 mL/min in the United States; in 1999 the values were 8.6 mL/min and 10.8 mL/min, respectively [57]. It thus seems that both in Europe and the United States there is a tendency to start dialysis at higher GFR compared with the past.

It is important to note that in many European centers, the residual renal function is, at least in most of the LRs, not the direct cause for initiation of dialysis. The decision to initiate dialysis therapy is often based on clinical and biochemical parameters, which should be frequently evaluated in the pre-ESRD time frame. The frequency of medical visits should be driven by clinical criteria, including control of hypertension, compliance to medications, control of hyperphosphatemia and PTH levels, treatment of anemia, control of acid-base, and other clinical considerations.

Moreover, it is not exceptional that urgent dialysis be performed, mostly for pulmonary edema, sometimes at clearances well above 10–12 mL/min. It appears however, that, probably because of induced ultrafiltration, the residual renal function rapidly falls to very low levels, necessitating the continuation of dialysis.

IMPACT OF LR ON USE OF VASCULAR ACCESS

Previous cross-sectional studies have reported the association between ER to a nephrologist and greater AV-access use at the initiation of chronic hemodialysis therapy [29, 30, 58–60]. Woods et al [59] reported that 37% of a sample of patients starting hemodialysis therapy in 1996 used an AV access at their first dialysis session, with 79% greater odds of using an AV access among patients referred to a nephrologist 4 or more months in advance of the initiation of therapy. In the same population, Stehman-Breen et al [58] found that patients told they had renal disease more than 1 year before the start of hemodialysis therapy were nearly three times more likely to have an AV access in use at the start of hemodialysis therapy than those told 1–4 weeks before the start of hemodialysis therapy. Arora et al [30] found that 48% of 86 patients referred to a tertiary-care center at least 4 months before the start of chronic hemodialysis therapy used an AV access for their first dialysis session compared with 4% of 28 patients referred later. These results were further extended in a recent analysis [61]. Patients who reported being seen by a nephrologist at least 1 month before starting hemodialysis therapy (75%) were more likely than those referred later to use an AV access at initiation (39% vs. 10%) and 6 months after starting hemodialysis therapy (74% vs. 56%). Patients referred within 1 month of initiating hemodialysis therapy used a dialysis catheter for a median of 202 days compared with 64, 67, and 19 days for patients referred 1–4, 4–12,

Table 2. Cost analysis with respect to planned or unplanned dialysis in 5 Spanish units

	Planned		Unplanned	
Dialysis sessions of acute patients (1 per patient)	31 × $ 254	$ 7,854	172 × $ 254	$ 43,688
Other sessions at hospital (overcost or differences with type I sessions)	47 × $ 47	$ 8,789	1023 × $ 47	$ 48,081
Hospitalization at dialysis initiation	269 days × $ 169	$ 45,461	3358 days × $ 169	$ 567,502
Hospitalization within the first 6 months	594 days × $ 169	$ 100,386	954 days × $ 169	$ 161,226
		$ 162,510		$ 820,497
Difference			+ $ 657,987	

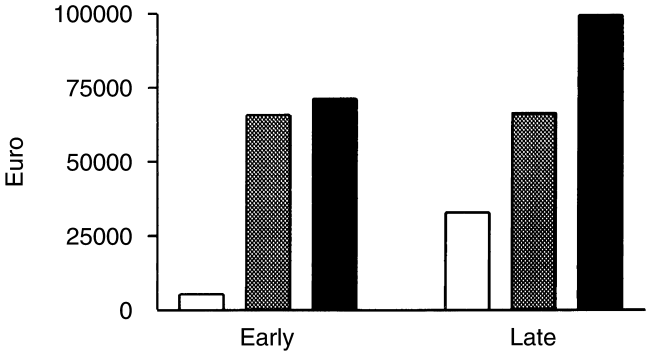

Fig. 1. Cost in Euro of the first hospitalization, the first year treatment without the first hospitalization, and the total first year of treatment in early and late referral incident patients admitted in RRT in Ghent during the year 1998. 1st hospitalization (open box); 1st year (shaded box); total (black box).

and greater than 12 months before initiating hemodialysis therapy, respectively. Compared with LR patients, those patients referred at least 4 months before initiating hemodialysis therapy were more likely to use an AV fistula, rather than a synthetic graft, as their first AV access (45% vs. 31%). These associations remained after adjustment for age, sex, race, marital status, education, insurance coverage, co-morbid disease status, albumin level, body mass index, and underlying renal diagnosis. These data show that LR to a nephrologist substantially increases the likelihood of dialysis-catheter use at the initiation of hemodialysis therapy and is associated with prolonged catheter use. Regardless of the time of referral, only a minority of patients used an AV access at the initiation of treatment, and greater than 25% had not used an AV access 6 months after initiation. As recently pointed out by us, the differences in vascular access policy between the United States and Europe may contribute to the greater mortality in US hemodialysis patients [62].

THE ECONOMIC IMPACT OF TIMELY REFERRAL

According to a recent review of economic evaluation of the treatment of ESRD [63], and assuming equivalent health outcomes between the different dialysis modalities (admittedly, a contentious assumption), economic evaluation shows that ESRD programs should strongly encourage continuous ambulatory peritoneal dialysis (CAPD), or for patients in whom CAPD is not an option, independent (home or self-care) hemodialysis. It is of course clear that autonomous dialysis cannot be mastered by many patients currently admitted in renal units. Consequently, many ESRD programs have low rates of CAPD utilization and very low rates of independent hemodialysis, also partly as a result of the financial incentives that exist for the nephrologists who care for dialysis patients. But as pointed out before, roughly one third of the patients arrive rather late in the renal unit and are then started on hemodialysis. In fact, assuming that an average patient starting renal replacement therapy spends 3.1 years on dialysis before death or renal transplantation, then treating an eligible patient with home rather than in-center hemodialysis could result in a cost saving of more than US$ 135,000 over the 3.1 years. The savings that may result from treating two eligible patients with home rather than in-center hemodialysis could then be used to fund fully the treatment of one in-center hemodialysis patient (for 3.1 years). As such, the health gains per dollar spent would be maximized. Accordingly, ESRD programs should address the barriers that impede the more widespread use of CAPD and independent hemodialysis; in addition, the financial incentives that promote in-center hemodialysis should be changed. One of these barriers is the LR of the patients.

Earlier calculations by Campbell et al [5] and Jungers et al [8] have revealed that, mainly because of prolonged initial hospitalization, the LR patient induced an excess of approximately US$19,000 in the early 1980s in the United States and of FF0.2 million (or approximately US$30,000 per patient) between 1989 and 1991 in France.

Only a few recent studies have directly calculated the differences in cost between ERs and LRs in more recent years.

Such calculations have been made in five Spanish centers [9] and in the renal unit of the Ghent University Hospital.

A total of 362 patients were admitted for RRT in five

Spanish centers in the years 1996 and 1997 (Table 2). Planned dialysis refers to a patient admitted in a renal replacement therapy program with either a peritoneal or vascular access present. The proportion of patients who had visited a nephrology unit, at least 6 months before the start of dialysis, was significantly greater in the planned group compared with the unplanned group (91.4% vs. 61.4%). The difference in costs between the unplanned and the planned group is substantial and amounts to a total of US$675,987 for the total number of patients admitted during the study.

Figure 1 summarizes the total cost calculation (in Euro, where 1 Euro = US$0.89300) in the Ghent dialysis unit for patients admitted during 1998. Total cost means the reimbursed costs from the social security system and the additional costs for the patient. All costs have been included: dialysis costs, hospitalizations, all clinical and radiological tests, surgery, transportation costs, medications, etc.

As in Spain, major cost-savings could be possible, both for society and the individual patient if LR could be avoided.

WAYS TO IMPROVE THE REFERRAL PATTERN

Several nephrological societies have published guidelines to improve care delivery and to stimulate the collaboration between primary care physicians and nephrologists such as the NIH Consensus Statement, guidelines of The British Renal Association, The Canadian Society of Nephrology, the NKF DOQI guidelines, etc.

However, the message has not been very well dessiminated amongst the primary care physicians and non-nephrological specialties. These guidelines should be distributed by the local primary care physician's associations. Also, patient associations should be contacted, and help should be provided for patient discussions.

A partnership among the nephrologist, primary care physicians and other, non-nephrology specialists should be developed whereby attention is paid to "alarm renal signs or symptoms" such as proteinuria, hematuria, hypertension, and/or edema.

A diabetic patient with a duration of disease over 5 years should be screened for microalbuminuria at least once per year. In case this is found, a nephrological consultation is warranted.

The nephrologist should provide a complete set of recommended interventions and should develop an individual management plan per referred patient. Once a possible diagnosis has been established, the patient is referred back to the primary care physician and seen only once per year by the nephrologist.

When the serum creatinine reaches 3–4 mg/dL, the nephrologist assumes more intense responsibility for the patient care. In case of diabetes, the nephrologist should assume a more intense responsibility at a serum creatinine of 2–3 mg/dL.

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