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Survey on Spanish Extra-hospital Hemodialysis Centers

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SUMMARY

Background: *Many guides and scientific recommendations about hemodialysis (HD) treatment have been developed. However, its impact and application is unknown. The aim of this study is to describe how Spanish Extrahospitalary Hemodialysis Centers work.*

Methods: *A transversal, descriptive study was conducted by means of a survey. An 83-items questionnaire tackled different aspects involving patients and HD characteristics, Dialysis Unit organization and anemia management.*

Results: *One hundred surveys were distributed and 91% were answered, corresponding to 6,599 patients (M 4,015/F 2,584). Fifteen % were younger of 50 years and 45.2% older of 70 years. Seventy seven % had arteriovenous fistulas, 8.1% had polytetrafluoroethylene grafts and 14.8% had catheters. The mean number of patients per center was 72.3 (11-212). Seventy eight % were divided in 3 shifts, with a mean relationship of 38.9 patients/physician, 4.7 patients/nurse and 9 patients/auxiliary personnel. HD characteristics were: 60.1% of the HD sessions were longer than 4 hours, 97.2% were on a 3 days/week schedule; 95.4% used a conventional technique; 49.1% were performed with high-flux membranes, 89.6% with synthetic membranes, and 11.7% used Qb higher than 400 mL/min: On the other hand, 8.8% of the patients were HVC +, 0.68% were AgHBs +, and 0.09 were HIV +. There were HCV + patients in 79% of Dialysis Units, 50% of them with complete isolation, while patients with hepatitis B were attended in 13.8%, and VIH + in 3.4% of the Units, the latter always with complete isolation. Water treatment was done with simple osmosis in 46.6% of the cases, with water collection in 86.8% with pyrogen filter in the monitors in 48.9%. Surveillance of the controls was performed by the physician in 94.3% of the cases, and by technicians or nurses in the rest. Mean Hb was 11.9(1.4) g/dL, being higher of 11 g/dL in 80.2% of the patients. Ferritin higher than 100 µg/L was found in 92.4% and transferrin saturation higher than 20% in 81.9% of patients. The percentage treated with erithropoyetic stimulant agents was 90.6%.*

Conclusions: *All information collected is relevant in order to know what is done and how to improve it. It will be useful to evaluate the impact of the publication of the new Guides of HD Centers of SEN on medical practice in this area.*

Key words: ***Hemodialysis. Extrahospitalary Centers. Treatment. Guides application.***

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ENCUESTA SOBRE LOS CENTROS DE HEMODIÁLISIS EXTRAHOSPITALARIA EN ESPAÑA

RESUMEN

Introducción: *Existen múltiples guías y recomendaciones científicas sobre el tratamiento de HD, pero se desconoce su grado de aplicación y repercusión. El Grupo de Trabajo de Hemodiálisis Extrahospitalaria se planteó describir una serie de puntos relevantes de la forma de trabajo de los centros extrahospitalarios.*

Material y métodos: *Se realizó un estudio transversal y descriptivo, mediante un cuestionario de 83 preguntas en forma de encuesta, que abordaba distintos aspectos de los pacientes (pac), de características la HD (pauta, tratamiento de agua, medidas de aislamiento de virus), de la organización y el manejo de la anemia.*

Resultados: *Se distribuyeron encuestas a 100 centros, de los que respondieron el 91%. El número total de pacientes fue 6.599 (H 4.015* vs *M 2584). El 15,7% eran menores de 50 y el 45,2% mayores de 70 años. Los accesos vasculares prevalentes eran: 77% fístulas nativas, 8,1% prótesis y el 14,8% catéteres. La media de pacientes por centro fue 72,3 (rango 11-212), en el 78% divididos 3 turnos, con una media 38,9 pac/médico, 4,7 pac/enfermera y 9 pac/auxiliar. El 60,1% se dializaban más de 4 horas, con una frecuencia de 3 días/semana en el 97,2%, por una técnica convencional el 95,4%, con membranas de alta permeabilidad el 49,1% y sintéticas el 89,6%, el 11.7% utilizaban Qb superiores a 400 mL/min. El 8,8% de los pacientes eran VHC+, 0,68% virus B + y 0,09 VIH +. El 79% de los centros dializaban pacientes portadores del virus C (con aislamiento completo el 50%), mientras que los individuos virus B + se atendían en el 13,8% y los HIV + en el 3,4% de los centros, siempre con aislamiento completo. El tratamiento de agua fue ósmosis simple en el 46,6%, con almacenamiento de agua, 86,8% y filtro de pirógenos en los monitores, 48,9%. La supervisión de los controles la realizaba el médico en el 94,3% y en el resto sólo lo supervisaban el técnico o el personal de enfermería. La hemoglobina media fue 11,9 (1,4) g/L, siendo superior a 11 g/L en el 80,2% de los pacientes, con una ferritina > 100 µg/L el 92,4% y una saturación > 20% el 81,9%. El % de tratados con agentes estimuladores de la eritropoyesis era el 90,6%.*

Conclusiones: *Toda la información obtenida es relevante para conocer qué se hace y cómo mejorarlo. Además, proporciona una herramienta para evaluar el impacto de la publicación de la Guía de Centros de HD de la SEN sobre la práctica médica en este sector.*

Palabras clave: ***Hemodiálisis. Extrahospitalaria. Tratamiento. Aplicación de normas.***

INTRODUCTION

The Extra-Hospital Hemodialysis Working Group was created in 2003 as an initiative of the Spanish Society of Nephrology (SEN). The goal of knowing and informing the whole Spanish nephrologic community how work is done in dialysis centers was set among their initial activities.

According to preliminary data presented at the 2005 SEN Meeting, the prevalence of hemodialysis (HD) patients in Spain is 448 pmp (data corresponding to 51% of the population), which approximately accounts for 19.000 patients, which is in agreement with the last registry published corresponding to the year 2002.[1] Taking into account that a large number of these patients receive therapy at extra-hospital units, it is relevant to know how are the working characteristics of these units. In fact, no study has been performed so far exclusively focusing on extra-hospital dialysis, nor it is exactly known the number of patients receiving therapy at these units.

We currently may find in the literature multiple clinical practice guidelines[2,3,4] establishing recommendations on several therapeutic issues in dialysis pa-

tients.[5] In Spain, the SEN has published guidelines on viral infections,[6] water quality control,[7] vascular accesses, and shortly guidelines on dialysis centers will be published, which already are at their preliminary stage.[8] On the other hand, in addition to scientific recommendations there are several factors, such as staff, infrastructure, or location in different Autonomous Communities subject to current contracts with the Public Administration, may influence the therapy offered at the different units. The level of implementation of these guidelines and their impact on different settings are, however, unknown. Therefore, the Extra-Hospital Hemodialysis Working Group set the goal of informing about the current situation of extra-hospital centers at the same time as the publication of the new guidelines on centers, as well as the level of application of some guidelines already published, such as water management and viral diseases.

The present work faces the need for knowing these basic issues on the population situation, the application of HD, and on the organization of HD satellite centers in Spain. The study has been approached by means of a questionnaire in order to guarantee general access and a reasonably short assessment period.

MATERIAL AND METHODS

A descriptive cross-sectional study was done by means of a questionnaire. Spanish extra-hospital dialysis units were invited to participate using the old SEN registry database. Data were gathered through a direct registry through the Internet. The data collection period remained open for two months.

Extra-hospital dialysis centers were defined as those located at strategic health care areas and linked to the Hospital Nephrology Departments were HD therapy is offered by the conventional way or by other techniques.

The questionnaire comprised 83 questions, most of them were limited multiple choice and others were of numerical answer. It comprised the following sections:

1. General characteristics of the patients: gender, age, type of vascular access, and viral serology.
2. Characteristics of HD therapy: this section focuses on three issues:

    a. The HD regime itself:
        i. Technique: conventional HD vs. hemodiafiltration.
        ii. Duration: < 4 hours or longer or equal to that time.
        iii. Frequency: 3, 4-5 ó 6 days/week.
        iv. Baths: calcium concentration used and use of glucose or not.
        v. Blood and bath flows.
        vi. Types of membrane:
            1. Biocompatibility: cellulose or synthetic.
            2. Connective permeability (low: Kuf < 12 mL/h/mmHg vs. high: Kuf > 20 mL/h/mmHg).
    b. Water management: determinations performed (osmosis conductivity, hardness, chloramines, cultures, endotoxins, aluminum and UNE regulation), frequency (none, daily or weekly, monthly, bimonthly or quarterly, semestral or annual), who performs them and who is in charge (a physician, a technician, the nursing staff).
    c. Isolation measures for hepatitis B and C viruses and HIV (room, monitoring device, shift, personnel).

3. Center organization: number of patients, number of shifts, and number of assisted patients per physician, nurse, and assistants. This point included the frequency by which some laboratory determinations (hemoglobin (Hb), transferrin, albumin) and further tests (chest X-ray, abdominal ultrasound, echocardiography, bone scan, gynecological follow-up, PSA, fundus examination) were carried out.
4. Issues on anemia management: analytical parameters such as mean hemoglobin, percentage of patients with Hb > 11 g/dL, ferritin > 100 mg/dL, and transferrin saturation > 20%, and percentage of patients treated with erythropoietic agents.

STATISTICAL ANALYSIS

The answers were included in the statistical package SPSS 10.0. The results are presented as total values and percentages, means, standard deviations (SD) of the means, and ranges. According to recent notation rules, SDs are expressed as figures in brackets after the mean value.

The Chi-square test was applied to assess the differences in frequency, and a p value < 0.05 was considered to be significant.

RESULTS

Answers obtained

One hundred questionnaires were distributed and complete responses were received for more than 75% of the whole items in 91 centers.

General characteristics of the patients assisted at the centers

The number of patients was 6,599. The general characteristics of the patients assisted at the centers are shown in Table 1.

Characteristics of HD therapy

Table 2 shows the data defining the HD characteristics for duration, frequency, technique, and type of membranes used, blood flow, and calcium and glucose bath concentration. A more detailed analysis showed that the percentage of patients treated with sessions lasting for less than 4 hours was higher in those centers with 3 hemodialysis shifts than in those with 2 shifts (41 *vs.* 30.5%, $p < 0.04$).

About water management, 88 centers provided their answers. Osmosis treatment was simple in 41 centers (46.6%) and double in 47 (53.4%). There was water storage in 79 (86.8%) and pyrogen filter within the monitoring device was used in 43 (48.9%).

Mean final water conductivity was 5.5 (4.6) microS/cm. Sixty-nine point three percent (n = 61) of water measurements were done by a technician in charge, in 11.4% (n = 10) by the nursing staff, in 6.6% (n = 10) by the physician, and in the remaining there were done by either one of the three. Supervision of the result was carried out only by the physician in 69.3% (n = 61), either by the technician or the physician in 20.5% (n = 18), and by both of them in 4.5% (n = 4), in addition to the nursing staff. It is worth highlighting that in four centers the results were supervised by the technician or the nursing staff alone. Determinations performed and their frequency are reflected in Figure 1. About the frequency of disinfection of the distribution ring, in 11.4% disinfection was carried out in a weekly basis, in 12.5% monthly, in 4.5 % bimonthly, in the remaining 68.2% quarterly or even more, and in 3.4% disinfection was never done.

Eighty-eight centers, as well, answered the questions focusing on hepatitis. In 79% of the centers, patients carrying HCV were dialyzed, whereas patients carrying HBV were assisted in only 13.8% and those with HIV+ in 3.4%. Isolation measures for HBV and HIV were identical, with complete isolation (room, shift, monitoring device, and nursing). Data regarding HCV are shown in Table 3.

Table I. General characteristics of the patients

	N	%	Range (%)
Total patients	6,599		
Gender			
Male	4,015	60.8	38.2-82.1
Female	2,584	39.1	17.8-67.6
Age			
< 50 years	1,036	15.7	1.8-51.5
50-70 years	2,575	39	21.2-85.7
> 70 years	2,988	45.2	7.1-69.7
Virus-positive			
HCV	583	8.8	0-31.5
HIV	6	0.09	0-7.1
HBsAg	45	0.68	0-14.2
Type of vascular access			
Native AVF	5,082	77	42.8-100
Prosthetic AVF	537	8,1	0-37.1
Permanent catheter	846	12.8	0-44.8
Temporary catheter	134	2	0-16.6

Table II. Characteristics of hemodialysis

	N	%	Range (%)
Duration			
< 4hours	2,628	39.8	0-89.6
≥ 4 hours	3,971	60.1	1.6-100
Frequency			
3 days/week	6,415	97.2	89.2-100
4-5 days/week	146	2.2	0-10.7
6 days/week	38	0.6	0-9.2
Technique			
Conventional HD	6,298	95.4	47.3-100
Hemodiafiltration	301	4.6	0-100
Permeability			
High permeability	3,245	49.1	0-100
Low permeability	3,354	50.8	0-100
Membrane composition			
Cellulose	685	10.3	0-100
Synthetic	5,914	89.6	0-100
Qb pump			
> 400 mL/min	773	11.7	0-68.6
300-400 mL/min	5,225	79.1	11.9-100
< 300 mL/min	601	9.1	0-88.1
Calcium in bath			
≤ 2.5 mEq/L	2,347	35.5	0-100
3 mEq/L	3,531	53.5	0-100
3.5 mEq/L	721	10.9	0-100
Glucose in bath			
Yes	6,106	92.5	0-100
No	492	7.4	0-100

Center organization

The mean of treated patients per center was 72.3 (37.3) (range 11-212). The analysis of work organization showed that patients are distributed into 2 (n = 1) or 3 (n = 71) shifts/day, with 14 centers working with 2 and 3 shifts depending on the days, and 5 centers working with 1 or 2 shifts depending on the days, as well. Mean number of patients assisted by a physician

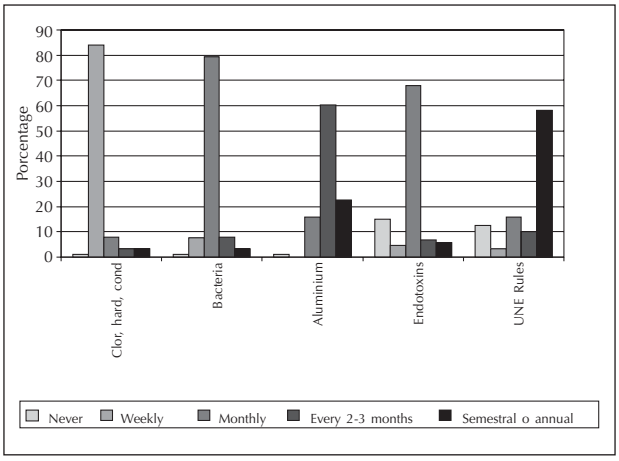

Fig. 1.—Frequency of determination of treated water: Chlor: chloramines, Hard: hardness, Cond: conductivity.

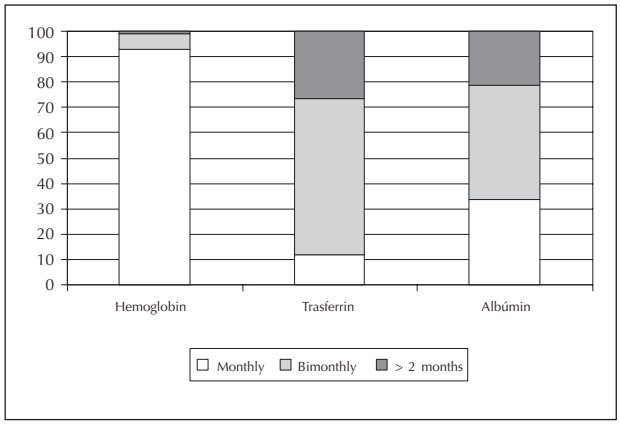

Fig. 2.—Frequency of analytical determination.

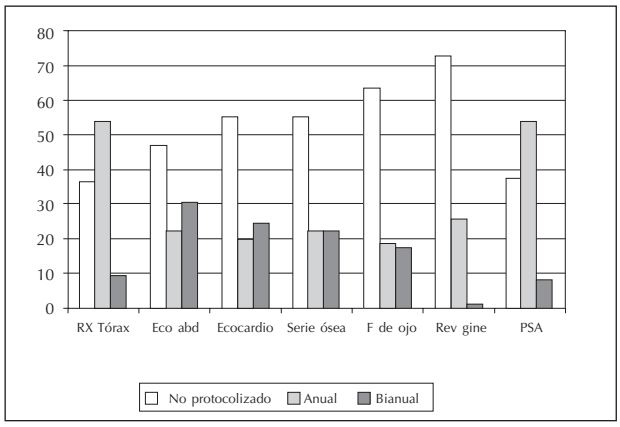

Fig. 3.—Frequency of additional testing.

was 38.9 (minimum 8, maximum 80), by a nurse 4.7 (3-6), and by a nurse assistant 9 (3-13). Eighty-five centers answered on the frequency by which additional tests are performed; the results are shown in Figures 2 and 3.

Issues on anemia management

Data on anemia were gathered for 85 centers. Mean hemoglobin was 11.9 (1.4) g/dL, 80.2% of the patients having a hemoglobin level > 11 g/dL, 92.4% having ferritin > 100 µg/L, and 81.9% having transferrin saturation index > 20%. The percentage of patients treated with erythropoietic agents was 90.6%, all of them intravenously.

DISCUSSION

The number of uremic patients on renal replacement therapy with HD is progressively increasing and although there are many clinical guidelines focusing on several issues of this therapy it is not known what is the real adherence to them. The present study describes for the first time the situation and therapy regimens of patients at extra-hospital HD centers.

Table III. Isolation measures for HCV-positive patients

	%
Only monitor	27.1
Monitor and personnel	18.6
Shift	4.3
Room, monitor, shift, personnel	50

The concern of extra-hospital nephrologists about this issue has been clearly shown by the high response rate obtained, higher than that of similar questionnaire-based Spanish studies.[9,10] This high response rate was achieved in spite of the fact that filling-up the questionnaire took time and effort, the participation was voluntary and did not implicate a specific practical or personal benefit. The questionnaire could not be sent to all existing centers, since there was not an easy way of communication among all of them, and the lack of an initial updated registry of all centers; however, the response rate achieved represents a clearly valuable sample.

We may highlight several aspects from the results. In the first place, almost half of the patients assisted at the centers answering the questionnaire were older

than 70 years. As the Spanish population gets older[11] the characteristics of patients included in HD change so that older and older patients are receiving dialysis with higher complexity and morbidity levels,[12,13] a fact that also affects patients treated at extra-hospital centers. It is a striking finding that the percentage of patients older than 70 years varies by center from 7.1% to almost 70%, which indicates that it is likely that selection criteria and treated populations may be highly different, and this is important when taking into account work resources and structure. To define other aspects of the treated population is the goal of a second part of this study that will be developed in the future. In any case, this age datum shows that the trend of keeping elderly patients at hospital HD has been overcome; besides, the observation of the mean age and age range underlines the feasibility of administrating dialysis out of the hospital to very old patients.

The data obtained on vascular accesses are quite different from those of recent studies. In 2001, Rodriguez *et al*.[9] reported the distribution of the different morbidities related with vascular accesses among the Spanish population on a regular HD program, although only 21.6% came from extra-hospital units. These authors found that 80% of the patients received dialysis through an arterial-venous fistula, 11% through a catheter, and 9% had a graft. However, in the DOPPS study,[14] providing more recent data, these percentages were 82%, 7%, and 12%, respectively. In our population, autologous arterial-venous fistula was the predominant vascular access, used by 77% of the patients, 8% using prosthetic fistulas and 14.8% catheters (12.8% permanent catheters, and 2% temporary catheters), so that the number of catheters is considerable higher than the one described, with a lower number of fistulas. We may take into account that these studies were carried out between the years 1999 and 2000, so that these differences may be due to the changes that have taken place in recent years among the dialysis population regarding age and comorbidity, which favored the use of catheters over autologous fistulas. On the other hand, in theory permanent catheters should be left to older patients or patients with an expected short time of HD, a population that should be less prevalent at extra-hospital dialysis centers. This a hypothesis that should be clarified when studies or registries categorizing both types of populations will be designed, although both reported age and the above-mentioned datum indicate that the type of population in these centers has changed as comparer to the near past and that the old distinction between hospital-based and extra-hospital HD patients is not so clear-cut as it used to be. Finally, we may highlight that the data obtained do not meet the goals set by the Quality Group —which are reported in the Vascular Access Guidelines of the SEN— of achieving an 80% rate of native fistulas and less than a 10% rate of catheters as the vascular access. In this sense, this contrast between ideal goals and the observed reality may be interpreted in two ways: on the one hand, it would indicate that there still is a lot to be done until reaching the proposed quality standards, but, on the other hand, it may be a call for reviewing the practical validity of some items of the Guidelines, not always set fully in most of the units. This matter of debate is certainly concerning for the near future, although it goes beyond the aim of this article.

About HD characteristics we may highlight several aspects. Virtually all patients received dialysis 3 days in a week, and 39.8% for less than four hours per session; a certainly interesting point is that this occurs more often in centers with 3 shifts. In the European guidelines[5] the recommendation is for a minimum duration of 4 hours with a conventional regimen, with no recommendations set about the frequency. The results from the Tassin group[15] and the analysis of large Japanese databases[16] support the hypothesis of the beneficial effect that prolonged sessions have on survival, independently of the Kt/V achieved. The feasibility of prolonged therapies at the extra-hospital HD setting I another matter of debate, although it is very likely that technical innovations will play down the importance to the issue of prolonged dialysis sessions. This point is directly linked with another aspect such as the fact that in most of the units only conventional regimens are used. In a more detailed analysis, we found that the 21 centers answering they used convective techniques, in 11 these techniques were applied to less than 10% of the patients, in 7 to 10%-20%, and in only 3 the rate was above this level. Finally, a comment on the results obtained for membranes. Cellulose membranes are seldom used (only in 2 centers they were used in 100% of the patients), but synthetic membranes, high-permeability membranes account for half of the membranes used, although we may underline the wide range obtained for this parameter. All of these facts (dialysis for less than 4 hours, the virtual absence of more frequent dialysis sessions, or the little presence of convective techniques) reflect, on the one hand, the work organization, with the load that represent three shifts of patients that have to be dialyzed in a certain time, and on the other hand, the financial circumstances of private concerted centers, since all expensive techniques will be only applied to highly selected patients since they are not included in the contract. It is expected that in the future these techniques will be approved in the contracts and it will be possible to apply them to

more patients. Massive use of synthetic membranes indicates that there exist the feeling that the expense is justified by higher biocompatibility, based on literature data supporting that more biocompatible membranes improve survival, although the low permeability characteristics are the one responsible for their affordable cost. Enough epidemiological data are not available in the Spanish population supporting or contradicting the supposed relationship between biocompatibility, permeability, special techniques and morbimortality.

Water management represents a very important element for characterizing the services in extra-hospital HD. Double osmosis and pyrogen filters are only used in about half of the units, whereas treated water is stored in most of them, in spite of the fact that the SEN Water Management Guidelines recommend the opposite. The distribution and configuration of water treatments is a complex and expensive matter. Since the publication of the guidelines, it has been observed that many settings are old and far from what is recommended, which does not mean that these units would not be able to obtain sufficiently treated water to avoid major problems. The change towards a more adequate water management is being implemented and will probably be an increasing trend. The frequency by which the different determinations must be done is established in the guidelines: daily measurement of conductivity, hardness and chloramines, and monthly cultures. According to our results, most of the centers adapt to these requirements, although it may be underlined that there still exist centers that do not carry out these determinations at the recommended periodicity. There is even greater variability in aluminum or endotoxins determinations or UNE rules that are not uniformly applied, although specific criteria are also established in the Guidelines. It is likely that this may be due to a slow adaptation and although in routine practice hardness, conductivity, and chloramines are measured, the remaining determinations may be more sporadic due to organizational issues.

The prevalence of HCV infection for these units is in agreement with that from current national data, which show that HCV prevalence has decreased within the last years, essentially because of adopted preventive measures.[18] Most of the units at extra-hospital centers prefer isolation, 100% of them adopt some sort of isolation measure, and 50% adopt total isolation (room, shift, monitor, and personnel), which is the one offering the highest safety guarantee in spite of the associated higher cost. This may be due to the fact that centers' organization, with a predominance of 3 shifts and more than 4 patients per nurse, makes of them risk locations (confer SEN Guidelines on viruses), although other factors such contract requirements at some Autonomous Communities and progressive awareness of the personnel may play a role.

Similarly, it is striking to observe that isolation for HIV patients is complete in spite of the verbatim statement of the Guidelines: *«HIV virus has low infection capacity so that patient isolation is not mandatory. The strict observation of universal prevention and disinfection precautions are sufficient to prevent HIV transmission.»* These results indicate that the centers prefer a higher safety level, independently of this recommendation. Intuitively, we may think that this practice comprises elements based on a defensive practice due to the presence of a special social sensibility towards HIV.

About work organization at the centers, what is certainly striking is the high variability. The average number of assisted patients per center was 70, but there were centers administering dialysis only to 11 individuals where as others reached numbers higher than 200, which certainly has an influence on organizational aspects. Most of the centers have three shifts, although there are several combinations depending on the number of patients. Thus, there is a trend to maximally optimize human resources so that the number of assisted patients per physician, nurse, or nurse assistant, although being close to the average in most of them, is within the limit of what is being considered acceptable by current standards, always considering demographical circumstances and comorbidity levels of assisted patients at these HD units.

We also asked about the frequency at which several determinations were carried out. In fact, one of the chapters of the Centers Guidelines includes the minimal criteria for patient evaluation and control, establishing minimal analytical controls and their periodicity. Current guidelines find «mandatory» monthly Hb determinations, and bimonthly determination of iron kinetics and albumin. The results obtained are close to the recommendations for Hb (only 5% determine Hb at a frequency higher than monthly), whereas the percentage of centers determining albumin and transferrin less frequently is about 20%. About complementary determinations, we may highlight the lack of related protocols. Also, the new guidelines include some recommendations, some of them being «mandatory» and others «optional» according to the circumstances. The results indicate that chest X-ray is the most protocoled and followed determination; the remaining tests, such as abdominal ultrasound, bone scan, echocardiogram, which are currently mandatory, at least at the beginning, in the guidelines are done in a very variable way and not adjusting to current recommendations. The optimal periodicities of follow-up for certain parameters are

clearly debatable and should be adapted to the characteristics of each unit, the assisted population, and work capabilities, since sometimes access to the hospital is difficult for performing particular examinations, and this depends on a good coordination with reference hospital. Certainly this is an issue that has to be taken care of in case of detecting deficiencies at some centers, since it is not acceptable that organizational issues or center-hospital relational issues may hinder appropriate assistance.

The results obtained about anemia management were very good when compared to the standards proposed by the Quality Group of the SEN.[19] Most of the centers meet the goal of keeping Hb > 11 g/dL in more than 80% of the patients. If we compared these data with those reported by the National Kidney Foundation in 2002, on a random sample of 8863 patients on HD from 18 centers in the USA,[20] we observe that the data from our survey slightly exceed the former regarding level of adherence: 19.8% of the patients from our study showed hemoglobin levels below 11 g/dl, versus 24% in the American study, and 7.6% had ferritin levels < 100 mg/L, versus 8% in the American study.

As a final thought, we may point out that, in spite of providing a series of data needed to evaluate a previously unknown reality, this work shows a major limitation, which is being a not verifiable survey. Thus the information provided must be considered in view that the data were accepted based on the premise of good faith and accuracy of the people answering the questionnaires but no control interventions were implemented. These interventions are virtually impossible to carry out within the SEN capabilities, and would be only affordable by health care administrations. However, our knowledge on the working manners of the community of Spanish nephrologists let us affirm, with a low error margin, the high reliability of the results. Secondly, we should point out that the survey was carried out before the publication of some current guidelines, so that the questions do not appropriately fit some of the guidelines criteria, and thus it is difficult to compare some of the results. Finally, the structure adopted to provide the answers does not facilitate the statistical analysis of some of the data so that a more comprehensive analysis has not been possible. These elements comprise our experience and have already been considered for further corrections.

As a summary and conclusion, we should insist that all this information is just a first approach that gives an idea of what is left to be done to meet the current recommendations. From our perspective, this piece of information is very important and we believe that it should also be spread out to hospital-based centers in order to better know the kind of therapy we are administering and benchmarking to improve. We reiterate that this is the first time a study of such characteristics is presented in our Country, so that all the information contained has a potential interest, for both knowing and improving what is being done. In view of the near publishing of the Guidelines for Dialysis Centers, it may represent a reference to assess the impact of the publication of theses guidelines on the medical practice in this field.

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