

Role of the Opinions of the Nephrologist and Structural Factors in Dialysis Modality Selection. Results of a Peritoneal Dialysis Study Group Questionnaire

Census

Loris Neri¹, Giusto Viglino², Valerio Vizzardi³, Silvia Porreca⁴, Claudio Mastropaolo⁵, Giancarlo Marinangeli⁶ e Gianfranca Cabiddu⁷ on behalf of the Peritoneal Dialysis Project Group of the Italian Society of Nephrology

- 1 Nefrologia e Dialisi, Ospedale "Michele e Pietro Ferrero", Verduno, Cuneo, Italy
 2 Referente per la Telemedicina dell'ASLCN2, Italy
 3 Nefrologia e Dialisi, Spedali Civili, Brescia, Italy
 4 Nefrologia e Dialisi, Policlinico Università A. Moro, Bari, Italy
 5 Visionage SRL
 6 UOC di Nefrologia e Dialisi, Ospedale di Giulianova, Teramo, Italy
 7 ARNAS Brotzu, Università degli Studi di Cagliari, Italy



Gruppo di Progetto di
Dialisi Peritoneale
Società Italiana di
Nefrologia

Corresponding author:

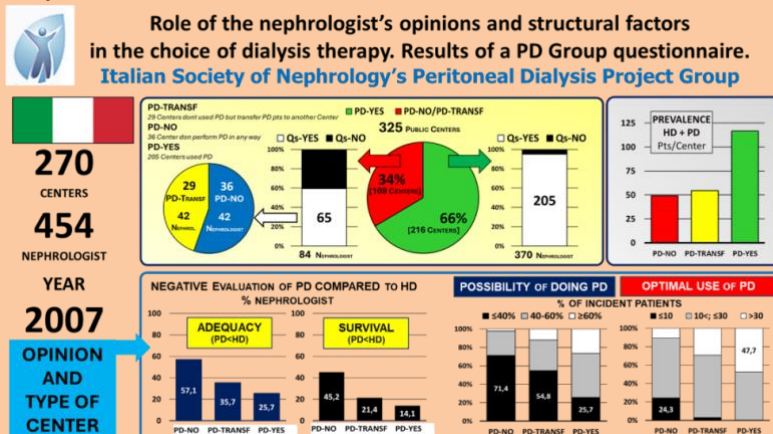
Loris Neri
 SOC Nefrologia e Dialisi - Ospedale "Michele e Pietro Ferrero", Via Tanaro 7 – Verduno (CN)
 Telefono 0172-140-8271
 Email: lorisneri1960@gmail.com

ABSTRACT

Background. The use of PD depends on economic, structural and organizational factors. The nephrologist's opinion is that peritoneal dialysis is less used than it should be. In Italy, PD is not carried out in private Centers, but neither is it in around one third of Public Centers. The aim of this study was to investigate the opinions of nephrologists on PD in Public Centers only, thereby nullifying the influence of the economic factors. **Materials and Methods.** The investigation was carried out by means of an online questionnaire (Qs) via mail, and during meetings and Congresses in 2006-07. The Qs investigated the characteristics of the Centers, the nephrologists interviewed, and opinions on the various aspects of the choice of Renal Replacement Therapy (RRT) (26 questions). Responses were received from 454 nephrologists in 270 public Centers. Among these, 205 centers (370 Qs) report PD (PD-YES), 36 (42 Qs) do not (PD-NO) and 29 (42 Qs) do not use it but send patients selected for PD to other Centers (PD-TRANSF). **Results.** The PD-NO and PD-TRANSF Centers are significantly smaller, with greater availability of beds. In the PD-YES Centers the presence of a pre-dialysis pathway, early referral and nurses dedicated solely to PD are associated with a higher use of PD.

The nephrologists in the PD-NO Centers rate PD more negatively in terms of both clinical and non-clinical factors. The belief that more than 40% of patients can do either PD or HD differs among the nephrologists in the PD-YES (74.3%), PD-TRANSF (45.2%) and PD-NO (28.6%) Centers. Likewise, the belief that PD can be used as a first treatment in more than 30% of cases differs among the nephrologists in PD-YES (49.2%), PD-TRANSF (33.3%) and PD-NO (14.3%) Centers. **Conclusions.** The use of PD in Public Centers is conditioned by both structural and organizational factors, and by the opinions of nephrologists on the use and effectiveness of the technique.

Graphical abstract



KEYWORDS: Peritoneal Dialysis, Hemodialysis, Modality selection, Physicians opinion, Chronic Kidney Disease

Background

The use of peritoneal dialysis (PD) in the world is limited to a prevalence of approximately <10% [1]. It has long been known [2] how the use of PD in different countries depends on factors which are unrelated to the patient, such as the type of National Health System and the relationship between the public and private sectors in each single country, the reimbursements envisaged for hemodialysis (HD) and PD, the standard of material and social development, and the cost of labor compared with materials [2–5]. In the absence of financial and structural barriers, the use of PD can be influenced by other factors, such as the type of referral (early or late), the availability of structured educational programs for patients suffering from CKD, PD training during studies and the availability of assisted PD programs, but they presuppose a system which favors the method.

For Italy, a significant contribution to the understanding of the factors influencing the use of PD was made by the Census of the Italian Society of Nephrology (SIN) relating to the state of dialysis in Italy in 2004 [5], which showed that the factors negatively affecting the use of PD were the presence of private centers (which do not use PD), the number of stations available for HD compared to the number of patients on hemodialysis, and the small size of Centers (evaluated by the number of prevalent patients on dialysis). Even considering public Centers alone however, considerable variability was shown in the use of PD, with Centers of limited overall size but relatively extensive PD programs and large Centers without or with small PD programs. This variability suggested that there were other factors capable of influencing the use of PD, such as the so-called “opinion of the doctor”, the importance of which was highlighted by Hingwala [6].

The numerous papers [7–16] which have investigated the role of doctors in the choice of dialysis modality show a considerable discrepancy between their opinions – generally favorable – and the actual use of PD in their country, which is at times marginal. These papers often show selection bias, in that they are limited to Nephrologists who use PD in some way.

Objectives of the study

In order to investigate “the opinion of doctors on PD and modality selection” and any role this may have in the actual use of PD in a Center, in 2006–2007 what was then SIN’s Peritoneal Dialysis Study Group (GSDP) devised and carried out research – in the form of a questionnaire (Qs) – limited to Public Centers in order to reduce the influence as far as possible of economic factors on the results, but also involving the Centers which did not use PD.

The main aim of the study was to compare opinions relating to PD and modality selection by analyzing the perspective of Nephrologists who work in Centers which use and those which do not use PD.

As the situation relating to PD remains substantially the same 20 years since the first SIN Census, the current PD Project Group decided to attach the results of this survey – which was never published – to the analysis of the 2022 Census data, as besides remaining valid its depth of analysis and the number of Nephrologists involved make it quite unique.

Materials and methods

Recruitment of Centers

The study was carried out by means of an on-line questionnaire (Qs) submitted to all non-pediatric Public Dialysis Centers. Aimed at all the Nephrologists in the Center, the filling out of at least 1 per Center was strongly requested. The completion of the Qs took place between January and October

2007, and was incentivized during Congresses and Conferences held during the period. The results were presented partially at Congresses and Conferences at the time, but have never been published.

The list of dialysis Centers eligible for the research was taken from the SIN Census relating to 2004 [5] (2004-SIN-Cens). In short, the 2004-SIN-Cens had documented the presence in Italy of 658 Dialysis Centers. After excluding private and pediatric Centers, the questionnaire was sent to the remaining 346. However, 15 of these 346 Centers had “special statute” status (research Centers) and 6 had no patients on dialysis and were therefore not considered. So as for the 2004-SIN-Cens, the 325 public, non pediatric, ordinary status Centers with a dialysis – PD and HD – incidence of other than zero have been considered in this analysis. As regards the Nephrologists, only “structured” doctors have been considered in this analysis, excluding specialty trainee and attendant doctors.

Breakdown of Centers

The Centers which did not use PD and those which did had been divided in the 2004-SIN-Cens on the basis of a PD incidence of other than or equal to 0 respectively: it was not used in 116 Centers, and was used in 209. The Qs asked again whether or not the Center the interviewee belonged to had a PD program: of the 270 (83.1%) of the respondent Centers, 65 did not use PD. However, 6 of these 65 had been classified in 2004 as Centers using PD, while 13 of the 205 which stated they had a PD program had been classified in 2004 as Centers which did not use it. It is to be remembered that the 2004 classification had been based on PD incidence, a criterion which no longer seemed correct to us today. We therefore reclassified the 2004-SIN-Cens Centers taking account of the prevalence at 31/12/2004 as well, and comparing the data with those of the GSDP Census of 2005 [17], and subsequent years where necessary. Following this reclassification, the number of inconsistencies was reduced to 4 Centers which had terminated their PD programs, and 6 Centers which had started one after 2004.

In the discussion at the time furthermore, a situation had emerged which was more complex than a simple distinction between Centers which used and those which did not use PD. Indeed, some of the Centers not using PD sent patients with indication (clinical or by choice) for PD to other Centers. The Qs took this distinction – not considered in the 2004-SIN-Cens – into account by dividing the Centers into Centers which use PD (PD-YES Centers), Centers which do not use PD but send patients with indication for it to other Centers (PD-TRANSF Centers) and Centers which do not consider it at all (PD-NO Centers).

In conclusion, 270 of the 325 Centers considered took part in the research with at least 1 Qs. Of these, 205 were PD-YES Centers, 36 were PD-NO Centers and 29 were PD-TRANSF Centers. Of the 55 Centers which did not respond to the Qs, 11 had been classified in 2004 as PD-YES Centers and 44 as PD-NO Centers, although their status at the time of the survey is not actually known as they failed to respond to the Qs.

The study did not relate in any way to patients, only to doctors whose participation was voluntary.

The questionnaire and the fields of investigation

The Qs was composed of 26 questions divided into 2 parts. The first defined the characteristics of the Nephrologist interviewed and the Center in which they worked; the second investigated the opinions of the Nephrologist on the validity of PD and the factors which can influence modality selection.

Part 1

Characteristics of the Nephrologist

The characteristics of the Nephrologist considered were: 1) training received in PD – 2) actual experience with PD (none, occasional and discontinuous, continuous for less or more than 3 years) – 3) hierarchical role within the Center (head of department/department director, manager, resident doctor) – 4) time effectively dedicated to dialysis (none; <25%; 25-50%; 50-75%; >75% of working hours) and, on a scale of between 1 and 5 (where 1 is only HD, 3 HD and PD equally, 5 only PD), how much time is dedicated to HD and how much to PD – 5) involvement in the choice of dialysis modality (yes/no), and if yes with which tasks (information, clinical evaluation, psychosocial-appraisal evaluation) and the degree of any such involvement, also on a scale of from 1 (little) to 5 (a lot).

Characteristics of the Center

The characteristics of the Center considered were: 1) the existence of a structured dialysis modality selection program (educational and informative, as well as clinical) – 2) the activities performed by the PD nurses (pre-dialysis, day hospital, inpatients, HD) for the PD-YES Centers – 3) the percentage of early referral patients – 4) an opinion on the level of information received by early referral patients in their Center on the different dialysis modalities – 5) the professional roles involved in their Center in the choice of treatment (head of department, HD doctor, PD doctor, HD nurse, PD nurse, nurses with other functions, psychologist). For the last question, the interviewee also had to express an opinion on the weight the professionals involved in the choice of the method had on a scale of from 1 (negligible) to 5 (decisive). For the first three questions (existence of a structured dialysis modality selection program, activities performed by the PD nurses and percentage of early referrals), in the Centers in which more than one Nephrologist responded, the responses did not always match. In the event of disagreement, the value attributed to the Center was determined on a hierarchical scale (in order: response of the Director if available, of the department manager if available, of the doctor with greater involvement in dialysis activities and finally, if there was still no agreement, of the majority). As the percentage of early referrals is numerical, inconsistencies were excessive, so it was not considered in this analysis.

For the last two questions (information provided to patients and weight of the different professional roles in their Center), as the responses involve opinions more than objective values they were considered individually and not adjusted into one sole value per Center.

Part 2

This part was divided into three sub-groups of questions. The first investigated the opinion of the doctor on the general factors which can influence the choice of modality, including the validity of the method; the second the opinion on certain conditions – clinical and non-clinical – of the single patients; and the third PD drop-out and duration.

General NON patient-associated factors

The general factors the interviewee had to give a personal evaluation of were: 1) the weight, on a scale of from 1 (none) to 5 (decisive), the doctor, nurse, patient, family members and other patients on RRT have on the choice of treatment for patients without required indications/contraindications for HD or PD. This assessment was requested for both patients with and without barriers to self-care of the PD – 2) the percentage of PD considered optimal on a scale of from <10% to >50% – 3) if they feel conditioned in the choice of modality by the risk of peritonitis – 4) a comparison of PD with HD

in terms of both dialysis efficiency and survival – 5) how much the total cost of the treatment, a shortage of nurses, private centers in the vicinity, the limited size of the Center (number of prevalent patients on dialysis) and HD station occupancy rates can affect the choice on a scale of from 1 (greatly in favor of HD) to 5 (greatly in favor of PD) – 6) the weight that the following incentives can have on favoring the use of PD: financial reimbursement for the caregivers of patients with barriers who are not suitable for self-care of PD (assisted PD), the development of remote care technology (telemedicine), full-time (24H) nursing phone support for patients on PD, home nursing support for patients on PD, financial incentives for residential care homes to assist patients on PD. Opinions were expressed on a scale of from 1 (no weight) to 5 (considerable weight).

Patient-associated factors

This part investigated opinions on certain specific conditions of patients which can represent an indication or contraindication for PD. In detail: 1) the percentage of patients who are eligible for both modalities – 2) the role of clinical and non-clinical factors associated with the patient and listed in Table 1 (the interviewee had to express an opinion on each of the factors listed on a scale of from 1 to 5 according to the following criteria: 1 = high indication for HD; 2 = moderate indication for HD; 3 = indication for either HD or PD; 4 = moderate indication for PD; 5 = high indication for PD).

CLINICAL FACTORS	NON-CLINICAL FACTORS
Congestive heart disease	Motivation for self-care
Ischemic heart disease	Between 65 and 75 years of age
Diabetes	Age > 75 years
Obesity (BMI > 30)	Not self-sufficient with caregiver available
Malnutrition (BMI < 20)	Living alone
Diverticulosis spread beyond the sigma	Body image in patients of < 50 years of age
Polycystic nephropathy	Working activity
	Flexibility in lifestyle and free time
	Quality of life

Table 1. Clinical and non-clinical factors influencing the choice which participants were asked to give an opinion on.

Duration of PD / Drop Out

In this last section, the interviewee had to give an opinion on 1) the duration of the PD – 2) the annual percentage of drop out considered “physiological” – 3) if drop out to HD could be influenced by the number of patients being treated.

Analysis

The responses were divided into the 3 types of Center, and compared using the chi-square method or non-parametric tests where indicated. The results were considered significant for $p < 0.05$ up to 0.00001.

Results

Participant Centers and nephrologists

Overall the Qs was completed by 454 Nephrologists in 270 Centers (83.1% of the 325 public Centers considered) with a mean participation of 1.68 Nephrologists per Center, which was higher in the PD-YES Centers (Table 2). The percentage of responses in the PD-YES Centers (205 Centers out of 216 = 94.9%) was significantly higher than in the other Centers (65 Centers out of 109 = 59.6%) ($p < 0.00001$). Of the Centers which do not use PD, 29 send patients to other Centers. The number and percentages of Centers which responded and of completed Qs are given in Table 2 and in Figure 1.

CENTERS / Qs	PD-YES	PD-TRANSF	PD-NO	TOTAL
Centers (2004-SIN-Cens)*	209	116		325
Qs-Centers **	216	109		325
Qs-participant Centers ***	205	29	36	270
Nephrologists	370	42	42	454
Qs per Center	1,80	1,45	1,17	1,68

Table 2. At least one nephrologist responded to the Qs in 270 of the 325 Public Centers resulting from the 2004 SIN Census. The participation in the Census was significantly higher in the Centers using PD. * "Centers (2004-SIN-Cens)" shows the breakdown of Centers as per the 2004 SIN Census (5). The distinction within the 116 public Centers not using PD of a sub-group of Centers which "rely" on other Centers for PD was not considered at the time. It is to be remembered that this classification was based on the use of PD for incident patients. The breakdown of Centers in the Qs is slightly different for the reasons given under Materials and Methods.

** "Qs Centers" are the Centers reclassified according to the criteria given under Materials and Methods *** "Qs participant Centers" are the Centers which took part in the survey with at least 1 questionnaire completed

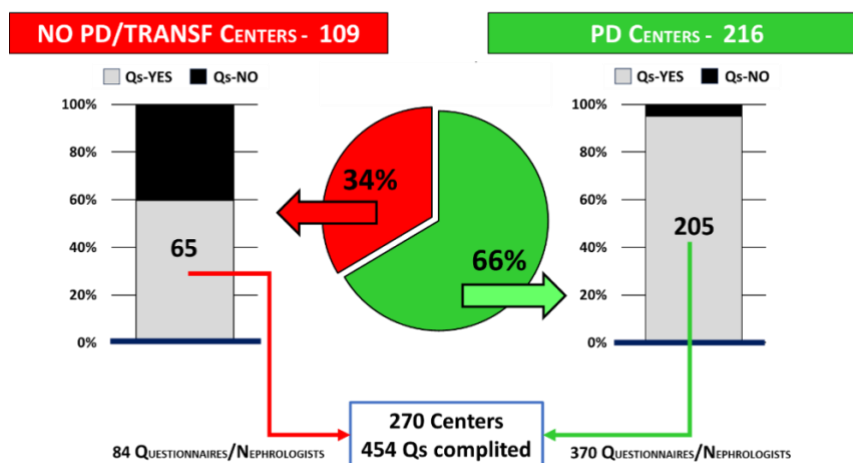


Figure 1. Participation in the survey of Centers with at least 1 Qs completed. In the middle, the division of the 325 non pediatric, ordinary status public Centers. On the right, Qs respondents in the 216 Centers using PD, and on the left in the 109 not using it.

Table 3 (represented in Figure 3) gives the characteristics of the 270 participant Centers taken from the 2004 SIN Census data. HD bed occupancy and Center size (HD + PD patients) were higher ($p < 0.0001$) in the PD-YES Centers than in the others, while there are significant differences between the PD-NO and PD-TRANSF Centers (Qs-YES in Table 3). The comparison with the Centers which did not respond was significantly different (Qs-NO in Table 3 and in Figure 2).

CENTERS	PD	N°	INCIDENCE (HD+PD)	PREVALENCE (HD+PD)	HD pt/PL
ALL	NO	109	11,9±9,4	50,0±35,3	2,9±0,9
	YES	216	28,7±18,4	116,1±65,9	3,4±0,8
Qs YES	NO	36	11,4±7,4	48,9±29,9	3,0±1,0
	TRASF	29	11,7±9,9	54,4±36,5	2,9±0,7
	YES	205	28,9±18,5	116,6±65,8	3,4±0,8
			p<0,0001	p<0,0001	p<0,0001
Qs NO	NO	44	12,5±10,6	47,8±39	2,9±1,0
	YES	11	25,6±16,1	106,9±69,4	3,4±0,8

Table 3. General characteristics (taken from the 2004-SIN-Cens) of the 270 Centers which responded to the Qs (Qs-YES) and the 55 Centers which did not respond (Qs-NO). The comparison was significant between PD-YES Centers and PD-NO and PD-TRANSF Centers, but not between PD-NO and PD-TRANSF Centers or between Qs-YES and Qs-NO.

BREAKDOWN OF THE 325 PUBLIC DIALYSIS CENTERS BY USE OF PD AND COMPLETION OF QUESTIONNAIRE (Qs) ACCORDING TO 2004-SIN-CENS DATA

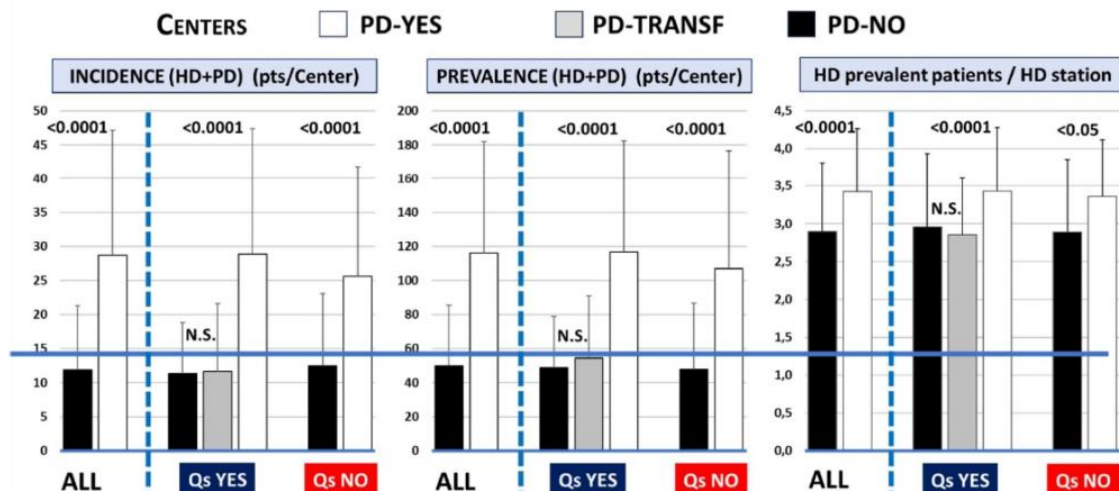


Figure 2. Overall dialysis (HD + PD) incidence and prevalence, and HD prevalent patients per HD bed or station. The data are broken down into PD-YES Centers and Centers which do not use PD (NO), in this case whether they do not consider PD or they transfer candidates for PD to other Centers. The same variables have been considered for all the Centers (ALL) and comparing the Centers which took part in the survey (Qs YES) or did not (Qs NO). For those which did take part, the NO Centers have been divided between those which transfer (TRANSF) and those which do not consider PD at all (NO). This distinction was clearly not possible for the Centers which did not respond. As can be seen, among the Centers which took part there was no difference between the PD-NO and PD-TRANSF Centers. The data are as reported in the 2004-SIN-Cens, so they relate to the year 2004.

Dividing the Centers by size and percentage of use of PD (Table 4) at 31/12/2004, though having an extensive dialysis program 17.5% of the Centers do not use PD or use it in less than 10% of patients, while 13.8% of Centers use it in a significant percentage of patients even though they are small in size. As regards the 4 Italian macro areas they belong to, analysis of the 2004-SIN-Cens data had shown how the use of PD was lower in the regions with a higher number of private Centers. The smaller size of the public Centers in these regions was also attributable to the presence of private Centers. Although the relationship between size and use of PD remains, the Centers using PD in the SOUTH are smaller, but with a higher percentage of patients on PD, which is likely to be compensation for the effect of private Centers and the greater number of Centers not using PD. These observations are summarized in Table 5 and Figure 2. The geographical breakdown of the Centers which took part in the Qs is shown in Figure 4.

At the time of the survey, reclassification was not possible due to not having the 2007 prevalence data, so the only variable considered remains the type of Center as defined above.

		PD PREVALENCE (%)				
		CENTERS	0	<10%	10-<20%	≥20%
PATIENTS ON DIALYSIS	≤45	81	18.2	3.4	1.8	1.5
	46-80	83	7.7	7.4	4.3	6.2
	81-130	80	4.3	5.8	6.5	8.0
	>130	81	1.2	6.2	10.8	6.8

Table 4. Breakdown of Centers by size (quartiles of the total number of patients on dialysis per Center) and percentage prevalence of PD at 31/12/2004.

	NORTH	CENTER	SOUTH	ISLANDS	ALL
CENTERS (number)	116	72	93	44	325
HD (prevalent pts)	13,951	5,509	4,911	1,959	26,330
PD (prevalent pts)	2,368	785	761	286	4,200
SIZE (PTS/CENTER)	140.7	87.4	61.0	51.0	93.9
% PD	14.5	12.5	13.4	12.7	13.8
PD-NO/PD-TRANSF CENTERS	17	26	38	21	102
% of ALL Centers	14.7	36.1	40.9	47.7	31.4
HD (prevalent pts)	1,432	1,479	1,214	813	4,938
PD (prevalent pts)	0	0	0	0	0
SIZE (PTS/CENTER)	84.2	56.9	31.9	38.7	48.4
% PD	0	0	0	0	0
PD-YES CENTERS	99	46	55	23	223
% of ALL Centers	85.3	63.9	59.1	52.3	68.6
HD (prevalent pts)	12,519	4,030	3,697	1,146	21,392
PD (prevalent pts)	2,368	785	761	286	4,200
SIZE (PTS/CENTER)	150.4	104.7	81.1	62.3	95.9
% PD	15.9	16.3	17.1	20.0	16.4

Table 5. Characteristics of Centers divided by geographical macro area and distinguishing between the Centers not using PD (PD-NO and PD-TRANSF were not separate in the 2004-SIN-Cens) and those using it (PD-YES). The data are taken from the 2004-SIN-Cens and therefore refer to 2004 and not to the time of the survey (2007).

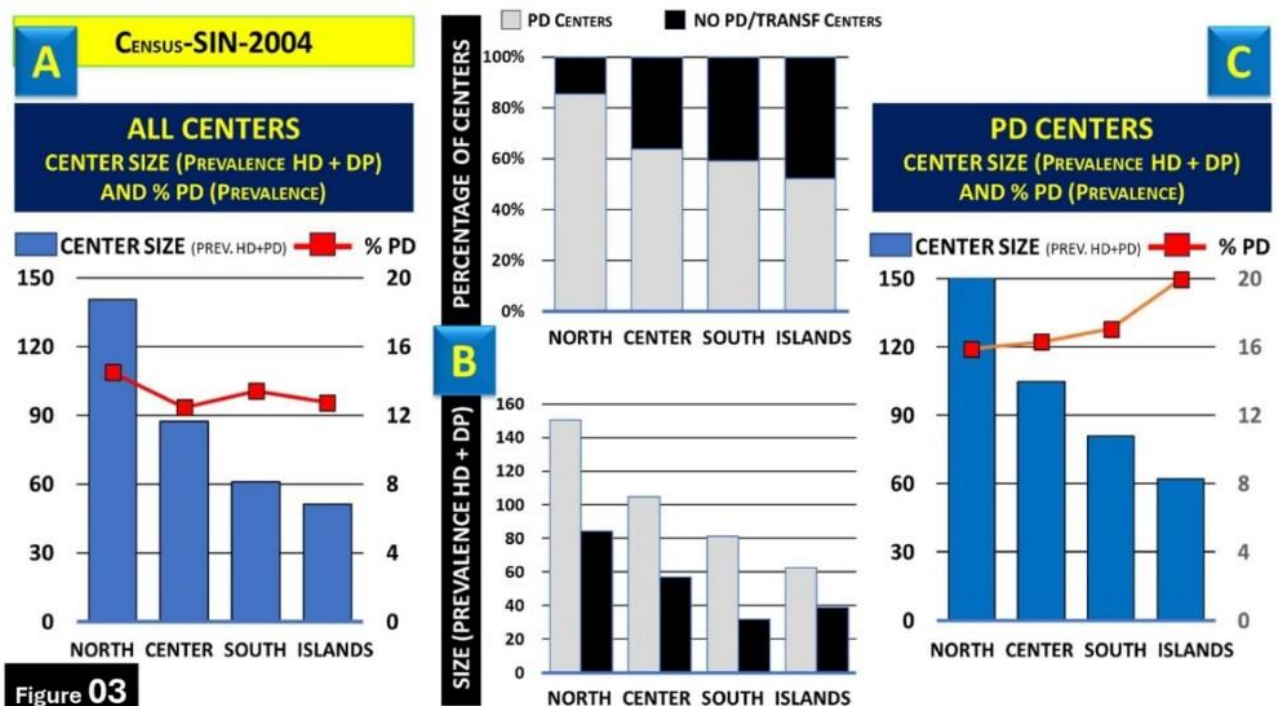


Figure 03

Figure 3. Breakdown of the 325 Centers in Italy into 4 macro areas as defined by ISTAT (NORTH = Valle d'Aosta, Piemonte, Lombardia, Trentino Alto Adige, Friuli Venezia Giulia, Veneto, Emilia Romagna, Liguria – CENTER = Toscana, Marche, Umbria, Lazio – SOUTH = Abruzzo, Molise, Puglia, Campania, Basilicata, Calabria – ISLANDS = Sicily, Sardinia). On the left (A), the average size of the Centers and the percentage PD prevalence (substantially similar). In the middle (B) at the top, the percentage of Centers not using PD (in black) and at the bottom the average size of the Centers that use (grey) and do not use PD (black). As can be seen, the Centers not using PD are always smaller than those using it in the same macro area, but with a gradual reduction from the NORTH to the ISLANDS. So though the principle that the smaller the Center the less PD is used is valid, it can be seen on the right (C) that when only the Centers using PD are considered, those in the SOUTH and ISLANDS use it more even though they are smaller.

BREAKDOWN OF THE 270 PUBLIC DIALYSIS CENTERS WHICH COMPLETED THE Qs BY GEOGRAPHICAL AREA

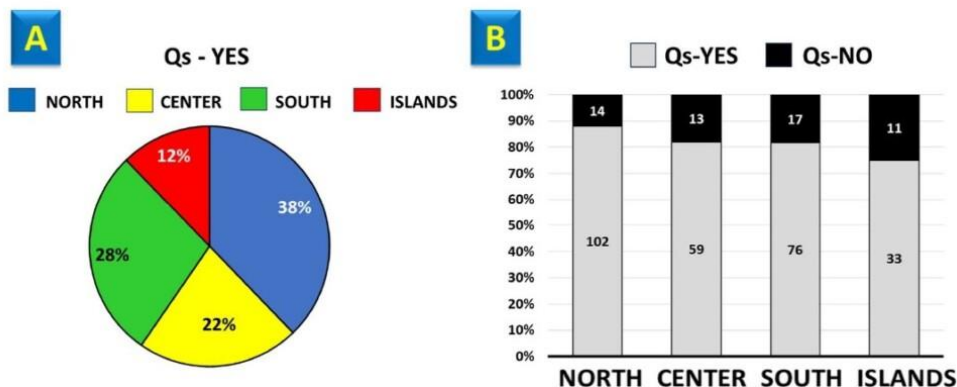


Figure 4. Breakdown of the 325 Centers in Italy into 4 macro areas. On the left (A), the 270 Centers which took part, and on the right (B) the 325 eligible Centers. Qs-YES and Qs-NO refer to the Centers which took part in the survey (with at least 1 respondent) and those which did not.

PART 1 – CHARACTERISTICS OF THE NEPHROLOGISTS INTERVIEWED AND OF THEIR CENTERS

Characteristics of the Nephrologists

The general characteristics of the Nephrologists taking part are shown in Table 6. There are no significant differences between the 3 types of Center as regards gender (2/3 male) or age (superimposable), while the geographical area where the Center of the interviewee is based ($p < 0.0001$) reflects the distribution of the Centers and the use of PD, which had already been analyzed in the 2004-SIN-Cens (Figures 2 and 3) [5].

CENTERS (type, number)	NEPHROLOGISTS (number)	FEMALE (%)	AV. AGE (years \pm DS)	NORTH (%)	CENTER (%)	SOUTH (%)	ISLANDS (%)
PD-NO	36	42	50,8 \pm 6,4	14,3	26,2	31,0	28,6
PD-TRANSF	29	42	51,0 \pm 5,4	7,1	7,1	47,6	38,1
PD-YES	205	370	51,2 \pm 6,8	46,5	18,1	19,7	15,7
ALL	270	454	51,2\pm6,6	39,9	17,8	23,3	18,9

Table 6. General characteristics of the 454 Nephrologists who responded to the Qs.

Hierarchical role. As regards the hierarchical role of the interviewees, 20.9% hold a top position (Director, Head of Department, Operating Unit manager), 19.6% Department manager (likely to be, but not necessarily, in PD). Specialty trainee and non-resident attending doctors – at the time only present in University Centers – were not considered in this analysis. With regard to the Centers, taking part in 29.3% of cases was the Director/Head or Manager of the Nephrology and Dialysis Operating Unit, in 23.3% of cases the Sub-Department Manager, and in 5.9% both (Table 7). Overall therefore, the Director and/or a Sub-Department Manager took part in 58.5% of the Centers.

Table 7 also shows the age and gender according to different hierarchical roles.

ROLE	N°	%	PD-NO	PD-TRANSF	PD-YES	AGE	Female(%)
HEAD OF DEPT.	95	20.9	38.1	28.6	18.1	53.3 \pm 5.7	11.6
SUB-DEPT. MAN.	89	19.6	7.1	14.3	21.6	53.5 \pm 4.2	30.3
RESIDENT	270	59.5	54.8	57.1	60.3	48.6 \pm 6.3	43.7
		ALL	42	42	370	51.2\pm6.6	34.4
			p<0.01			p<0.00001	p<0.00001

Table 7. Hierarchical role of the 454 participants in the survey.

Training and experience. The majority stated that they had received no or insufficient preparation for PD (score “1” or “2”) during their studies.

Interestingly, the percentage of Nephrologists with no or little preparation for PD (sum of the “None”, “1”, “2” percentages given in Table 8) increases significantly from the PD-NO Centers (38.0%) to the PD-TRANSF Centers (47.5%), and reaching 57.6% in the PD-YES Centers (Table 8 and Figure 5-A).

Vice versa, and in this case as expected, their experience with PD (Table 9) is unsurprisingly significantly greater and with continuity in the PD-YES Centers than the others. In particular, more than 3 years experience with PD had been acquired by 16.7% of the Nephrologists in the PD-NO Centers, by 26.2% in the PD-TRANSF Centers and by 65.1% in the PD-YES Centers (Table 9) (Figure 5-B).

	Insufficient			Suitable for managing		
	None	1	2	3	4	5
PD-NO	19.0	7.1	11.9	28.6	11.9	21.4
PD-TRANSF	33.3	7.1	7.1	21.4	14.3	16.7
PD-YES	39.5	7.3	10.8	15.1	8.9	18.4
ALL	37.0	7.3	10.6	17.0	9.7	18.5
	p<0.04					

Table 8. Preparation received on PD while studying.

	Continuous			
	None	Discontinuous	<3 years	>3 years
PD-NO	40.5	26.2	16.7	16.7
PD-TRANSF	35.7	19.0	19.0	26.2
PD-YES	6.5	20.3	8.1	65.1
ALL	12.3	20.7	9.9	57.0

Table 9. Experience of the 454 participants gained with PD (p<0.0001).

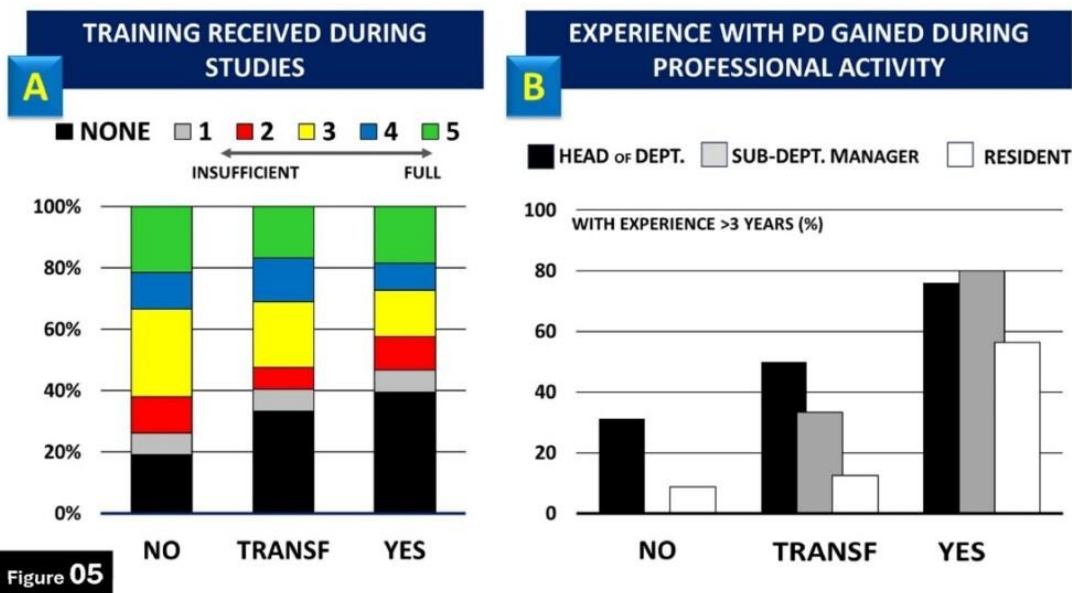


Figure 5. Characteristics of the Nephrologists who took part in the study. A. Training in PD received during the course of their studies (interestingly, the percentage of those who received no training increases from the PD-NO Centers to the PD-YES Centers). B. Experience of more than 3 years with PD of the 454 Nephrologists interviewed by hierarchical role.

Working activity. As regards their area of work, practically all the interviewees (97.0%) handled dialysis. In detail, more than 50% of their working hours were spent on it by 71.4% of those in PD-NO Centers, 76.2% in PD-TRANSF Centers and 64.4% in PD-YES Centers.

While dialysis can be considered as focused only on HD in the Centers which do not use PD, in the PD-YES Centers the percentage of those working mainly or exclusively with PD is 28.6% (106 of 370 Nephrologists), with 18.6% (69 of 370 Nephrologists) dedicating more than 50% of their working time (Table 10).

	0	< 25%	26 – 50%	51 – 75%	> 75%
NO	0	0	28.6	26.2	45.2
TRANSF	0	11.9	11.9	21.4	54.8
SI	3.0	10.0	22.7	29.5	34.9
only HD		1.4	0.3	1.1	4.6
mainly HD		1.9	3.5	4.6	7.0
HD and PD		4.3	11.4	14.3	14.1
mainly PD		1.1	4.6	6.5	5.4
only PD		1.4	3.0	3.0	3.8
ALL	2.4	9.3	22.2	28.4	37.7

Table 10. Engagement with dialysis – the differences between the three types of Center are not significant. The modality the Nephrologist is involved with clearly only regards the PD-YES Centers.

Engagement in the choice of dialysis modality. Overall, 94.7% (430 interviewees) feel involved in the dialysis modality choice process, with no significant differences between the 3 types of Center (Table 11) either in the extent of their involvement (on a scale of from 1, “little”, to 5, “a lot”: PD-NO 3.7±1.1; PD-NO-TRANSF 4.2 ± 1.2; PD-YES 3.7 ± 1.4; p = NS). With regard to the 3 aspects of the selection process (information, clinical assessment and aptitude assessment), most of the doctors in the Centers not using PD feel involved in the information (Table 11). Considering only the interviewees involved in the information process, checking the content of the information shows how 42.1% of those in PD-NO Centers say they provide information on both modalities. Although this is lower than the 75.0% in PD-TRANSF Centers and the 84.5% in PD-YES Centers, it was not expected as the percentage relates to Centers which do not use PD and do not send any possible candidates for PD to other Centers (Figure 6). The number of activities performed in the choice process is shown in Table 12.

	ASSESSMENT			
	Not involved	Information	Clinical	Aptitude
PD-NO	2.4	90.5	28.6	28.6
PD-TRANSF	4.8	85.7	59.5	52.4
PD-YES	5.7	73.2	78.9	68.4
ALL	5.3	76.0	72.5	63.2

Table 11. Engagement in the dialysis modality selection process. The differences between the three types of Center are not significant for the percentage of those involved in some way, but neither are they with regard to the degree to which they feel involved in this aspect. Significant, on the other hand, are the differences as regards the method of involvement (information, clinical assessment and social-aptitude assessment). Meanwhile, the different level of engagement in the three activities is to be expected: it is only natural that there is a negligible level of clinical assessment for indications and contraindications for PD in the Centers not using PD, and even more so aptitude assessment.

CENTERS	ACTIVITIES PERFORMED			
	0	1	2	3
PD-NO	2.4	69.0	7.1	21.4
PD-TRANSF	4.8	40.5	7.1	47.6
PD-YES	5.7	23.0	16.5	54.9
ALL	5.3	28.9	14.8	51.1
p<0.0001				
N°	24	131	67	232
DEGREE	0	3.7±1.2	3.8±1.0	4.1±1.1

Table 12. Engagement in the choice of dialysis modality. The numbers show the activities performed in the modality selection process. These activities are information, clinical assessment and social-aptitude assessment. As can be seen, 51.1% (mainly in the PD-YES Centers) say they are involved in all 3 activities with a medium-high level of engagement.

How are you involved in the dialysis treatment choice pathway?

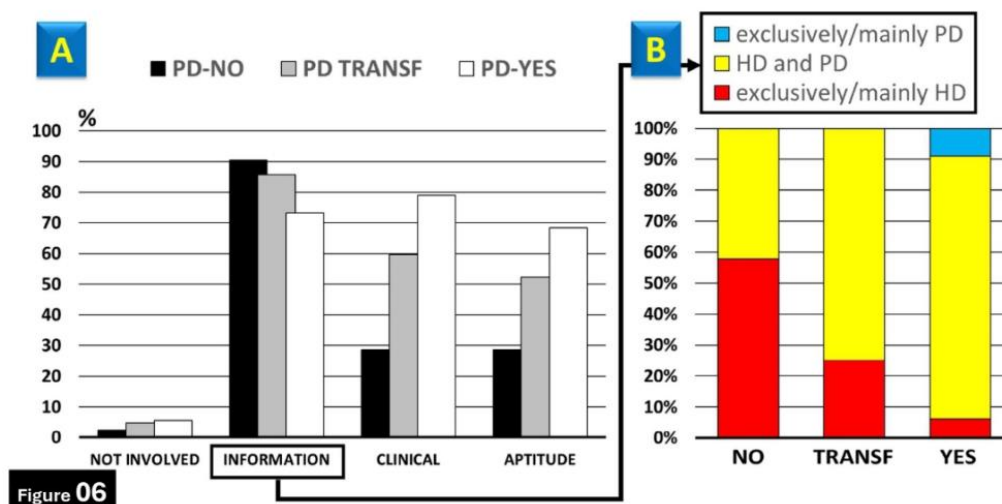


Figure 6. Involvement in dialysis modality selection. A. Percentages of the 430 interviewees involved in the THREE areas of evaluation (information on the methods available, clinical and social-aptitude evaluation) – B. For the 345 Nephrologists involved in information, the modality(ies) illustrated by the interviewee to the patient. As can be seen, more than 40% of the Nephrologists in the PD-NO Centers say they also provide information on PD.

Characteristics of their Centers

The responses to this part of the survey can in some cases be considered opinions, as will be specified in the individual aspects. For some questions, in some Centers in which more than one Nephrologist took part conflicting assessments emerge between the Nephrologists in the same Center. These cases were resolved as reported under Materials and Methods.

Dialysis modality selection pathway. The existence of a pre-dialysis pathway increases from 47.2% in PD-NO Centers and 55.2% in PD-TRANSF Centers to 73.2% in the 205 PD-YES Centers ($p < 0.00005$) (Figure 7). Of the 97 Centers with more than one Qs, the response of all the participants in 61 Centers (62.9% – 3.1 Qs per Center) is in agreement, while in the remaining 36 Centers (37.1% – 2.6 Qs per Center) there is at least one response which is not in agreement with the other Nephrologists in the same Center. In 6 of these 36 Centers, the response of the head of department or department manager is not in agreement with that of the majority; in particular, in 1 case for the Head of Department/Director there is no pathway while the majority confirm there is, with the opposite in 5 cases.

Other activities performed by the PD nurse. Of the 205 Centers performing PD, the nurse is dedicated exclusively to PD in just 26 (12.7%), while for the activities considered (pre-dialysis, day hospital activities, inpatients and HD) the PD nurse is responsible for 1, 2, 3 and all 4 in 45.4% (93 centers), 28.8% (59 centers), 10.7% (22 centers) and 2.4% (5 centers) respectively of the remaining 244 Centers (Figure 8). The main activity the PD nurse is engaged in is Pre-dialysis (Figure 8). The size of the PD program is inversely proportional to the number of “other activities” (Figure 9).

Completeness of the information provided to patients (opinion). Incident HD patients are adequately informed on HD, but not on PD in all three types of Center, though as regards the latter the level improves from the PD-NO Centers to the PD-YES Centers (Table 13). For incident PD patients, the level of information on the two methods is equivalent (not considering, obviously, the PD-NO Centers). The result does not change when the responses given by doctors involved in dialysis activities for more than 50% of their working time are considered.

In your Center, is there a **structured** dialysis treatment choice pathway?

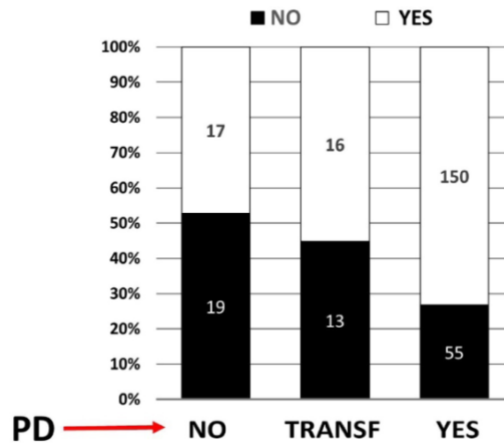


Figure 07

Figure 7. Presence of a structured pathway (with dedicated personnel and a pre-defined assessment program) in the different types of Center.

In your Center, **what other activities** are performed by the PD nurses?

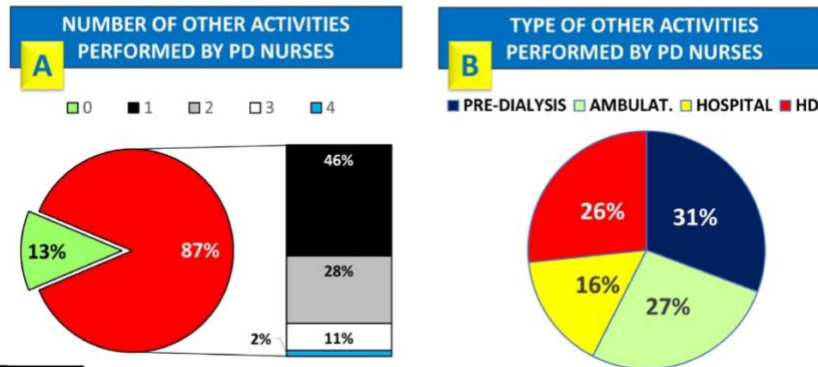


Figure 08

Figure 8. Other activities carried out by the nurses who are involved with PD. The data obviously refer to the 205 PD-YES Centers. A. Number of other activities performed (the nurses are exclusively dedicated to PD in only 13% of the Centers). B. Type of activity carried out as a proportion of “other activities”.

In your Center, **what other activities** are performed by the PD nurses?

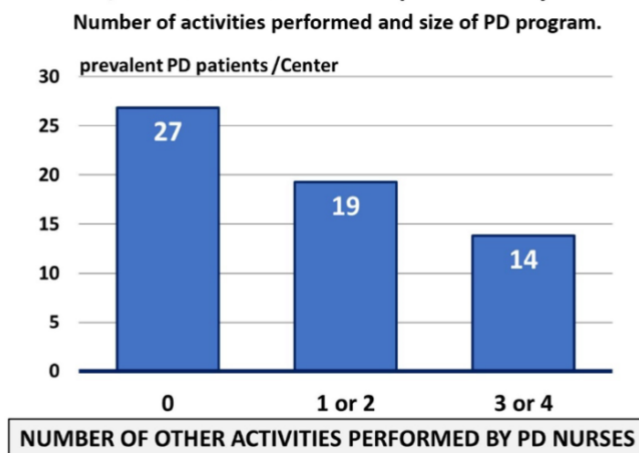


Figure 09

Figure 9. The number of “other activities” performed by PD nurses increases as the patients treated with PD reduces. Obviously the chart can also be read in reverse: the higher the number of other activities performed, the lower the number of patients on PD.

INFORMATION PROVIDED	HD INCIDENT		PD INCIDENT	
	HD	PD	HD	PD
NO	4.4	2.8		
NO-TRANS	4.4	3.3	3.0	3.2
YES	4.2	3.7	4.3	4.7
ALL	4.2	3.6	4.0	4.3
	N.S.	p<0.00005	p<0.00001	p<0.00001

Table 13. Information provided to early referral incident patients.

Influence of different healthcare practitioners in the choice of modality (opinion). The healthcare practitioners considered as having a decisive role in their Center in the choice remain the head of department and the HD doctor for all Centers, while the PD doctor and nurse only have influence in the PD-YES Centers (Figure 10).

For the psychologist, the response (some weight only in the PD-YES Centers) depends clearly on the availability of this service, confirming the presence in the PD-YES Centers of a more well-structured pre-dialysis pathway. The Head of Department is recognized as having a decisive role, even though the weight attributed depends on the role of the interviewee (Figure 11).

Indicate **which professionals in your Center are involved** in the choice of dialysis treatment.

Evaluate the influence each has on the choice process

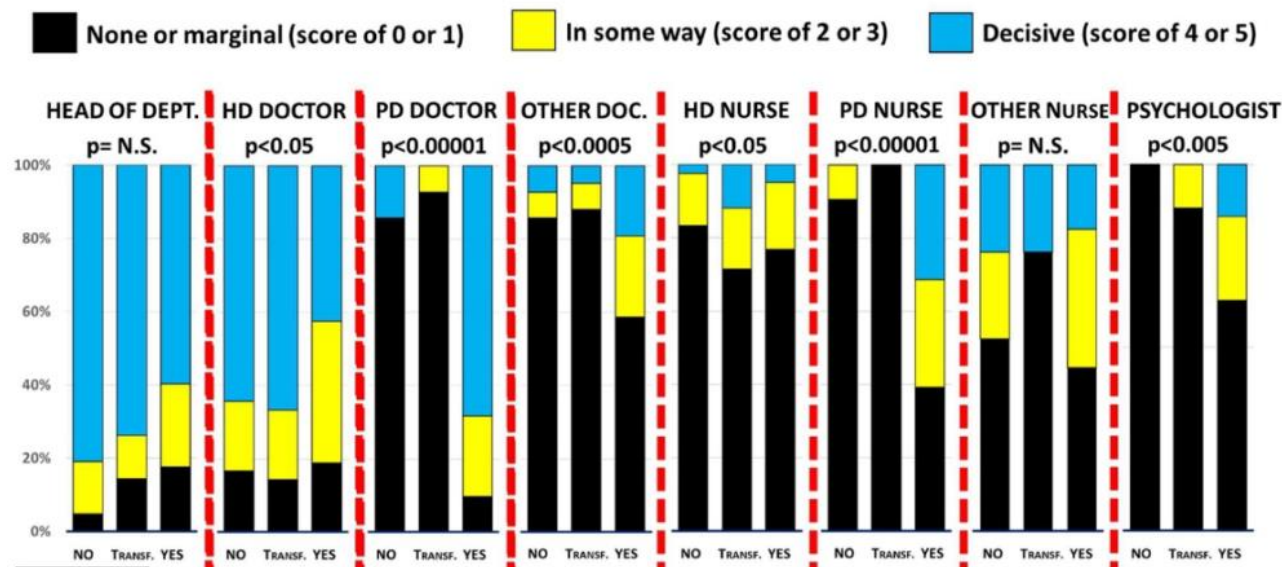


Figure 10

Figure 10. Opinion on the weight (from left to right) of the Head of Department (Director or Operating Unit Manager), the HD Doctor, the PD Doctor, a Doctor not involved with Dialysis, the HD nurse, the PD nurse, a Nurse not directly involved with Dialysis and lastly the Psychologist. The differences relating to PD Doctor and Nurse are as expected, as is the superimposable opinion between PD-NO and PD-TRANSF Centers. The interviewees in all the three types of Center agree on the role of the Head of Department.

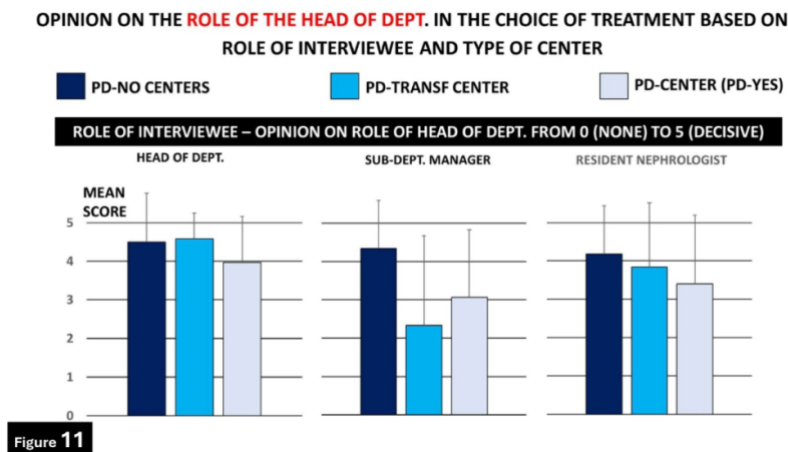


Figure 11. Opinion on the role of the Head of Department in the choice depending on the role of the interviewee (Head of Department, Sub-department Manager or resident doctor). The weight is expressed as the mean (\pm DS) of the weight score attributed by the three professionals to the Head of Department (scores from 0 – no weight – to 5, decisive).

PART 2 – THE OPINIONS OF THE NEPHROLOGISTS

General non patient-dependent factors

Weight of different parties, including patient and family members (opinion) in self-sufficient and NON self-sufficient patients. Overall (considering all 3 types of Center together), the “weight” attributed to the doctor and nurse is the same whether the patient is self-sufficient or not. As expected, the “weight” attributed to the patient is greater when the patient is self-sufficient, while for those who are not self-sufficient the family member’s opinion is even more important than that of the doctor (Figure 12). The role of other patients is less important, and minimal for non self-sufficient patients. Differences in the type of Center they belong to are highlighted in the opinion expressed on the importance of the nurse, patient and family members in the choice of modality (Figure 13) (Figure 14). For self-sufficient patients all three of these are assigned a significantly greater role by the interviewees in the PD-YES Centers than in the other Centers. For NON self-sufficient patients, the difference between PD-YES Centers and the others only relates to the nurse and family member (Figure 14).

In your opinion, in relation to **SELF-SUFFICIENT** patients and **NON SELF-SUFFICIENT** patients **who are clinically suitable for either HD or PD**, what weight in the choice of dialysis treatment is given to:

Give a score of between 1 and 5 to each response: 1 = no weight – 5 = decisive weight

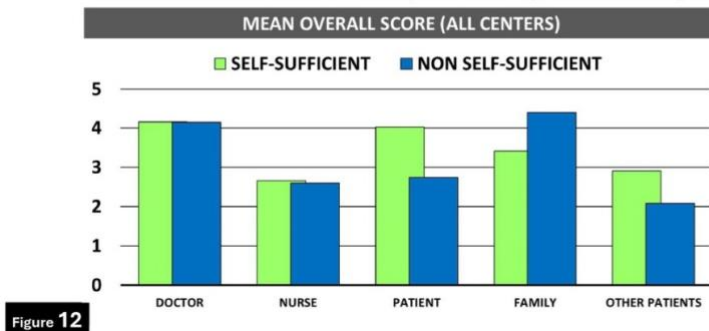


Figure 12. Overall opinion (all Centers) on the role that the main professionals involved have in dialysis modality selection in patients who are self-sufficient or need a caregiver for PD. The value is the mean score (in this case the scale is from 1 – absent or irrelevant – to 5, decisive).

In your opinion, for **SELF-SUFFICIENT** patients who are clinically suitable for either HD or PD, what weight in the choice of dialysis treatment is given to:

Figure 13 Give a score of between 1 and 5 to each response: 1 = no weight – 5 = decisive weight

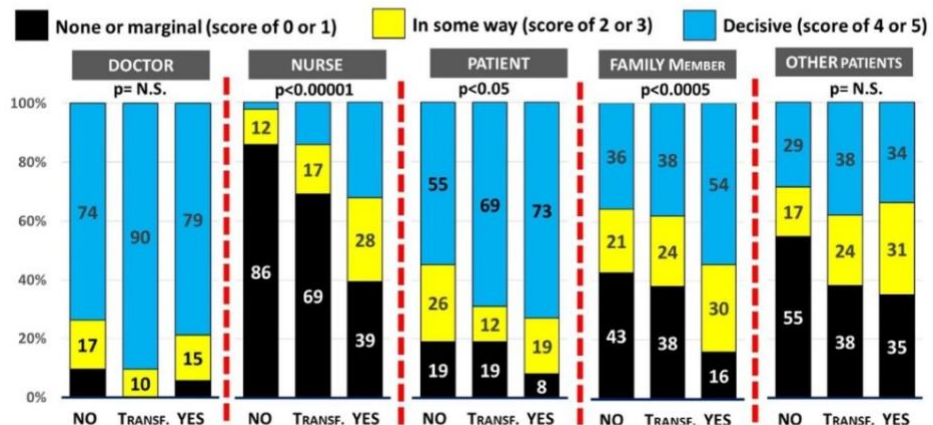


Figure 13. Opinion by type of Center on the weight the main professionals involved have in dialysis modality selection in self-sufficient patients. The value is the mean score (in this case the scale is from 1 – absent or irrelevant – to 5, decisive).

In your opinion, for **NON SELF-SUFFICIENT** patients who are clinically suitable for either HD or PD, what weight in the choice of dialysis treatment is given to:

Figure 14 Give a score of between 1 and 5 to each response: 1 = no weight – 5 = decisive weight

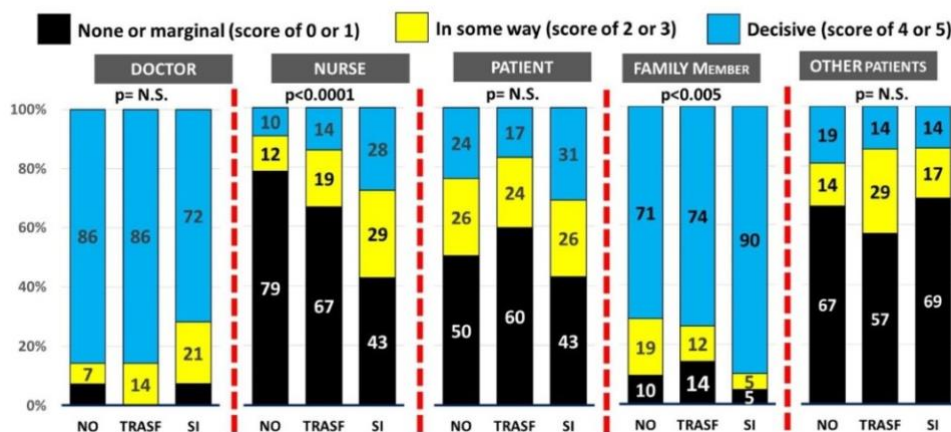


Figure 14. Opinion by type of Center on the weight the main professionals involved have in dialysis modality selection in NON self-sufficient patients (need for a caregiver for PD). The value is the mean score (in this case the scale is from 1 – absent or irrelevant – to 5, decisive).

Optimal percentage of PD. The responses relating to the percentage considered optimal confirm the importance of the type of Center in which the Nephrologist works (Table 14). Those working in Centers which do not use PD express significantly lower percentages as optimal for the use of PD compared to the others. The percentage does not change when only the 350 Nephrologists spending more than 50% of their time on dialysis and heads of department are considered (Figure 15).

OPTIMAL %	NO	TRANSF	SI
≤ 10	21.4	2.4	0.3
between 11 and 20	28.6	31.0	19.5
21 – 30	35.7	33.3	31.1
31 – 40	7.1	11.9	28.6
41 – 50	7.1	21.4	13.8
> 50	0.0	0.0	6.8

Table 14. Evaluation of the percentage of patients on dialysis with PD considered optimal (p<0.00001).

In your opinion, what should be the **optimal percentage** of patients treated using PD?

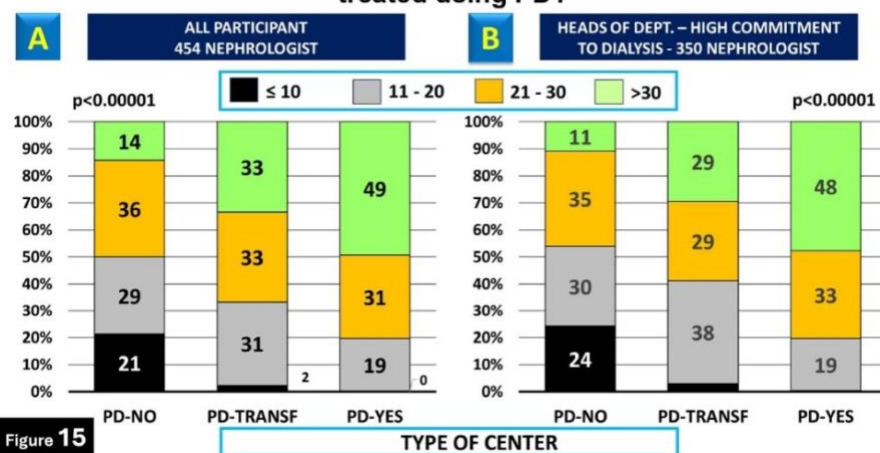


Figure 15. Optimal percentage use of PD according to Nephrologists in the different types of Center. In B, only the 350 Nephrologists with high involvement in dialysis (more than 50% of work time dedicated to dialysis) are considered. There are no significant differences between A and B.

Fear of peritonitis. Of the 454 interviewees, 24 were not considered because they are not involved in any way in the modality selection process. Being conditioned by a fear of peritonitis is referred to by 48.8%, 19.5% and 15.5% respectively of the Nephrologists in PD-NO, PD-TRANSF and PD-YES Centers (Table 15). Considering only those with more than 3 years of experience with PD, the difference is not more significant, but the limited number of interviewees with >3 years experience in the PD-NO and PD-TRANSF Centers (a total of 16 out of 82), intriguing though it may be, does not allow for the drawing of certain conclusions in this regard, while in the PD-YES Centers there is no significant difference between those who have more or less than 3 years of experience in PD (Figure 16).

FEAR OF PERITONITIS	NO	TRANSF	SI
NO	21	32	295
YES	20	8	54

Table 15. The fear of peritonitis diminishes from the PD-NO Centers (48.8%) to the PD-TRANSF (20.0%) and PD-YES Centers (15.5%).

Does the **risk of peritonitis** condition you in recommending PD?

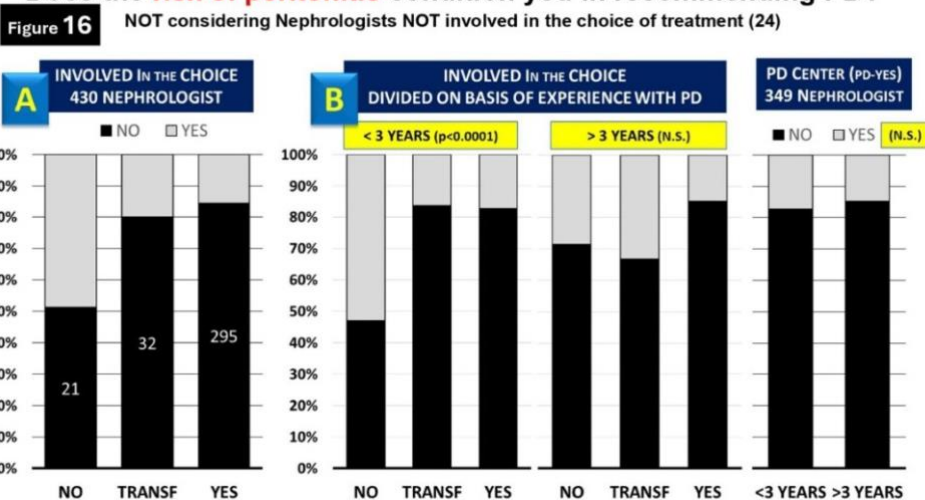


Figure 16. Influence of the fear of peritonitis in the choice process, considering only the 430 Nephrologists involved in the choice. A. All participants – B. Breakdown by having less or more than 3 years experience.

Validity of the method: adequacy. Table 16 gives the percentages of the different opinions expressed by the interviewees on the validity of clearance adequacy in PD compared to HD. The majority of PD-NO Centers consider it to be lower, while in the PD-TRANSF and PD-YES Centers the majority considered it to be the same or superior (Figure 17). The result does not change if only the interviewees with a high level of involvement in the modality selection pathway are considered.

CENTERS	DIALYSIS ADEQUACY			SURVIVAL		
	LOWER	EQUAL	HIGHER	LOWER	EQUAL	HIGHER
NO	57.1	40.5	2.4	45.2	47.6	7.1
TRANSF	35.7	45.2	19.0	21.4	54.8	23.8
YES	25.7	61.4	13.0	14.1	64.9	21.1
ALL	29.5	57.9	12.6	17.6	62.3	20.0

Table 16. Evaluation of the validity of PD compared to HD. Both are evaluated in a significantly different way in the three types of Center (dialysis adequacy $p < 0.0005$ – survival $p < 0.00002$).

VALIDITY OF THE METHOD – OPINION OF NEPHROLOGISTS AND TYPE OF CENTER

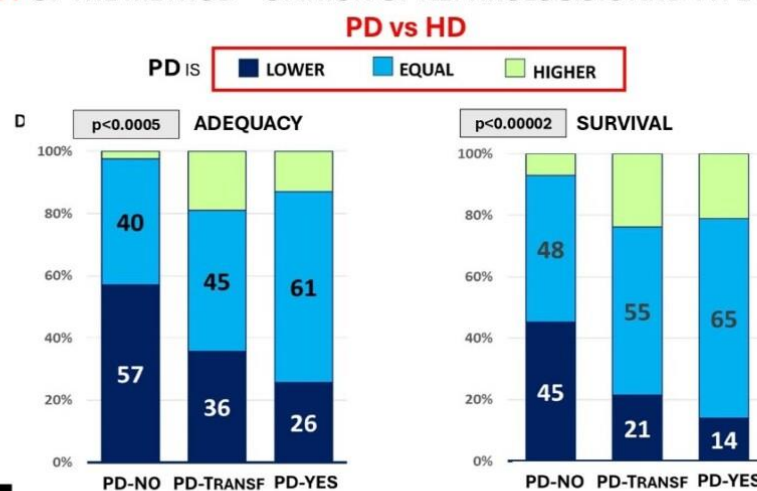


Figure 17

Figure 17. Evaluation of dialysis adequacy in PD compared to HD.

Validity of the method: survival. The results for survival are similar to those for adequacy, though less marked (Table 16) (Figure 17). The majority of participants believe it to be the same in all three types of Center, but only a few fewer in the PD-NO Centers believe it to be worse (47.6% the same – 45.2% worse). The opposite is true in the PD-YES Centers (64.9% the same – 14.1% worse) and in between in the NO-TRANSF Centers (54.8% the same – 28.1% worse). The result does not change when only the 300 interviewees with high involvement in dialysis are considered (lower survival rate – NO = 43.3% – TRANSF = 21.9% – YES = 13.0% – same survival rate – NO = 53.3% – TRANSF = 50.0% – YES = 64.3%)

Structural factors conditioning the use of PD. Of the 5 factors considered (cost, shortage of nurses, closeness to private Centers, limited overall size of Center, excess HD beds) the majority in all three types of Center agree that private Centers in the vicinity, limited size of Center and excess HD beds are factors favoring HD (Table 17) (Figures 18, 19). The majority belonging to PD-NO Centers do not consider cost to be an important factor, while in the PD-TRANSF and PD-YES Centers they consider it an indication for PD. This difference in opinion on costs is no longer significant when only the highly-involved Nephrologists are considered. The opinion expressed on the shortage of nurses as a conditioning factor is similar: the majority (38.1%) in the PD-NO Centers consider it a deciding factor, while in the TRANSF and YES Centers (61.9% and 66.8% respectively) it is considered an indication for PD, both overall and by just Nephrologists with high involvement in dialysis. In the PD-NO Centers however, more than a quarter of the interviewees (26.1%) consider it an indication for HD.

INDICATION FOR HD (1 – 2); INDIFFERENT (3); INDICATION FOR PD (4 – 5)					
	1	2	3	4	5
COST (p<0.05)					
NO	4.8	4.8	59.5	23.8	7.1
TRANSF	7.1	4.8	28.6	33.3	26.2
YES	3.0	3.8	36.2	26.8	30.3
ALL	3.5	4.0	37.7	27.1	27.8
SHORTAGE OF NURSES (p<0.0001)					
NO	11.9	14.3	38.1	26.2	9.5
TRANSF	14.3	7.1	16.7	42.9	19.0
YES	3.0	5.7	24.6	33.8	33.0
ALL	4.8	6.6	25.1	33.9	29.5
PRIVATE CENTERS IN THE VICINITY (N.S.)					
NO	47.6	14.3	38.1	0.0	0.0
TRANSF	28.6	19.0	42.9	7.1	2.4
YES	33.5	12.2	43.5	5.4	5.4
ALL	34.4	13.0	43.0	5.1	4.6
LIMITED SIZE OF CENTER (N.S.)					
NO	28.6	23.8	31.0	14.3	2.4
TRANSF	33.3	9.5	35.7	14.3	7.1
YES	18.1	22.4	35.7	14.1	9.7
ALL	20.5	21.4	35.2	14.1	8.8
EXCESS HD BEDS (N.S.)					
NO	54.8	16.7	23.8	2.4	2.4
TRANSF	38.1	19.0	28.6	7.1	7.1
YES	36.2	17.6	33.5	6.2	6.5
ALL	38.1	17.6	32.2	5.9	6.2

Table 17. Evaluation, as indication for PD or HD, of the structural factors given in the Table. If only the interviewees (300) with high involvement in the choice process (data not shown) are considered, the difference regarding the opinion between the three types of Center on cost is no longer significant.

«STRUCTURAL» FACTORS CONDITIONING THE CHOICE OF METHOD

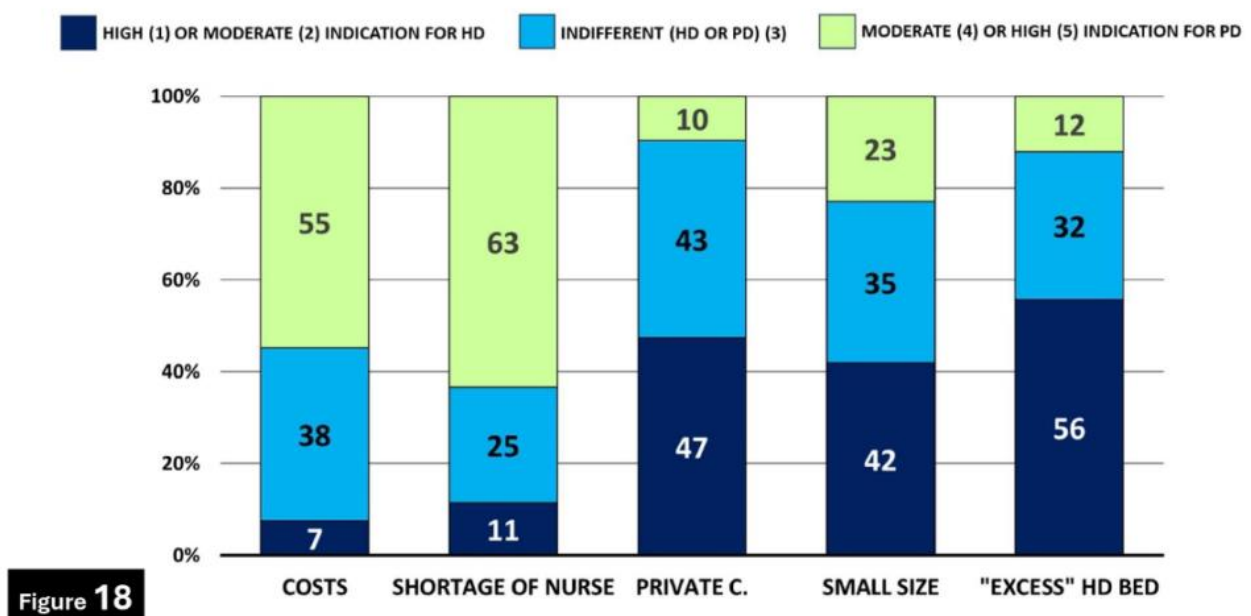


Figure 18. Overall evaluation (454 Nephrologists) of indication for PD or HD for each of the structural factors reported above on a scale of from 1 to 5.

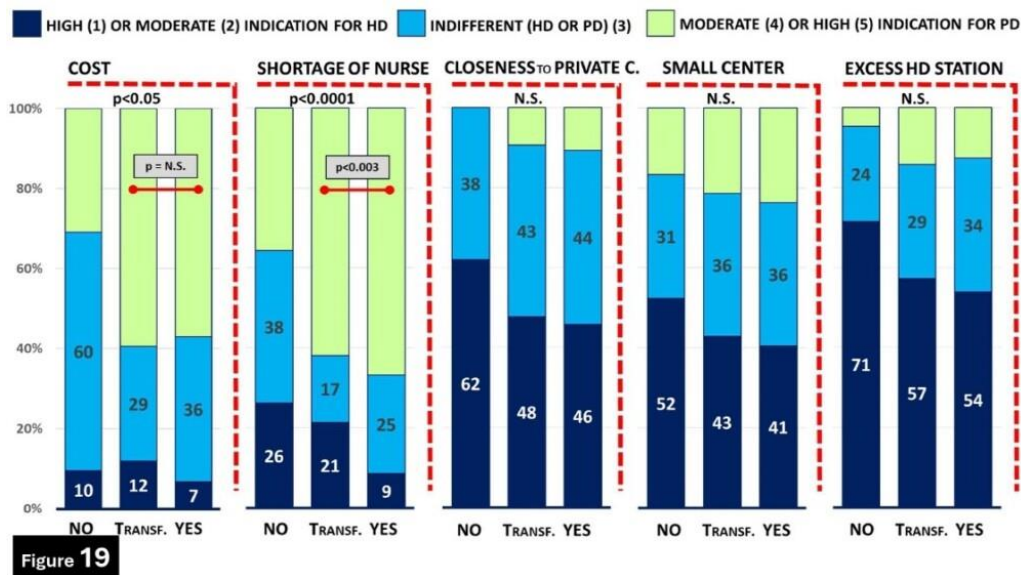


Figure 19. Evaluation of indication for PD or HD for each of the structural factors reported above on a scale of from 1 to 5. Participants have been divided by the type of Center they belong to.

Possible incentives for PD. The majority of interviewees (Figure 20) (Table 18) judge all 5 incentives considered positively. Analysis by type of Center shows significant differences regarding financial support for assisted PD, telemedicine and the application of financial incentives for residential care homes willing to manage PD: financial support for assisted PD and residential care homes is warmly supported by those belonging to PD-TRANSF and PD-YES Centers, and telemedicine by the PD-NO Centers (Figure 21).

	from no importance (1) to considerable weight (5)				
	1	2	3	4	5
FINANCIAL SUPPORT FOR ASSISTED PD (p<0.00001)					
NO	33.3	16.7	16.7	21.4	11.9
TRANSF	14.3	4.8	28.6	26.2	26.2
YES	4.9	6.8	15.4	28.4	44.6
ALL	8.4	7.5	16.7	27.5	39.9
TELEMEDICINE (p<0.0005)					
NO	7.1	7.1	14.3	54.8	16.7
TRANSF	2.4	7.1	31.0	31.0	28.6
YES	11.1	17.0	26.2	25.9	19.7
ALL	9.9	15.2	25.6	29.1	20.3
24H NURSE PHONE SUPPORT (N.S.)					
NO	2.4	4.8	14.3	57.1	21.4
TRANSF	0.0	7.1	16.7	38.1	38.1
YES	3.2	9.2	17.0	34.1	36.5
ALL	2.9	8.6	16.7	36.6	35.2
HOME NURSING SUPPORT (N.S.)					
NO	4.8	4.8	16.7	40.5	33.3
TRANSF	0.0	2.4	14.3	38.1	45.2
YES	2.4	3.8	9.7	29.5	54.6
ALL	2.4	3.7	10.8	31.3	51.8
FINANCIAL SUPPORT FOR RESIDENTIAL CARE HOMES (p<0.0005)					
NO	7.1	4.8	28.6	42.9	16.7
TRANSF	2.4	7.1	19.0	33.3	38.1
YES	3.5	4.9	10.8	26.5	54.3
ALL	3.7	5.1	13.2	28.6	49.3

Table 18. Evaluation of the weight that the incentives for PD given in the Table have on the choice for PD according to Nephrologists by type of Center.

EVALUATION OF POSSIBLE INCENTIVES FOR CHOOSING PD

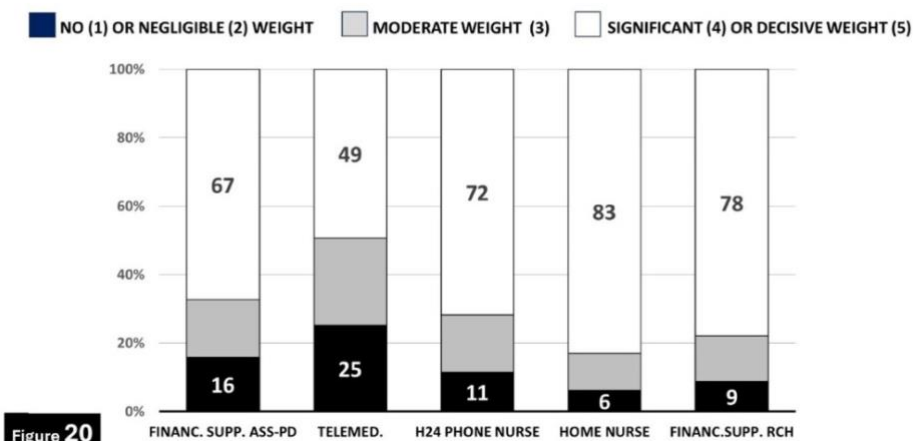


Figure 20

Figure 20. Opinion of the effectiveness of various initiatives generally considered to be incentives for PD: financial support for Caregivers in assisted PD; telemedicine; 24H nurse phone support; home nurse support; financial support for residential care facilities willing to accept and manage patients on PD. All interviewees (454 Nephrologists).

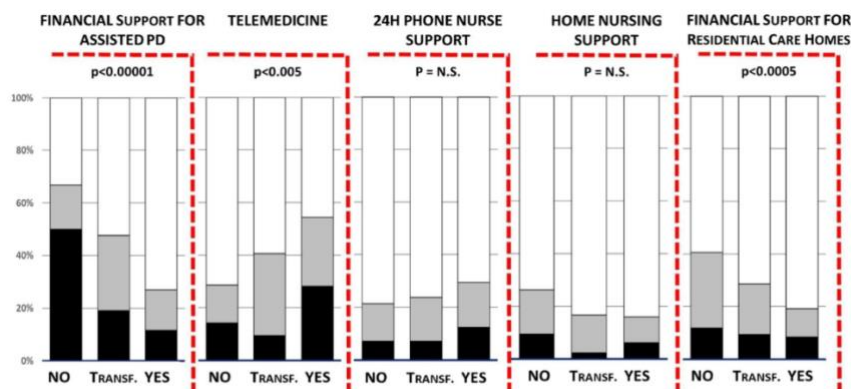


Figure 21

Figure 21. Opinion of Nephrologists of the effectiveness of various initiatives generally considered to be incentives for PD divided by the type of Center they belong to.

General patient-dependent factors

Together these represent the most common clinical and social-apptitude indications and contraindications to PD which are normally evaluated during the pre-dialysis process.

Percentage of patients with no conditioning. The percentage of early referral patients who are free to choose between HD and PD is evaluated in a significantly different way depending on the type of Center a nephrologist belongs to (Table 19). In particular, while it is believed to be less than 50% of incident patients for 92.8% of interviewees in the PD-NO Centers, 47.6% in the PD-YES Centers believe it to be more than 50% (Figure 22), with the result not changing taking into account only the 300 interviewees with high involvement in dialysis (96.7% and 48.3% respectively).

	≤40%	40-50%	50-60%	60-70%	≥70%
NO	71.4	21.4	4.8	0.0	2.4
NO-TRANSF	54.8	23.8	9.5	4.8	7.1
YES	25.7	26.8	21.1	14.1	12.4
ALL	32.6	26.0	18.5	11.9	11.0

Table 19. Percentage of patients free to choose dialysis modality (p<0.00001).

In your opinion, what percentage of patients could do **either** HD or PD?

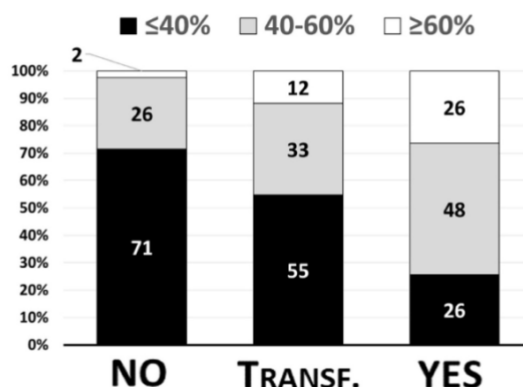


Figure 22

Figure 22. Opinion of the percentage of total incident patients in dialysis with no clinical or social conditioning and therefore able to choose either PD or HD.

Particular clinical conditions. Figure 23 compares the assessments given by those belonging to NO and TRANSF Centers considered together (82 interviewees) with those belonging to YES Centers (370 interviewees), considering together high or moderate indication for HD (responses 1 and 2) and PD (responses 4 and 5). On ischemic heart disease, malnutrition and diverticulosis, the responses – indication for PD for CAD and contraindication for PD for BMI<20 and diverticulosis spread beyond the sigma – do not differ significantly between the different types of Center. Opposite evaluations, on the other hand, were given by the majority of the interviewees for heart failure (indication for the PD-YES Centers and contraindication or indifferent for the PD-NO/TRANSF Centers) and polycystic nephropathy (contraindication for the PD-NO/TRANSF Centers and indifferent for the PD-YES Centers) (Figure 24).

With regard to Type 2 DM, the proportion among those in the PD-NO/TRANSF Centers who expressed indifference or consider it an indication for PD (indifferent 41.7% – indication 35.7%) is higher than among those belonging to the PD-YES Centers (indifferent 52.4% – indication 21.9%). For obesity too, which is considered by over 75% in both groups to be a contraindication for PD, indifference is higher in the NO/TRANSF Centers (17.9% vs 8.4%). The difference between NO and TRANSF Centers was only significant with regard to Polycystic nephropathy (Figure 24); for all the other conditions the differences in evaluation between NO and TRANSF Centers were not significant.

The results for all three types of Center with the responses on a scale of from 1 to 5 are given in detail in Table 20.

Particular social conditions (NON-clinical factors associated with the patient). Figure 25 and Figure 26 compare the assessments given by those belonging to NO and TRANSF Centers considered together (82 interviewees) with those belonging to YES Centers (370 interviewees), considering together high or moderate indication for HD (responses 1 and 2) and PD (responses 4 and 5). The interviewees agree ($p = N.S.$) that motivation for self-care, working activity, a need for flexibility in times for dialysis and – in the case of NON self-sufficient patients – the availability of a caregiver all represent indications for PD, just as not sticking with the therapy (NON compliance) is a valid indication for HD. Opinions are significantly different between the three groups, on the other hand, with regard to the importance of body image, age, quality of life and living alone. Body image in particular is considered an indication for HD by 52.4% in PD-NO/TRANSF Centers, while 62.7% in the PD-YES Centers consider it to be an indication for PD or are indifferent ($p < 0.05$); while Quality of Life is considered an indication for PD by 51.2% in the PD-NO/TRANSF Centers, with the percentage rising to 67.3% in the PD-YES Centers ($p < 0.01$); an age of between 65 and 75 is considered an indication

for HD or indifferent by 15.5% and 50.0% respectively in the PD-NO/TRANSF Centers, while in the PD-YES Centers these percentages are 4.1% and 57.3% respectively ($p<0.0005$); the difference is more marked for > 75 years of age, considered an indication for HD by 48.8% of the interviewees in PD-NO/TRANSF Centers compared with 24.3% in the PD-YES Centers ($p<0.00005$); finally, living alone is an indication for HD for 78.6% in PD-NO/TRANSF Centers compared with 51.6% in PD-YES Centers ($p<0.00005$).

For all the NON clinical conditions considered, the differences in evaluation between PD-NO and PD-TRANSF Centers was not significantly different. The results for all three types of Center are given in detail in Table 21, with the responses on a scale of from 1 to 5. The results of the analysis limited to the 300 Nephrologists with high involvement in dialysis activities proved to be superimposable with those given in Table 21.

INDICATION FOR HD (1 – 2); INDIFFERENT (3); INDICATION FOR PD (4 – 5)					
	1	2	3	4	5
CONGESTIVE HEART FAILURE ($p<0.005$)					
NO	28.6	14.3	16.7	33.3	7.1
TRANSF	23.8	14.3	19.0	31.0	11.9
YES	11.1	10.8	17.6	29.2	31.4
ALL	13.9	11.5	17.6	29.7	27.3
ISCHEMIC HEART DISEASE ($p<0.0005$)					
NO	14.3	7.1	26.2	45.2	7.1
TRANSF	2.4	4.8	21.4	52.4	19.0
YES	1.6	5.4	30.0	38.9	24.1
ALL	2.9	5.5	28.9	40.7	22.0
DIABETES ($p<0.01$)					
NO	14.3	11.9	47.6	23.8	2.4
TRANSF	7.1	11.9	35.7	31.0	14.3
YES	5.1	20.5	52.4	15.9	5.9
ALL	6.2	18.9	50.4	18.1	6.4
OBESITY – BMI>30 kg/m² (N.S.)					
NO	57.1	16.7	21.4	4.8	0.0
TRANSF	50.0	33.3	14.3	0.0	2.4
YES	52.4	35.1	8.4	3.2	0.8
ALL	52.6	33.3	10.1	3.1	0.9
MALNUTRITION – BMI<20 kg/m² ($p<0.05$)					
NO	38.1	14.3	9.5	35.7	2.4
TRANSF	31.0	23.8	19.0	14.3	11.9
YES	24.1	23.2	25.7	19.7	7.3
ALL	26.0	22.5	23.6	20.7	7.3
DIVERTICULOSIS SPREAD BEYOND THE SIGMA ($p<0.01$)					
NO	57.1	16.7	21.4	0.0	4.8
TRANSF	66.7	19.0	7.1	2.4	4.8
YES	41.9	35.9	17.3	3.5	1.4
ALL	45.6	32.6	16.7	3.1	2.0
APKD ($p<0.00001$)					
NO	35.7	23.8	35.7	0.0	4.8
TRANSF	50.0	33.3	11.9	0.0	4.8
YES	15.4	25.7	50.3	5.9	2.7
ALL	20.5	26.2	45.4	4.8	3.1

Table 20. Detailed evaluation of the single clinical factors (in percentages) on which the opinion of the Nephrologists was requested.

PATIENT-DEPENDENT («CLINICAL») FACTORS CONDITIONING THE CHOICE OF DIALYTIC TYPE TREATMENT

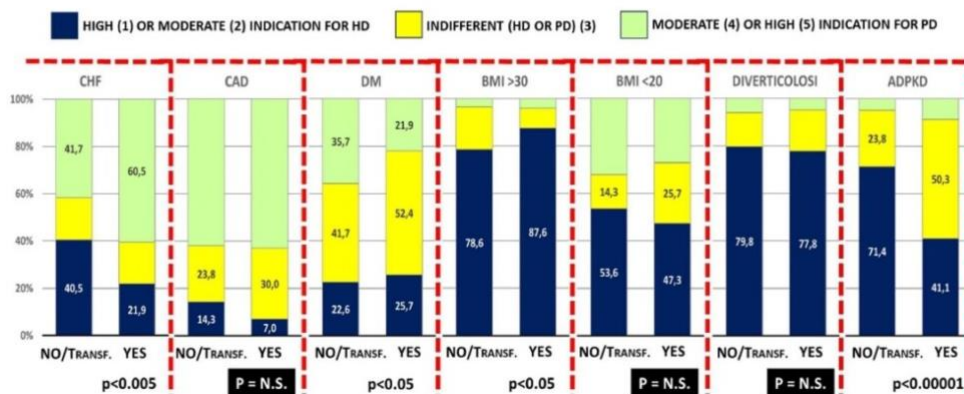


Figure 23

Figure 23. Evaluation of the main clinical factors which can condition the choice of modality. 1. «CHF» Congestive heart failure; 2. «CAD» Ischemic heart disease; 3. «DM» type 2 Diabetes Mellitus; 4. «BMI>30» Obesity; 5. «BMI<20» Malnutrition; 6. «Diverticulosis», understood as diverticulosis spread beyond the sigma; 7. «ADPKD» Polycystic nephropathy. NOTE – The interviewees in the NO and TRANSF Centers (82) were considered together and compared with those of the PD-YES Centers (370).

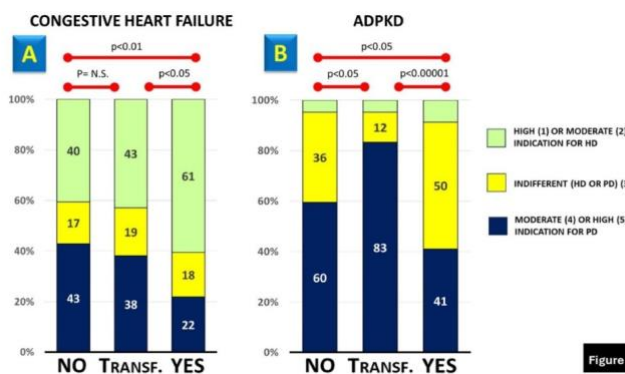


Figure 24

Figure 24. Polycystic nephropathy and congestive heart failure in the opinion of the interviewees divided by type of Center.

PATIENT-DEPENDENT («NON CLINICAL») FACTORS CONDITIONING THE CHOICE OF DIALYTIC TYPE TREATMENT - 01

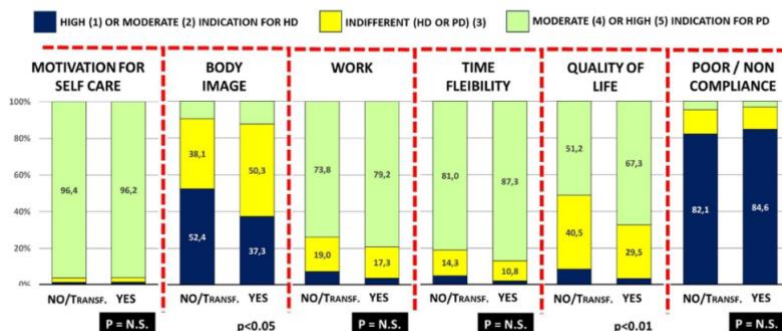


Figure 25

Figure 25. NON clinical conditions evaluated according to level of indication for HD or PD. «MOTIVAT. SELF-CARE»: patient motivated for self-care dialysis; «FLEXIBILITY» in treatment times; «Q of L»: Quality of Life; «NON COMPLIANCE»: limited compliance with prescriptions. NOTE – The interviewees in the NO and TRANSF Centers (84) were considered together and compared with those of the PD-YES Centers (370).

PATIENT-DEPENDENT («NON CLINICAL») FACTORS CONDITIONING THE CHOICE OF DIALYTIC TYPE TREATMENT - 02

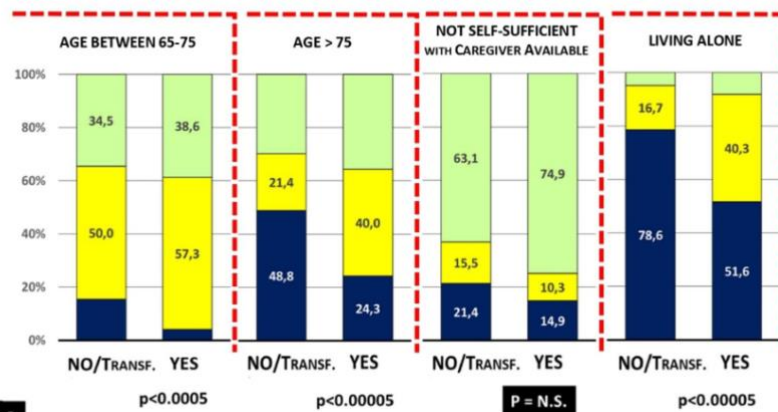


Figure 26. NON clinical conditions evaluated according to level of indication for HD or PD. «ASSIST-PD»: NON self-sufficient patient needing a CareGiver (CG) who is available. NOTE – The interviewees in the NO and TRANSF Centers (82) were considered together and compared with those of the PD-YES Centers (370).

Duration of PD and drop-out to HD

Duration of PD. When asked if drop-out from PD was to be considered a probable event after 2, 4 or 5 years, or whether PD has no definable time limit a priori, the responses were significantly different, as reported in Table 22. Rather than being a division between those who believe it has a predetermined duration and those who do not ($p=N.S.$) however, the difference relates to the estimate of the duration given by the former (Figure 27). Limited to the 300 interviewees with high involvement in dialysis, the result of the same analysis was not significant.

Duration of PD and size of PD program. The majority of the interviewees (63.7%) believe that the size of a Center's PD program (total number of patients treated and/or in treatment) has no influence on the percentage of drop-out to HD (Figure 28-A), with no significant differences among the three types of Center (or when considering only the 300 with high involvement in dialysis).

Percentage of annual drop-out. The interviewees in the three types of Center also gave a similar response to this question (Figure 28-B). Overall, 48.9% believe there is no PHYSIOLOGICAL drop-out percentage, while among the remainder 17.6% and 19.6% respectively consider it to be lower than 6% or between 6 and 10%.

Interest for the subject. When asked "In future, would you like to be informed of the results of this questionnaire and any new initiatives which may follow?", a total of 91.6% expressed interest, though there was a strongly significant difference between the types of Center. Indeed, while almost all those belonging to YES Centers (98.6%) expressed interest, in the NO Centers the percentage of those interested drops to 47.6% (Figure 29).

Discussion

The 2004-SIN-Cens had shown the importance of structural factors (number of private Centers, size of Center and HD station occupancy rate) in the use of PD: Centers not using PD are smaller, have a lower HD bed occupancy rate and are located in regions where there are numerous private Dialysis Centers. If structural factors alone counted, opinions on PD would be no different between those using PD and those not using it; however, they were shown to be significantly different depending on the type of Center respondents belonged to: negative when it does not use PD and positive in those that do.

As choosing a place to work generally precedes work experience, opinions on PD seem to be defined according to experience gained with the method, confirming the importance of structural factors on use of the modality. However, the importance alongside structural factors of positive opinions of the modality is shown by the fact that there are Centers (PD-TRANSF) which have the same structural characteristics as Centers which do not consider PD at all due to size (small) and HD bed occupancy (low), yet send candidates for PD to other Centers.

In short, the use of PD in public Centers in Italy seems to be the result of balancing structural factors and opinions, with the latter however being conditioned – though only partially – by the former as opinions are enhanced with the gaining of experience in PD.

The main results of the study are summarized in Table 23.

Characteristics of the Nephrologists and their Centers

As regards the Nephrologists in the three types of Center, the only significant difference relates – naturally – to experience with PD, while their personal characteristics, training and engagement with dialysis, and degree of involvement in the choice of modality are substantially similar. The Centers which took part in the survey are not significantly different to those which did not. The main difference between the 3 types of Center regards the presence to a lesser extent of a structured modality selection pathway in the PD-NO Centers than in the PD-YES Centers, and in between the two in the PD-TRANSF Centers. Matching this is the percentage of those involved in all the 3 components of the choice (information, clinical evaluation and social-apptitude evaluation). If this concurs with the nature of the Center (choice is not an issue where PD is not performed), the level of participation of those who define themselves as being involved in the choice is medium-high in all three types of Center. This contradiction could represent a different cultural approach essentially limiting the choice in the PD-NO Centers to information. Strangely however, even in the PD-NO Centers HD incident patients are informed on PD, although insufficiently. Despite this, the difference between PD-NO and PD-YES Centers in regard to the information provided to patients is of note (2.8 vs 3.7 respectively on a scale of from 1 to 5). As the question on information provided related to early referral patients, but did not specify an absence of contraindications for PD, this information may be influenced by these contraindications, which are logically more numerous in HD incident patients in PD-YES Centers (in everyday practice, the existence of contraindications for PD is considered grounds for making informing the patient on this method “unnecessary”).

Opinions: roles played in making the choice

In accordance with the above, there is a clear difference in the way the percentage of patients who could do either PD or HD (with no contraindications) is assessed by Nephrologists in the three types of Center. If the choice is influenced by the healthcare practitioners, everyone recognizes as regards their own Center the decisive role played by the Director, while the weight attributed to other professionals, such as the PD doctor or nurse and psychologist, depends obviously on the type of Center and availability of the Service. Of interest is the role of the psychologist, which is important only in the PD-YES Centers, indicating a more well-structured selection pathway in these Centers. As regards the roles in general of the doctor, nurse, patient, family members and other patients, everyone agrees that the doctor is key, the patient or family members (depending on whether the patient is self-sufficient or not) are important, and other patients are irrelevant. The main difference between the three types of Center lies in the assessment of the role of the nurse, which is seen as NON marginal only by 14.3% of the Nephrologists in the PD-NO Centers compared to 60.5% in the PD-YES Centers.

INDICATION FOR HD (1 – 2); INDIFFERENT (3); INDICATION FOR PD (4 – 5)					
	1	2	3	4	5
MOTIVATION FOR SELF-CARE (p<0.00001)					
NO	2.4	0.0	0.0	64.3	33.3
TRANSF	0.0	0.0	4.8	31.0	64.3
YES	0.8	0.5	2.4	13.0	83.2
ALL	0.9	0.4	2.4	19.4	76.9
AGED BETWEEN 65 AND 75 (p<0.0005)					
NO	7.1	9.5	57.1	21.4	4.8
TRANSF	4.8	9.5	42.9	35.7	7.1
YES	0.3	3.8	57.3	25.9	12.7
ALL	1.3	4.8	55.9	26.4	11.5
AGE > 75 (p<0.00001)					
NO	40.5	11.9	19.0	21.4	7.1
TRANSF	21.4	23.8	23.8	14.3	16.7
YES	5.1	19.2	40.0	24.6	11.1
ALL	9.9	18.9	36.6	23.3	11.2
NOT SELF-SUFFICIENT WITH CAREGIVER AVAILABLE (p<0.005)					
NO	11.9	7.1	11.9	61.9	7.1
TRANSF	19.0	4.8	19.0	40.5	16.7
YES	8.6	6.2	10.3	40.5	34.3
ALL	9.9	6.2	11.2	42.5	30.2
LIVING ALONE (p<0.005)					
NO	50.0	26.2	21.4	0.0	2.4
TRANSF	42.9	38.1	11.9	4.8	2.4
YES	25.1	26.5	40.3	5.4	2.7
ALL	29.1	27.5	35.9	4.8	2.6
BODY IMAGE (p<0.05)					
NO	26.2	31.0	35.7	7.1	0.0
TRANSF	23.8	23.8	40.5	9.5	2.4
YES	8.6	28.6	50.3	9.2	3.2
ALL	11.7	28.4	48.0	9.0	2.9
WORK (p<0.05)					
NO	2.4	4.8	19.0	59.5	14.3
TRANSF	2.4	4.8	19.0	38.1	35.7
YES	1.6	1.9	17.3	33.5	45.7
ALL	1.8	2.4	17.6	36.3	41.9
TIME FLEXIBILITY (p<0.005)					
NO	7.1	0.0	14.3	61.9	16.7
TRANSF	0.0	2.4	14.3	47.6	35.7
YES	1.4	0.5	10.8	34.3	53.0
ALL	1.8	0.7	11.5	38.1	48.0
QUALITY OF LIFE (p<0.00001)					
NO	2.4	2.4	47.6	45.2	2.4
TRANSF	0.0	11.9	33.3	40.5	14.3
YES	1.4	1.9	29.5	28.6	38.6
ALL	1.3	2.9	31.5	31.3	33.0
NON COMPLIANCE (p= N.S.)					
NO	71.4	11.9	14.3	2.4	0.0
TRANSF	66.7	14.3	11.9	4.8	2.4
YES	67.6	17.0	12.2	1.6	1.6
ALL	67.8	16.3	12.3	2.0	1.5

Table 21. Detailed evaluation of the single NON clinical factors (in percentages) on which the opinion of the Nephrologists was requested.

	2 years	3 years	5 years	UNDEFINED
NO	14.3	19.0	19.0	47.6
TRANSF	2.4	21.4	19.0	57.1
YES	2.7	11.6	30.5	55.1
ALL	3.7	13.2	28.4	54.6

Table 22. Duration of PD.

In your opinion, is drop-out from PD to HD probable: After 2 years - After 3 years - After 5 years or – No time limit can be set a priori

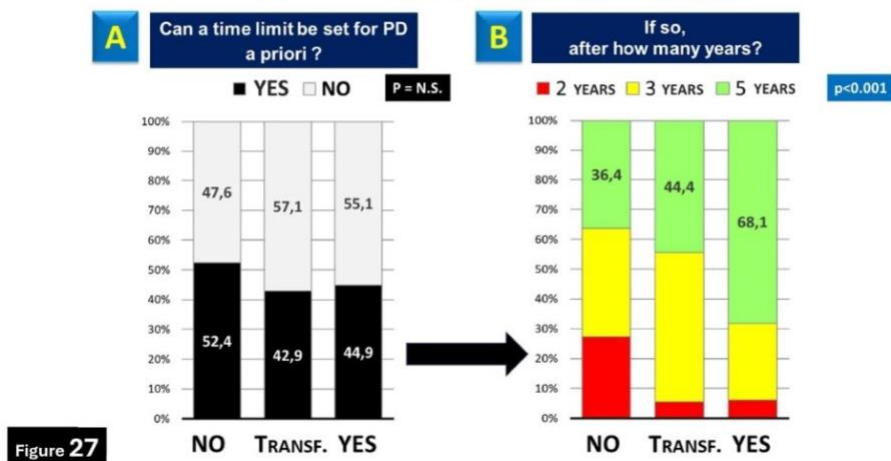


Figure 27. The duration of PD in the opinion of the interviewees divided by type of Center.

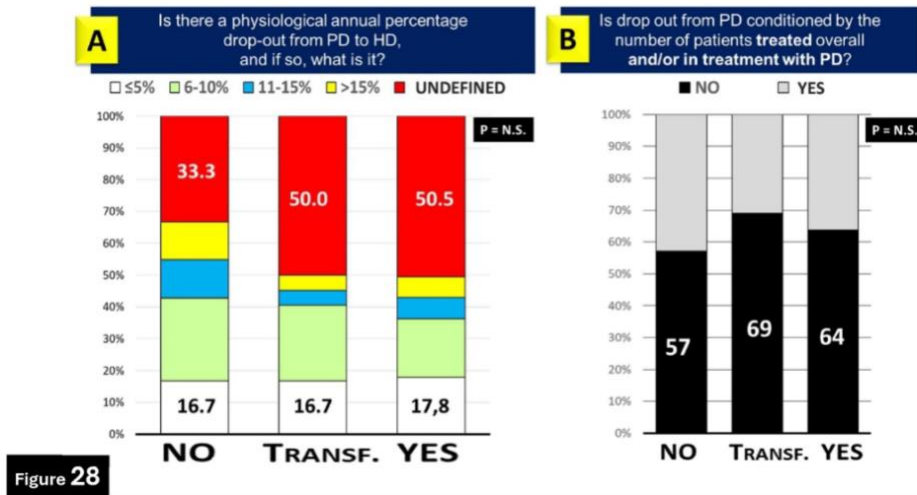


Figure 28. The response on annual drop-out rate is similar to that on the duration of PD (A). In B, the opinion of the Nephrologists, divided by type of Center, on the influence the size of PD program can have on drop-out.

In future, would you like to be informed of the results of this questionnaire and other new initiatives which may follow?

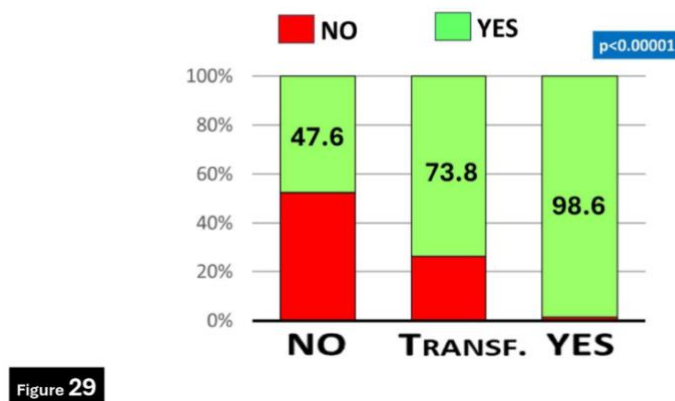


Figure 29. The response to this question, asked more out of courtesy than as part of the survey, can be an indicator of interviewee interest in PD.

Opinions: validity of the method, optimal percentage and drop-out

Opinions on adequacy and survival in PD compared to HD also differ considerably in the three types of Center: worse for the PD-NO Centers, the same or better than HD in the PD-YES Centers. Around half believe that PD has no predefined duration, with no differences between the Centers; however, the percentage of the other half who give it a maximum duration of 2 or 3 years compared to 5 years is significantly higher in the PD-NO Centers. It is therefore only natural that just 14.3% in the PD-NO Centers consider a proportion of patients treated with PD of more than 30% optimal, while the proportion is below 10% in 21.4% in these Centers, unlike the others. This means, however, that for 64.3% in the PD-NO Centers the optimal proportion of patients treated with PD is between 10 and 30% (the actual percentage of PD in the PD-YES Centers)[18].

For this aspect, as for several others, the evaluation given by the Nephrologists in PD-TRANSF Centers is similar to that of those in PD-YES Centers.

Opinions: general factors conditioning modality selection

Fear of peritonitis is most felt in the PD-NO Centers, least in the PD-YES Centers and in between the two in the PD-TRANSF Centers. Of interest is the finding that the difference is no more significant when considering only the interviewees with > 3 years of experience with PD. Size of Center, less pressure on HD beds and closeness to private Centers are recognized as factors that favor or are indications for the use of HD with no significant differences between the Centers, while cost and shortage of nurses are indications for PD in the PD-YES and PD-TRANSF Centers, but not in the PD-NO Centers, where to the contrary for the majority they represent an indication for HD or have no importance. This may be justified by the different perspective Nephrologists have in different types of Center. In fact, though the nurses/patients ratio clearly favors PD, and therefore a shortage of nurses should represent an incentive for this method, the perspective taken in PD-NO Centers is of having to start a PD program with an initial investment which is known to always involve a greater use of resources rather than a saving, as becomes evident only after the program has started.

Opinions: patient-specific factors conditioning modality selection

While practically everyone agrees that diverticulosis and obesity are an indication for HD, that coronary artery disease is an indication for PD and that it makes no difference in the case of malnutrition and diabetes, there is no agreement on congestive heart failure (clear indication for PD in the PD-YES Centers) or polycystic nephropathy (clear indication for HD in the PD-YES and PD-TRANSF Centers). For the non-clinical factors, everyone agrees that motivation for self-care, having a work activity and the need for flexible treatment times are all indications for PD, while poor compliance is an indication for HD. The differences regard body image, which is considered an indication for HD in the PD-NO and TRANSF Centers while 50% in the PD-YES Centers are indifferent, and Quality of Life, which is considered better in PD by everyone, but even more positively in the PD-YES Centers. An age of between 65 and 75 is considered as making no difference or an indication for PD by the majority, while an age of over 75 and living alone are judged differently by those in the 3 types of Center. For the majority in the PD-NO Centers, being >75 years of age is an indication for HD, but not in the PD-YES Centers, while living alone represents an indication for HD for everyone, but much more so in the PD-NO Centers. However, if the patient is not self-sufficient and has a caregiver available PD is recognized by everyone as the recommended modality. Clearly, the availability of a caregiver is considered very rare in the PD-NO Centers. As regards possible incentives for PD, financial support for the caregiver or residential care facility is considered most important in the PD-YES Centers, while interestingly the most important for the interviewees in the PD-NO Centers are telemedicine and technological innovation.

	PD-NO	PD-TRANSF	PD-YES
CHARACTERISTICS OF THE NEPHROLOGIST			
existence of a structured choice pathway (YES, %)	47.2	55.2	73.2
involvement in all three pre-dialysis activities (%)	21.4	47.6	54.9
experience in PD of >3 years (%)	16.7	26.2	65.1
information on PD provided to pts on HD (score from 1 to 5)	2.8	3.3	3.7
THE CHOICE – ROLES			
>40% of incident pts who could do PD (%)	28.6	45.2	74.3
NON marginal role of nurse in the choice (%)	14.3	31.0	60.5
THE VALUE OF PD			
lower dialysis adequacy than HD (%)	57.1	35.7	25.7
lower survival rate than HD (%)	45.2	21.4	14.1
drop-out expected after 2 or 3 years (%)	33.3	23.9	14.3
optimal percentage of pts treated with PD of >30%	14.3	33.3	49.2
optimal percentage of pts treated with PD of <10%	21.4	2.4	0.3
FACTORS WHICH CONDITION THE CHOICE – indications for PD			
cost (%)	41.0	59.5	57.0
shortage of nurses (%)	35.7	61.9	66.8
congestive heart failure (%)	40.4	42.9	60.6
Quality of Life (%)	47.6	54.8	67.2
pt not self-sufficient with caregiver available (%)	69.0	57.2	84.8
FACTORS WHICH CONDITION THE CHOICE – indications for HD			
age > 75 years (%)	52.4	45.2	24.3
living alone (%)	76.2	81.0	51.6
ADPKD	59.5	83.3	41.1
body Image indication for HD	57.2	47.6	37.2
fear of peritonitis	48.8	20.0	15.5

Table 23. Summary of the main differences (considering only significant ones) of opinion between Nephrologists in the three types of Center.

Limitations of the study

The study has several limitations. The data were re-analyzed a number of years following their collection, so some findings linked to the time at which the survey was carried out may not have been highlighted or discussed. The prevalence and incidence data refer to 2004, and not to the year of the study. Finally, the participants were selected on a voluntary basis. However, the large size of the sample cohort, the inclusion of a substantial number of Nephrologists who do not prescribe PD and the different aspects considered undoubtedly represent a strength.

Conclusions

The study confirms the importance of the opinions or “preconceptions” of Nephrologists associated with the type of Center they work in. Compared with Centers in which PD is performed, in Centers in which it is not the opinion of PD is more negative, if there is a pre-dialysis choice pathway it is simplified to just providing information and the percentage of patients considered optimal for treatment with PD is lower. However, opinions vary in these Centers too (not everyone has the same view), conditioned as they are by the experience the Nephrologist has with PD, and can even be positive on various specific aspects. Together with the existence of Centers which send patients who may have an indication for PD to other Centers though they do not perform it themselves, as is highlighted for the first time by this study, all this suggests that the use of PD depends on a combination of structural factors (size, neighboring private facilities and HD beds) and opinions, in which the latter however are only partially conditioned by the former.

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