

Bulletin de la Dialyse à Domicile

Home dialysis and Covid-19 in French-speaking countries (RDPLF data-base)

Dialyse à domicile et pandémie Covid-19 dans les pays francophones (données RDPLF)

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Résumé

Buts de l'étude : évaluer la fréquence de la Covid-19 symptomatique chez les patients dialysés à domicile et son influence sur le nombre de patients traités par dialyse à domicile dans les unités de dialyse des pays francophones qui participent au Registre de Dialyse Péritonéale et hémodialyse à domicile de Langue Française (RDPLF). Un accent particulier est porté sur les patients traités par dialyse péritonéale (DP) en France métropolitaine.

Résultats : en HDD l'incidence est de 6 % en Belgique, et 4,8 % en France métropolitaine. Elle est en DP de 10,6 % en Belgique, 6,7 % en France métropolitaine, 10,8 % au Maroc et 11,5 % en Tunisie. La létalité est inférieure à 5 % en HDD et comprise entre 8,4% et 42,7 % en DP en fonction de l'âge et des comorbidités associées. En France le pourcentage de patients qui ont eu une Covid-19 symptomatique est inférieur en dialyse à domicile, toutes méthodes confondues. Néanmoins, parmi les méthodes de DP à domicile, les fréquences et gravités les plus élevées sont observées en France métropolitaine en DP assistée à domicile : ce sont les patients les plus âgés et comorbides. Par ailleurs, les transferts de DP en hémodialyse en centre ont augmenté alors que le nombre de transplantations a diminué.

Conclusion : si la baisse du nombre de transplantations peut s'expliquer par une moindre disponibilité des blocs opératoires, des équipes chirurgicales et des unités de soins intensifs en période de pandémie, il est paradoxal que la prescription de la dialyse à domicile, qui limiterait le risque de contagion, ait diminué.

Mots clés : SARS-CoV-2, Covid-19, dialyse péritonéale, hémodialyse à domicile

Summary

Aims of the study: to assess the frequency of symptomatic Covid-19 in home dialysis patients and its influence on the number of patients treated at home in dialysis units of centers included in the French-speaking peritoneal and home hemodialysis Registry (RDPLF). Focus is placed on patients treated by peritoneal dialysis (PD) in mainland France.

Results: in home hemodialysis (HHD) the incidence is 6% in Belgium and 4.8% in mainland France. On peritoneal dialysis it is 10.6% in Belgium, 6.7% in mainland France, 10.8% in Morocco and 11.5% in Tunisia. Lethality is less than 5% in HHD and between 8.4% and 42.7% in PD depending on age and associated comorbidities. In France, the percentage of patients who have had symptomatic Covid-19 is lower on home dialysis, all methods combined. Nevertheless, among the home methods, the higher frequencies and severities are observed in mainland France in home assisted PD: these are the oldest and most co-morbid patients. Transfers from PD to in center hemodialysis have increased during Covid-19 pandemic while the number of transplants has decreased.

Conclusion: if the drop in the number of transplants can be explained by a reduced availability of operating theaters and surgical teams during a pandemic period, it is paradoxical that the prescription of home dialysis, which should be supposed to limit the risk of contagion, has decreased. More investigation should be performed to understand this paradox.

Key words : SARS-Cov-2, Covid-19, peritoneal dialysis, home hemodialysis

INTRODUCTION

The current Covid-19 pandemic is the subject of numerous studies. In addition to vaccination, barrier measures play an essential role in the prevention of contamination. Due to their reduced immunity, patients with renal insufficiency on dialysis are at high risk of severe complications. Frequent visits to healthcare establishments and their transport from home to the dialysis center can increase the risk of contamination. Several studies have insisted on the advantage of encouraging home treatments for these patients to reduce the risk of nosocomial contamination or during transport. The purpose of this report is to assess, from the French Language Home Peritoneal Dialysis and Hemodialysis Registry (RDPLF), whether the number and characteristics of patients treated with peritoneal dialysis has changed during the pandemic period, as well as the evolution of morbidity and mortality linked to Sars-Cov2.

METHODS

The description and organization of RDPLF have been previously reported [1] [2]. This is a retrospective observational study using an anonymised dataset of the RDPLF data base.

- all patients, aged 18 or over, treated at home between January 1, 2017 and June 30, 2021 and recorded in the RDPLF database were included.
- the following data have been extracted: - treatment modalities (home hemodialysis or peritoneal dialysis (PD)) - age - sex - presence or not of diabetes - level of autonomy (autonomous, assisted by family, assisted by nurse) - start and end dates of home treatment - causes of discontinuation of treatment (death, transfers to a center, transplantation) - causes of death, - causes of transfers to hemodialysis center - dates of and modes of contamination by SARS Cov2 - dates of implantation of PD catheters: this information is only available for centers participating in the optional catheter module, i.e. around 40% of patients.
- the inclusion period has been divided into semesters
- for each semester we have calculated
 - the number of incident patients during the semester and their profile
 - the number of patients prevalent in the semester (treated at least 1 day during the semester)
 - the number of prevalent patients at the end (last day) of each semester
 - the rate of PD dropout in the period compared to the number of prevalent patients (number of patients discharged in the period / number of patients treated at least 1 day in the period)
 - the death rate in each semester
 - the transfer rate in each semester
 - causes of death and transfers

The COVID-19 pandemic became evident during the first quarter of 2020. In France, as in most countries, PCR tests for systematic detection of contamination by SARS-Cov2 were not readily available at the start of 2020. To avoid the bias of a change in the number of PCR tests performed during the observation period, only patients with symptomatic Covid have been recorded in the RDPLF database. All centers were repeatedly informed not to record positive tests without clinical symptoms.

Software

Calculations were performed with R software version 4.0.2 (<https://www.r-project.org>)

Ethics and quality control

The RDPLF database is declared to the Commission Nationale de l'Informatique et des Libertés (CNIL) under approval number 542668. The data entered are subjected to a plausibility algorithm and a visual inspection by a trained secretary: in case of doubt, the centers are contacted. During this period of the epidemic all the centers were contacted by email or telephone to ask if they had infected patients and, if so, the suspected mode of contamination.

RESULTS

Almost 100% of patients in mainland France treated by PD are registered in the database. Completeness is much less with regard to home hemodialysis, of which only about 40% is followed by the RDPLF.

Concerning peritoneal dialysis in the French overseas territories, patients from New Caledonia and Reunion are included, but only one center in Polynesia; Martinique and Guadeloupe do not participate.

In Belgium the exhaustiveness is complete for the French-speaking part, but incomplete for the Flemish-speaking part of the country.

Finally, the profiles of patients treated by HHD and PD not only differ among themselves, but the profiles of PD patients also differ greatly from one country to another, as shown in Table I.

For the sake of homogeneity and for greater reliability, we have decided to analyze in detail essentially the patients treated by PD in mainland France. Nevertheless, a summary of the situation in French-speaking countries is shown in Table I: The percentage of symptomatic patients was lowest in HHD centers, lower in PD in metropolitan France which, on the other hand, has the highest rate of overall lethality, at 32.7%.

I - Global results

↓ *Table I. Overall results; only patients who have presented with clinically symptomatic Covid disease are recorded. The number of patients corresponds to all those who were treated between January 1, 2020 and June 30, 2021. Lethality is the ratio between the number of patients who died and the number of patients with clinically symptomatic Covid. The actual lethality is therefore lower since non-symptomatic positive subjects are not included.*

	Belgium HHD	France HHD	Belgium PD	France PD	Switzerland PD	Morocco PD	Tunisia PD
Nb centres included	8	52	20	170	3	6	7
Nb prevalent patients 01/2020-06/2021	163	388	556	4943	64	250	276
Gender (%F/%M)	34/66	29/71	36/64	40/60	43/57	49/51	45/55
Age (years)	48±19	52±14	62±17	67±17	63±15	44±17	42±16
% Diabetes	20,4	14,8	37	36	28	12	20
Covid Symptomatic	10 (6%)	19 (4.8%)	59 (10;6%)	333 (6.7%)	10 (15.6%)	27 (10.8%)	32 (11.5%)
Death rate of symptomatic patients	0 (0 %)	1 (5%)	5 (8.4 %)	109 (32.7 %)	1 (10%)	5 (18.5%)	5 (15.6%)

II - Mainland France - Peritoneal dialysis

Forty-six percent of patients treated on PD between January 2020 and June 2021 were assisted at home by a nurse (Table II). These are patients whose average age is about 15 years older than those who are independent. The percentage of symptomatic Covid in this group is almost twice as high as is their lethality. 70% of PD units had at least one patient with symptomatic Covid-19, whereas 30% of PD units were totally free of Covid-19.

↓ Table II. Profile and evolution of symptomatic Covid patients on peritoneal dialysis, according to autonomy, in metropolitan France from January 1, 2020 to June 30, 2021

	Autonomous	Assisted
Number of prevalent patients	2650	2250
Age (years)	60±15.3	75.9±11.5
Gender % F/M	34/66	41/49
Median Charlson	5	7
Number of symptomatic patients	125 (4.7%)	206 (9.1%)
Number and percentages of deaths from Covid-19 in symptomatic patients	21 (16.8%)	88 (42.7%)

The sources of contamination are based on a subjective assessment by the staff based on the contagion investigation carried out with the patient. The rate of contamination by an external visitor to the assisted patients includes nurses as well as other non-health professional visitors: it does not make it possible to incriminate nurses of assisted patients among external visitors who, anyway, remain in the minority compared to contamination by a member of the family or during a passage in a care institution (Table III).

↓ Table III. Sources probables de contaminations selon le degré d'autonomie

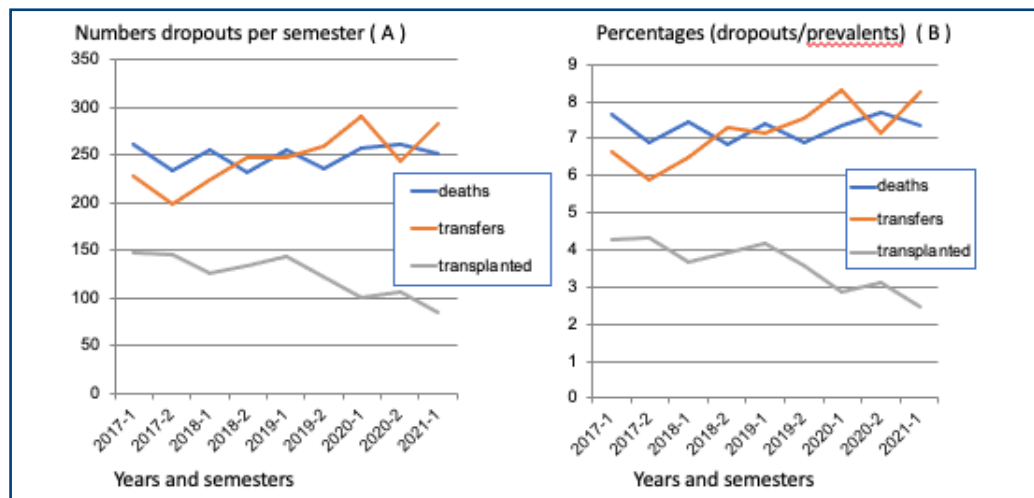
Supposed source of contamination	Total	Autonomous	Assisted
By a family member	26.2%	47.8%	33.6%
Following an hospitalisation	33%	31.9%	33.6%
By an external visitor	7.8%	5.7%	8.9%
Following a consultation	5.9%	5.7%	5.9%
Rest House	12.8%	2.8%	17.9%
Unknown or not described	14.3%	6.1%	0.1%

Evolution of the number of symptomatic Covid patients with PD in mainland France

The rate of patients with symptomatic Covid-19 peaked during the second half of 2020, reaching 4.7% (Table IV)

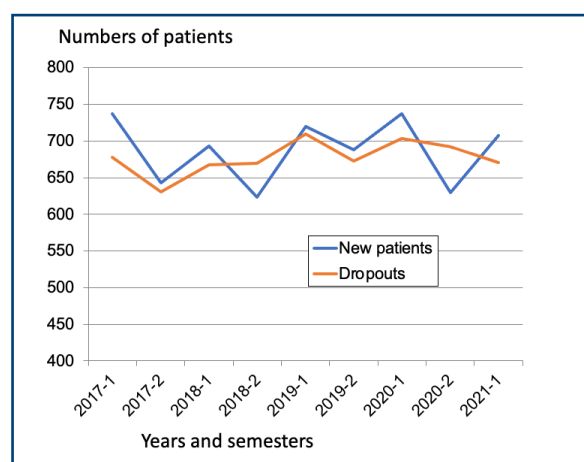
↓ Table IV. Evolution of Symptomatic Covid-19 patients on PD in France. The percentage is calculated based on the number of patients prevalent each semester. Lethality is the number of patients who died among those who presented with symptomatic Covid-19. In the first quarter of 2021 102 patients were symptomatic against 31 in the second trimester.

Semesters	Symptomatic Covid Patients	Lethality of Symptomatic Pts
2020-1	68 (1.9%)	24 (35%)
2020-2	162 (4.7%)	45 (28%)
2021-1	133 (3.8%)	39 (29%)



↑ Figure 1A. number of patients released from PD. Figure 1B. percentage compared to prevalent in each semester

The January 2020-June 2021 period essentially targets an increase in transfers from PD to in-center HD and a drastic decrease in the number of transplants (figures 1a and 1b). The average number of incident patients during the three semesters of the pandemic remains close to that of the three previous years with the maintenance of a significant seasonal variation, the number of new patients systematically decreasing each year during the second semester (figure 2).



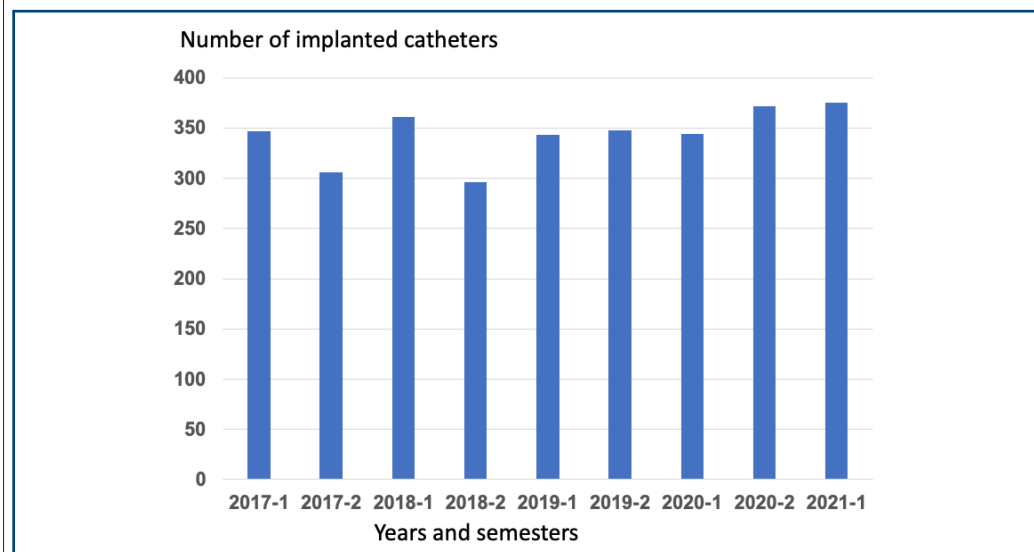
↑ Figure 2. Half-yearly change in the number of new patients and technique withdrawals

In total, the number of patients undergoing PD treatment fell sharply from the second half of 2020 (Table V)

↓ Table V. Evolution of the number of patients

Semester	Number of prevalent patients	number of patients present at end of semester
2017-1	3420	2740
2017-2	3385	2751
2018-1	3447	2775
2018-2	3398	2727
2019-1	3449	2737
2019-2	3428	2753
2020-1	3492	2780
2020-2	3409	2710
2021-1	3422	2705

Catheter implantations: The number of implanted catheters appears to increase over the period 2020-2021 (Figure 3), but the centers that record catheter placements in the RDPLF database represent only 40% of the centers included. The recording of catheter placements is done in a specific module which is optional.



↑ Figure 3. Number of catheters implanted per semester in the centers participating in the catheter module in metropolitan France, i.e. 72 centers out of 204 centers

Peritonitis: Table VI compares the rate of peritonitis in the three years preceding the pandemic period to that during the pandemic period. The ISPD recommends not to count the relapses and to present in fractional form in episode per year [3]; nevertheless the real number of episodes undergone by the patients being that usually used in the RDPLF we included the two modalities of presentations. There is a tendency towards a decrease in the rate of infections associated with a lower percentage of Gram positive cocci as causative germs; a more detailed analysis will be necessary to confirm if this trend is statistically significant.

↓ Table VI. Rate of peritonitis and percentage of germs before and during the pandemic

Periods	Peritonitis rate with relapses	Peritonitis rate without relapses	Gram positive Cocci
01/2017-01/2020	1 / 38.4 months or 0.31/year	1 / 40 months or 0.30 /year	46%
01/2020 -06/2021	1/ 40 months or 0.30/year	1 / 43 months or 0.28 /year	43%

DISCUSSION

Global incidence of Covid-19 in RDPLF centers

The main aim of this study was to see whether the incidence and prevalence of the number of patients treated with PD had changed during the first 3 semesters of the pandemic. Before following this evolution, a more global synthesis was carried out. The main results of the RDPLF centers by country have been reported in the results in Table I; due to the significant differences that exist from one country to another, both in terms of patient recruitment and management methods, any comparison should be made using adjustment methods that were outside the scope of this study. We have therefore chosen to analyze, in an only descriptive approach, the evolution of PD in metropolitan France only, which represents a relatively homogeneous area.

The high lethality linked to COVID-19 in symptomatic patients in mainland France is probably linked to the recruitment of patients in France and their comorbidities: in fact 46% of patients must be assisted at home. Table II shows in assisted patients a double percentage of symptomatic Covid patients, contemporaneous with a higher age and a higher Charlson comorbidity index, associated with a case fatality of 42.7% in this group compared to 16.8% in autonomous patients.

The sources of supposed contamination, as declared by the nurses, were attributed for more than a third to a stay in hospital, thus suggesting a nosocomial origin in approximately 33% of cases. (Table III). If a family member was held responsible in a third of cases in assisted patients, the origin of the contamination was attributed to him/her in 47% of cases when patients were autonomous. This highlights the importance of maintaining home barrier measures. Finally, staying in a nursing-home for the elderly represents a known risk. It should be noted that the pandemic period is not associated with an apparent change in the risk of peritoneal infection, the trend even being a decrease (Table VI). The fact that the percentage of peritonitis due to Gram positive cocci organisms is also decreasing is in favor of a reduction in hand-carried contamination: the much more prevalent use of hydro-alcoholic solutions since the beginning of the pandemic is probably the favorable causal factor of this.

Evolution of peritoneal dialysis in metropolitan France during the COVID-19 period

The aim of this study was to follow the six-monthly evolution of the incidence and prevalence of patients treated by PD during the Covid-19 pandemic in the centers participating in the RDPLF, by comparing with the previous three years.

The percentage of patients with symptomatic Covid was at its maximum at 4.7% during the second half of 2020 to decrease again during the first half of 2021 (Table IV) in parallel with the vaccination policy started in January of the same year which has led to a drastic drop in the

number of symptomatic contaminations.

The proportion of infected patients at home is probably lower because we did not ask the centers to register asymptomatic patients: systematic testing in 66 hemodialysis centers in Spain showed that 13% of patients with a positive PCR test were asymptomatic [4]

Variation of PD uptake

During the last three semesters, the variations in the number of new patients, from one semester to another, are in the averages of those observed in the quarters of the previous three years, a more significant decrease being observed during the second semester of 2020.

It is remarkable that there is a seasonality of PD uptake, marked by a drop in the number of patients starting PD during the second semester of each year, even before the pandemic period: the summer months correspond to holiday periods with certainly a decreased availability /of staff members who may delay home dialysis training during these periods.

The number of prevalent patients is also certainly decreasing due to an increase in deaths from Covid, but even more due to an increase, which one could consider as paradoxical, in the number of patients transferred to in-center HD during the pandemic period. This decrease in the number of prevalent patients is partly limited by a concomitant decrease in the number of transplants.

A greater availability of HD beds in a center combined with a staff less available for training and a lack of availability of operating theaters for the implantation of PD catheters may explain the absence of an increase in PD. In fact, a recent Belgian study, probably applicable to France, showed that the pandemic period was accompanied by an overall reduction in the management of chronic renal failure on replacement therapy [5], including kidney transplantation.

Figure 2 suggests that it is also possible that a certain number of patients already have a PD catheter in place but that the onset of PD is delayed: implantation of the catheter in most centers is done by a surgeon. One could think that the surgical act requires a shorter staff time than that necessary for home education and that the number of catheters placed is then greater than the number of patients trained. However, it is also possible that Figure 2 only represents a fraction of the centers, since all the centers do not participate in this optional module, and that throughout the territory the dynamics are not the same. The coming months will make it possible to invalidate or confirm this hypothesis.

The SARS-Cov2 epidemic has been the source of significant contamination in populations of dialysis patients around the world, but with highly variable rates from one country to another. During a roundtable of the Dialysis Outcomes and Practice Patterns Study (DOPPS) investigators, the most striking aspect was a very significant difference in risk from one region to another with in all cases and included risk of death, between 10 and 30% in dialysis patients, but less in those treated at home [6]. Across France, at the time of writing, the Biomedicine Agency estimated that 16% of dialysis patients, all methods combined, had a SARS-Cov2 infection and 20% of deaths were considered to be related to SARS-Cov2 [7]. By considering only symptomatic patients (therefore excluding those who had a search for Covid without clinical signs), we had recently found, in a joint study of the two registers REIN and RDPLF, a rate of 8% in patients treated in a dialysis unit. while those treated [8] at home with PD or HHD were symptomatic in 4.9% of cases during

the first nine months of 2020 [8]. The fact of limiting contacts in transport or in the hospital has favored in France the constitution of a network of nephrologists for the development of home HD, but the latter comes up against both organizational and financial constraints. [9]. Others have also recently mobilized to encourage all home techniques, both PD and HD [10]

An example of a program aimed at limiting the risks of contamination in dialysis patients by promoting PD at home is illustrated in Canada: a recent study in centers in British Columbia, following the recommendations of the Canadian Society of Nephrology, favored an increase incidence of PD, while the total number of incident dialysis patients has decreased. This was the result of transfers from HD to PD with 50% of PD catheters implanted at the bedside [11]

Evolution of incidence and prevalence

The absence of a larger prescription for home dialysis in France may therefore seem paradoxical in a pandemic period since theoretically it would reduce the risk of contamination in transport or in hospitals despite the barrier measures. It should be remembered that the nursing staff are in greater demand than in normal periods, sometimes re-deployed to areas in difficulty. Their availability to train new patients can be considerably reduced, either because of a lack of time or because of absences linked to colleagues who are themselves ill. However, training a patient at home requires several interviews, to calm his/her anxieties to repeat the explanations: this requires nursing time that it is not possible to have during periods of intense activity. France has a large network of private nurses who have long made it possible to take care of non-autonomous patients at home [12]; one could have imagined, in the event of a lack of personnel to train, to have an initial recourse to home assistance by a nurse. However, private nurses during the Covid period probably also have little time, overloaded with home visits to other patients who would otherwise have been hospitalized and there is, moreover, at the end of 2020 and the first half of 2021 a slight decrease in the percentage of patients assisted at home by private nurses.

Operating theaters were also less available during peak contamination; the placement of a PD catheter at the patient's bedside is not common practice or has been abandoned in previous years in our regions, unlike the Canadian experience already cited [11]: a start with in-center HD, possibly on a central catheter, can then be considered more practical and rapid and be done at the expense of a desire for further development towards home dialysis, PD or HHD. A hospital organization and different means from one country to another may explain the different management of patient flows and would merit a more precise analysis which cannot be carried out within the framework of this article.

However, the significant increase in HD transfers in France, for reasons other than a Covid disease, over the past few months is all the less an explanation as one would expect the reverse if one is based on a purely infectious reasoning. Other studies will certainly deserve to be carried out to elucidate this aspect, with a general purpose national registry of each country (such as REIN registry in France) which includes both in-center and home dialysis.

Limits

The main limitations of this study are based on the absence of stratification according to regions. We know that the indications for PD vary enormously from one region to another in France

[13]. It is possible that some regions have favored PD in order to prevent contamination while others, due to a lack of staff or due to a less suitable organization, have preferred to focus on the implementation of specific protocols and barrier measures in the in-center dialysis environment. Theoretically, a quarterly calculation would have been more precise, but risked losing sensitivity given the number of PD patients which remained low compared to the entire population of patients with renal insufficiency on dialysis. A comparison with the patients treated by in center HD is not possible with the only data of the RDPLF which concerns only the patients treated by PD. Likewise, the comparison with HHD must remain cautious as the RDPLF is only about 40% exhaustive for this type of treatment compared to PD, which is 100% exhaustive in the RDPLF.

CONCLUSIONS

The data recorded in the RDPLF show a lower risk of serious Covid infection with PD than what is known in in-center HD. In HHD patients the risk is even lower, but certainly influenced by their lower average age. Lethality in symptomatic patients justifies ensuring effective vaccination. An increase in the number of transfers from PD to in-center HD, mainly for causes other than Covid during the Covid-19 pandemic, while a consensus exists for better prevention of infection at home, may seem paradoxical in the current context and requires further studies that were not considered in this work.

CONFLICT OF INTEREST

The authors declare that they have no conflict of interest with this article.

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REVIEWING

This article, by invitation, has been reviewed on a non-anonymous basis by the members of the editorial board. We thank them for their constructive remarks.

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