Why less success of the peritoneal dialysis programmes in Europe?

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In this issue of NDT, an interesting editorial by Li and Szeto describes the success of the peritoneal dialysis (PD) programme in Hong Kong. The swift expansion of PD in Asia, and particularly in Hong Kong, is in sharp contrast with the tantalizing efforts of the PD community in Europe to prevent PD utilization rates from declining. Whereas in Hong Kong, the prevalence rates of PD are as high as 80%, in Europe, they are around a disappointing 15% [1]. The prevalence rates vary also substantially from country to country inside Europe, being <5% in Germany [2] and >30% in the United Kingdom [3]. Even within different regions in each country, there are striking differences: in Spain, PD prevalence ranges between 31% in Cantabria and 11% in Catalonia, and in Italy it ranges between 16% in Liguria and 2% in Campania [4]. All these facts make it clear that the penetration rate of PD in Europe is most likely not only attributable to differences in patient mix [5,6]. In this short comment, we will use the successful PD programme in Hong Kong as the benchmark to explore which factors do have an influence, and, more importantly, how they can be changed to improve PD utilization in Europe.

Would an increase in peritoneal dialysis utilisation in Europe offer advantages?

A first and important point is of course related to patient survival. As shown in the Hong Kong experience, survival rates on PD can be excellent, with 2-year survival rates, unadjusted for age, of 83%. In Europe, the gender- and age-adjusted 2- and 3-year survival rates are 79% and 68% respectively [1]. More importantly, these results are equal in patients started on PD or on HD. Hence, starting a patient on PD in Europe does not jeopardize his/her outcome. There is even evidence, to a large extent based on European data, that a 'PD first' [7] approach can further improve outcomes [8–11].

A second matter of consideration is related to cost. In Hong Kong, with its staggering real estate prices, a home-based treatment is definitely financially more interesting than the construction of haemodialysis centres. In Western Europe, the highest cost of renal replacement therapies is generated by labour cost [12,13], and the cost of the disposables is lower for patients on HD versus PD. As a final result, PD tends to be overall more economical than HD [12–15]. The cost difference even increases if not only the cost of the treatment by itself, but also the so-called spin-off is taken into account. This spin-off includes medical costs, like biochemistry, radiology, other technical investigations, etc., which are generated more in a patient who is under medical supervision three times a week, than in a patient at home. Also medication, like the use of erythropoiesis stimulating agents, and costs for transport are lower for PD [13]. It is thus not surprising that in countries where RRT is provided by the public sector, like in the United Kingdom and some Northern European countries, PD utilization is much higher than in those where most of the RRT provision is in private practice with fee-for-service reimbursement, like in Belgium [16] or Germany [2].

The economical advantage of PD, however, also has a tradeoff, which is reflected in the distribution of PD in different centres. The labour cost for PD is almost identical irrespective of whether 5 or 30 patients are enrolled, as the programme can be managed by two or three nurses. The cost per PD patient treated is thus much higher in starting centres with low patient numbers. In contrast, the 'real estate' cost of an HD unit is fixed, and the cost per capita goes up as more seats remain empty. This tends to create a vicious circle, whereby HD units try to fill their HD seats as much as
therapy. Take on rate: number of patients started each year on renal replacement therapy, expressed per million population. Living TX: patients with a living donor kidney transplant before the 90th day of renal replacement therapy, expressed per 10 million population.

There appears also to be an inverse relation between take-on rates on RRT, the mean age of the patient at start of RRT and PD utilisation (Figure 1). Countries with low PD utilisation also have a markedly lower percentage of transplants from living donors at Day 90 after start of RRT. It is, however, not clear what governs this relation, as there is also a higher take on rate in countries with fee-for-service RRT organization. It might be that these countries accept more comorbid and older patients, who are (mostly incorrectly) not considered to be no good candidates for home treatment. A more in-depth socio-economic analysis of this phenomenon is certainly warranted.

In contrast, the situation might be different in Eastern European countries, because they have to pay for imported PD fluids in foreign currency, and labour costs are relatively low. Although the cost per capita in these countries is higher for PD, theoretically, the growth of HD programmes could be hampered by the need to invest substantial amounts in the expansion of HD programmes, where the main part of the investment (buildings, machines, water treatment systems) needs to be done at the start, whereas, in contrast, in a PD programme, costs need only be paid at the moment they are made. It is thus not surprising that in many Eastern European countries, dialysis companies have filled this gap by ‘leasing’ dialysis units to private ‘dialysis providers’, so that costs for HD are written off over longer time periods. The best way to make PD financially more attractive in these countries would be to create local production facilities for PD solutions, just as has been done in some countries in Latin America and Asia. Of course, dialysis companies will only be interested in such investments if the PD market would grow. It is interesting to compare the impact of privatization of the RRT sector on the utilization of PD in Europe with the declining PD numbers in the USA, at the same time as the expansion of large multicentre industrial dialysis providers. According to a recent paper, these observations are ‘associated but not causative [17], and the authors argue that the decreasing utilization merely reflects the diminished enthusiasm of nephrologists for home therapies. They also point to the lack of appropriate education of both physicians and patients in these modalities as a potential culprit.

In general, it appears that macro- rather than micro-economical issues determine the cost distribution of the different modalities in Europe. However, as patient free choice concerning modality is important, mechanisms should be incorporated to make sure that all patients really do get free choice as described by Li and Szeto, and that modality presentation is not coloured by local financial motives. Although the success of PD in Hong Kong is very impressive, it has to be stressed that patient free choice does not really exist in this programme. We would not advocate that such a system be copied in Europe, as free patient choice should be the cornerstone of integrated care. Having that in mind however, it is clear that, besides survival and economic advantages, having a flourishing PD programme might become necessary in Europe for other reasons: the increasing number of patients and the decreasing availability of skilled (dialysis) nurses. We will have to search for an ‘optimal’ modality selection strategy for Europe, and from the above it is clear that political decisions will play a major role in this process.

### Non-organisational reasons for the low incidence of patients starting on PD in Europe

Besides the organisational issues discussed above, the reasons for not starting on PD as first line renal replacement therapy can be classified into two categories: patients do not want it and physicians do not want it.

However, there is a clear overlap between the two groups, as patients in almost all cases base their opinion on the information they get from the physicians and nurses who treat them. In addition, it is quite evident that ‘hidden persuaders’ can colour the way information is provided. It has already been demonstrated before that the majority of patients on HD did not recall ever having had information on home-based therapies [18], and that, when patients do get an informed choice, the incidence of patients starting PD can be substantially increased [19–21]. Patient satisfaction also seems to be higher on PD [22]. All these facts make it possible, resulting in a low PD utilization, making PD less profitable and creating more of an incentive for expanding the HD programme. In Italy, it has been demonstrated that there is an inverse relation between the percentage of PD patients and the number of patients per available HD seats in the centre [4]. As a result, it is quite difficult to create momentum in ‘HD-minded’ centres to start an active and expanding PD programme, and increasing reimbursement for PD will only have a limited impact, if it is not accompanied by a strategy to decrease HD seat availability. In Germany, there has been an explosive increase in satellite haemodialysis units, resulting in a patient/HD seat ratio far below 3, with, as a consequence, a decrease in PD numbers, despite equal weekly reimbursement for the two modalities. There appears also to be an inverse relation between take-on rates on RRT, the mean age of the patient at start of RRT and PD utilisation (Figure 1). Countries with low PD utilisation also have a markedly lower percentage of transplants from living donors at Day 90 after start of RRT. It is, however, not clear what governs this relation, as there is also a higher take on rate in countries with fee-for-service RRT organization. It might be that these countries accept more comorbid and older patients, who are (mostly incorrectly) not considered to be no good candidates for home treatment. A more in-depth socio-economic analysis of this phenomenon is certainly warranted.

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unlikely that the low incidence of PD patients in Europe is due to the fact that patients do not want this modality.

Doctors and nurses have, over time, developed a somewhat biased vision towards PD [23]. Although several surveys indicate that nephrologists agree that centre HD is over-used, it is also apparent that they identify a lot of factors as being contra-indications for PD [23]. Most of these appear as rather ‘relative’ contra-indications, like obesity, or abdominal pain. Some other factors like lack of personal hygiene, poor visual acuity, or lack of social support can easily be overcome by more intense and individualized training, as is demonstrated in the successful French-assisted care programme [24]. It might well be that lack of experience and incorrect interpretation of the literature make physicians take the ‘safe’ option to have the patient under their own close supervision in a centre-based dialysis facility, rather than having the courage to give responsibility to the patient. It is very unlikely that an unconfident nephrologist can persuade a patient to take care of his/her own treatment and start on PD. Again, there is a vicious circle, as the decreasing number of PD patients reduces exposure of younger nephrologists to training in PD; it makes them less confident about the method, and therefore less likely that they will institute the modality themselves [5]. Training in and exposure to PD should be a major concern if one wants to increase PD utilization rates in Europe.

Factors influencing technique success

On top of the low incidence rates for PD (on average around 21%) in Europe, it is apparent that prevalence rates are even lower (15%), suggesting a high technique failure rate.

It is tempting to speculate that lower technique success (patients being alive and on PD) is due to more active transplant programmes. From the ERA/EDTA registry data [1], it is suggested that those countries with higher PD prevalence have more transplanted patients at Day 90, but there is no difference in total percentage of transplanted patients of the whole RRT population, so the impact of (mostly younger and less comorbid) patients ‘disappearing’ from PD to TX as an explanation for low technique success on PD in Europe seems to be less likely.

The peritonitis rates reported in Hong Kong, as in most other Asian centres, are quite low. In most European centres, reported peritonitis rates are higher, but still in an acceptable range, around 1 every 30 patient-months. Peritonitis is stated as the cause of transfer to HD in 25% of patients [24, 25]. Taken together, it is unlikely that the difference in technique success of PD between Hong Kong and Europe could be explained by differences in peritonitis rates.

A cause of transfer that has gained substantial importance, especially in the era between the publication of the first K/DOQI guidelines and the ADEMEX trial, is the perceived danger of ‘inadequate dialysis’ as measured with small solute clearances. It is conceivable that in (large and heavy) European patients, adequacy targets are more difficult to obtain than in smaller Asian patients. It is of note that a substantial part of PD patients in Hong Kong are treated with 3 exchanges/day, whereas in Europe, more complex and high volume APD regimes seem to be increasingly popular. Unfortunately, after publication of ADEMEX [26], most European nephrologists seem not to have made the ‘mental click’ to accept that small solute clearance is not all that important, and that asymptomatic patients can be maintained on PD even if Kt/Vurea targets are not obtained. Again, a lack of sufficient training on how to achieve ‘adequate’ PD might be the underlying cause. The exposure of European patients to larger volumes of PD solutions might also contribute to a faster degeneration of the peritoneal membrane, leading to a more rapid technique failure.

There is a clear relation between centre size and patient technique success in PD [27]. In Europe, most centres have only a limited number of patients on PD, and therefore, it can be estimated that technique survival on PD is shortened. In addition, as HD seats are readily available, transferring the patient from PD to HD is, for an unconfident physician, often the safest and most convenient option to solve a PD-related problem, whereas in experienced hands even ‘problematic’ PD patients, like anuric patients [28], or patients with relatively mild ultrafiltration failure [29], can be successfully maintained on the PD programme. Parenthetically, it is noteworthy that most people consider the ‘technique success’ of HD to be around 100%, which is of course a spurious reasoning, as HD failure results in death of the patient, as few other options are available. Again, a more in-depth training of nephrologists in PD seems to be a conditio sine qua non, to increase the confidence of physicians with this modality.

Conclusion

The successful PD programme in Hong Kong should convince the unbiased reader of the potential of PD as a viable option for RRT. Also in Europe, there is evidence that the option of free and motivated patient choice between home therapies and HD can improve patient survival and quality of care. In order to enhance PD utilisation in Europe, macro-economical and macro-organizational modifications, rather than a mere increase of reimbursement, are warranted. In addition, there is an urgent and compelling need to enhance training in the education of and exposure to clinical PD for young trainees in nephrology.

Conflict of interest statement. None declared.

(See related article by Philip Kam-Tao Li and Cheuk-Chun Szeto. Success of the peritoneal dialysis programme in Hong Kong. Nephrol Dial Transplant 2008; 23: 1475–1478.)

References

All high-flux membranes are equal but some high-flux membranes are less equal than others

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The progression of renal failure is characterized by the accumulation of a host of compounds [1], which, under normal conditions, are excreted or metabolized by the healthy kidneys. Many of these compounds affect several organ systems, resulting in the uraemic syndrome.

Once this retention has progressed to disabling or life-threatening complications, quality of life and survival can only be maintained by removing retention products by dialysis or transplantation. Over time, it became clear that many of the disabling retention solutes (toxins) are difficult to remove by standard dialysis, as they are either protein bound and/or characterized by a high molecular weight (middle molecules) [2,3].