Hemodialysis in Patients Over 80 Years

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Key Words

Hemodialysis · Very elderly · Survival · Predialysis nephrological care

Abstract

Background: In Germany, every fifth patient starting dialysis is now 80 years of age or older. The question that is currently relevant is not whether we have to treat patients who are older than 80. Rather the question now is how to treat this elderly group of patients. **Methods:** Single centre data of all dialysis patients aged over 80 were analyzed with regard to survival, social circumstances, vascular access, and pre-dialysis nephrology care. **Results:** Between 2001 and 2012, 76 patients over 80 years started chronic ambulatory hemodialysis treatment. One-year survival was 87%, 3-year survival 52%, 5-year survival 27% and 10-year survival 9%. Patients (n = 55) with more than 3 months of nephrological care prior to dialysis (3–161 months, median 31 months) survived significantly longer than patients (n = 21) having had less than 3 months contact with nephrologists. On 31st December 2012 there were 38 patients aged ≥80 (median age 84, 80–95 years) in the chronic hemodialysis program accounting for 19% of all dialysis patients of this center. Thirty patients (79%) had been in long-term nephrological care prior to dialysis initiation (3–161 months, median 45 months). Thirty one patients (82%) started the first dialysis treatment with a functioning shunt access. **Conclusion:** Long-term pre-dialysis nephrology care is of most importance for successful dialysis treatment in the elderly, especially in octogenarians

and nonagenarians. It enables the early establishment of functioning vascular access and careful scheduling of first dialysis treatment and increases survival. The long-term use of catheters can be avoided in almost all patients above the age of 80.

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Introduction

In developed countries, the life span of the population is increasing. As a consequence, a higher prevalence of diabetes, hypertension and cardiovascular diseases is leading to an increase in the prevalence of chronic kidney diseases. More and more very elderly patients reach end-stage renal disease (ESRD) and require dialysis. In this cohort, the incidence and prevalence of dialysis patients are growing more rapidly than what it is among younger age groups [1–3].

Due to a heavy burden of comorbidities in the very elderly, nephrologists face a lot of challenges in making a decision to start dialysis or offer maximum conservative management [4]. Considering German standard care, this issue in general, seems to be decided. In 2012, the median age of incident hemodialysis patients was 72 years, 38.4% of patients were 75 years or older, and one fifth of all incident patients was 80 years or older [3].

In the same year in Japan, 22% of all dialysis patients were 80 years or older, and the number seems to be on the increase every single year [5].

Now we have to answer the question of how we should treat these very elderly dialysis patients and which factors influence the overall quality of ESRD care in the elderly [6].

Dialysis data, especially in the age group of octogenarians and nonagenarians, are rare [5, 7, 8]. Therefore, we analyzed the outcomes of our patients in this age group, particularly going by the influence of pre-ESRD care.

Patients and Methods

First, all patients aged ≥ 80 who started ambulant chronic hemodialysis treatment in our center between 1st January 2001 and 31st December 2012, were identified and their survival data were evaluated.

Second, clinical and social data of all patients aged ≥ 80 who underwent chronic hemodialysis treatment on 31st December 2012 in a single center were analyzed, especially areas such as vascular access, social status and prior conservative nephrology care were studied.

According to the German quality guidelines, all patients were dialyzed three times per week for the duration of 4–5 h. At initiation of dialysis treatment, time of the first sessions was usually reduced to 2 h. First uremic symptoms or fluid overload were decisive for starting dialysis, not a defined GFR level.

This hemodialysis unit is located in the southeast of Berlin covering a population of 150,000 inhabitants. It is associated with a local hospital and there is a comprehensive care network with the general practitioners in this area. Generally all patients with severe renal diseases especially with CKD 3–4 are referred to our outpatient department.

The patients and their families are informed about ESRD and renal replacement therapy in detail. Patients are invited to visit the dialysis unit and to talk to the dialysis patients already under treatment in this unit. If the patient decides to commence chronic dialysis treatment, a vascular surgeon is involved and the vascular access is created in time. We aim to carry out the first dialysis using an AV-shunt in an outpatient setting.

All statistical analyses were performed with SPSS Statistics 22 (SPSS Inc., Chicago, Ill., USA). Non-normally distributed data are presented as medians and ranges. Survival was calculated using the Kaplan-Meier method. Significance was evaluated using the log-rank test.

Results

Between 1st January 2001 and 31st December 2012, 76 patients aged 80 years or older commenced chronic ambulatory hemodialysis therapy (32 female and 44 male). The median age at first dialysis treatment was 82 (80–91 years). One-year survival was 87%, 3-year survival 52% and 10-year survival 9%.

Fig. 1. Survival (Kaplan-Meier) of 76 patients commenced hemodialysis in age ≥ 80 . Solid line: patients with more than 3 months pre-dialysis nephrology care ($n = 55$). Dashed line: patients with less than 3 months nephrologist contact ($n = 21$).

Figure 1 shows survival data of the 55 patients (72%) who had at least 3 months pre-dialysis nephrology care compared to that of the 21 patients with less than 3 months care. For those 55 patients with more than 3 months, the median pre-dialysis nephrology care duration was 31 months (3–161), and in 49 patients (64%) it was longer than one year. In 14 patients (18%), dialysis initiation occurred following an emergency referral to a hospital. Cumulative survival rates differed significantly between both groups ($p = 0.003$). Five-year survival in patients with more than 3 months of nephrological care prior to dialysis was 37%, and 10-year survival was 18%. In contrast, all patients having had less than 3 months contact with nephrologists died within 7 years. Both groups did not differ significantly concerning age, gender, and diabetics. In the patient group with pre-dialysis nephrology care, there were slightly more insulin-dependent diabetics (45 vs. 38%). Other comorbidities and their severity at the beginning of dialysis are not documented clearly or are incompletely recorded, as are data on vascular access in the first dialysis session. Although most patients ($n = 47$) with pre-dialysis nephrology care commenced dialysis treatment with an AV-access (none temporary catheter, 3 permanent catheters, in 5 patients access was unsatisfactory recorded) most patients with a first dialysis session under emergency conditions started

Table 1. Characteristics of prevalent patients 80 years of age or older

Characteristic	n = 38
Age (years)	84 (80–94)
Female (%)	18 (47)
Time on hemodialysis (months)	50 (1–155)
Renal disease (%)	
Vascular nephropathy	18 (47)
Diabetic nephropathy	6 (16)
Glomerulonephritis/vasculitis	6 (16)
Interstitial nephritis/pyelonephritis	5 (13)
Other	3 (8)
Comorbidities (%)	
Diabetes	19 (50)
Heart disease	21 (55)
Cancer	12 (32)
Peripheral vascular disease	9 (24)
Cerebrovascular disease	5 (13)
Vascular access (%)	
Fistula	31 (82)
Graft	3 (8)
Catheter	4 (10)

Heart disease: myocardial infarct, coronary intervention, implanted pacemaker or defibrillator, congestive heart failure. Peripheral vascular disease: with intervention. Cerebrovascular disease: stroke, vascular intervention.

Table 2. Pre-dialysis nephrology care and circumstances of dialysis commencement

	n = 38 (%)
Early referral (>3 months)	
median 45 months (3–161 months)	30 (79)
Late referral (<3 months)	3 (8)
Emergency referral to hospital	5 (13)
Vascular access in the first dialysis session	
Fistula	30 (79)
Graft	1 (3)
Permanent catheter	4 (10)
Temporary catheter	3 (8)
Dialysis commencement in the first dialysis session	
Outpatient setting	24 (63)
Hospital setting	14 (37)

with a temporary catheter (n = 9) in the first dialysis session (one AV-access, none permanent catheter, in 11 patients access was unsatisfactory recorded).

Thirty-eight patients aged ≥ 80 (18 female and 20 male) underwent hemodialysis treatment on 31st December 2012, corresponding to 19% of all dialysis patients at our

center. The median age was 84 (80–94 years). In 28 patients, hemodialysis treatment had started after the 80th year. Data are shown in table 1.

The duration of pre-dialysis nephrology care and the circumstances of dialysis initiation are given in table 2.

The respective vascular access had been used for 43 months (1–155 months). Ten access complications had occurred in 8 patients; in 4 cases, a new vascular access had to be established (3 grafts, 1 catheter). Consequently, one access had been lost in 39 patient years on dialysis. Compared to all in-center patients (one loss in 37 patient years) the elderly suffered less access failures overall.

Thirty-three patients (87%) lived at home (9 patients single, 24 with spouse), 2 patients lived with relatives and 3 patients were nursing home residents.

Discussion

The survival of our patients beyond age 80 is similar or even better in comparison to other single-center studies of recent years [5, 8, 9]. Single-center data usually show better results than registry data, which represent all patients. Selection bias may be possible in every single center study. In our center, the mean age (74 years) of patients on dialysis and the proportion over 80 years (one fifth) is greater than the German average [3]. So, concerning Germany, it can be assumed that there is no considerable selection bias. As optimum health maintenance definitely contributes to more autonomous life style, especially in the elderly, the homogenous composition of our cohort regarding life style might as well be the effect than the cause.

In the first years of dialysis treatment, the survival of our patients over the age of 80 was better than the survival of British dialysis patients over 65 years [10] and the survival of the whole US dialysis population over all age groups [1]. Survival rates as observed after 5 years of early referred patients have never been described in this age group. In our opinion, the early and intensive nephrology pre-dialysis care is the key to a successful dialysis treatment in octogenarians and nonagenarians. A very recent study from Slovenian national registry (170 patients ≥ 80 years) confirms these results [7]. Gubensek et al. found in a multivariate analysis that only age and pre-dialysis nephrology care were independent predictors of survival.

Late referral is a well-known significant independent risk factor influencing dialysis patient's outcomes [7, 11–14]. In a reverse approach, Jungers et al. showed that longer duration of regular nephrological care in the pre-di-

alysis period is associated with better long-term survival on dialysis. Cardiovascular deaths, especially, are reduced in patients with pre-dialysis nephrology care duration of more than 3 years [11], indicating an influence of efficient nephrology care on comorbidities. The intensity of pre-dialysis nephrology care also influences the outcome. A study with more than 100,000 patients showed a reduction in first-year mortality after dialysis initiation with increased frequency of pre-dialysis nephrology visits [12].

Schwenger et al. found that late referral occurred more frequently in patients aged over 75 compared to younger patients. They concluded that age is an independent risk factor for late referral [13]. However, current data of large registers do not confirm this finding. In the US renal data system 40.3% of incident patients over 75 years did not have pre-ESRD nephrology care compared to 42.1% of all incident patients of the register [1]. In the UK patients aged 75 to 84 had nearly 3 years of pre-ESRD care, thus accounting for even the longest duration of all age groups [15]. Over two-thirds of British dialysis patients in all age groups had been seen by nephrologists over a year before they needed to start dialysis treatment. Late presentation (<90 days) dropped from 23.9% in 2006 to 19.3% in 2012 [15]. Our data in patients over 80 years are well-comparable with this British practice.

Duration and intensity of pre-dialysis nephrology care depend on referral practice and show considerable regional differences especially when concerning the elderly [1, 5, 7, 8, 11–15]. This is mainly due to the varying judgment of referring primary care physicians and non-nephrology specialists [16] who stress on the importance of local networks. Our results certainly cannot be extrapolated altogether. But greater efforts to develop or improve local nephrology care structure are possible everywhere. Educational programs about kidney diseases and renal replacement therapy are needed to improve the knowledge of primary care physicians. Guidelines for referral to nephrology care should be made known to all general practitioners.

Maximum conservative management (MCM) may be an alternative in very frail elderly patients with a heavy burden of comorbidities. In a study of Carson et al. [4], 29 of 202 patients decided to go ahead with MCM. Hemodialysis patients spent almost half of the days in the dialysis unit or in hospital, but there were more hospital-free days in dialysis patients than in the MCM patients. However, we can find out if a dialysis day is actually a burden. For many elderly single patients, this sometimes

becomes a social event! But we cannot present any data to confirm this matter. In Germany, standard care with a mean age of incident hemodialysis patients of 72 [3] in general seems to be decided in favor of dialysis treatment.

The type of vascular access is highly dependent on an early referral [11, 13, 14, 17]. In a recent US Renal Data System analysis of over 115,000 patients aged ≥ 67 , a catheter as an initial vascular access was associated with increased mortality compared to an AV-fistula [17]. In fact, 78.4% of all patients started dialysis treatment with a catheter. There was also a significant association between the duration of pre-dialysis nephrology care and type of initial vascular access.

Zingerman et al. reported an excellent 1-, 2-, and 5-year survival probability of 80, 65 and 20%, respectively in patients aged 85 years and older at the initiation of hemodialysis. The use of catheters was significantly associated with increased mortality. Twenty-two of 29 patients had been seen regularly in the pre-dialysis clinic and these patients started dialysis less often with a catheter [18].

In a DOPPS-study [19], there were substantial regional differences concerning the type of vascular access in patients aged over 75. Permanent central venous catheters were used in North America in 31.8% and in Europe in 23.1% of these patients, but in only 6.9% of patients in Australia and New Zealand. In Japan, permanent catheters were not applied at all. Concomitantly, Japanese patients had the best survival rates. In comparison to the younger dialysis population in the elderly, there is a more frequent use of catheters [19], an access type with an increased risk of death [20]. In our octogenarians and nonagenarians, the proportion of AV-fistulas or grafts was similar to that in younger patients; this might have contributed to the beneficial survival rates. For some reason, it is commonly believed that in the elderly, problems with AV-shunts occur more frequently. But this assumption lacks evidence. According to our data patients over 80 years tend to have even slightly less shunt complications than younger patients. Neither did other authors find differences in the elderly [21, 22], and especially in patients aged over 80 years [23, 24]. Nadeau-Fredette et al. reported a higher rate of primary AV-fistula failure in patients over 80 years. But the subsequent primary patency was similar [25]. Swindlehurst et al. found that grafts in the elderly had a higher cumulative patency compared to patients aged below 65 [22]. Early and close cooperation with vascular surgeons can help avoiding catheters. Japan may serve as an example here.

In conclusion, long-term pre-dialysis nephrology care is of utmost importance for successful dialysis treatment in the elderly. It might at least partially delay the progression of renal disease and comorbidities. Early establishment of a functioning vascular access and careful scheduling of first dialysis treatment reduce complications and increase survival. The long-term use of catheters can be avoided in almost all patients over 80 years.

In contrast to other factors, the quality of pre-dialysis nephrology care is well-modifiable. Therefore, the development or improvement of local nephrology care structure is necessary.

Disclosure Statement

The authors have no conflicts of interest to disclose.

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