



ORIGINAL ARTICLE

Attitudes of nephrologists towards assisted home dialysis in Germany

Wolfgang Pommer¹, Steffen Wagner², Dominik Müller³ and Julia Thumfart³¹Kuratorium für Dialyse und Nierentransplantation (KfH), Neu-Isenburg, Germany, ²INWT Statistics, Berlin, Germany and ³Department of Pediatric Nephrology, Charité, Berlin, GermanyCorrespondence and offprint requests to: Wolfgang Pommer; E-mail: wolfgang.pommer@kfh-dialyse.de

Abstract

Background: Assisted home dialysis (AHD) is an option to combine the benefits of home dialysis therapy with the needs of dialysis patients who are unable to perform self-treatment at home. While this method is growing in many countries worldwide, no data so far are reported for Germany.

Methods: A survey was designed to identify the barriers to the implementation of AHD with the focus on attitudes and beliefs concerning AHD. The survey was sent to all 2060 members of the Germany Society of Nephrology.

Results: The response rate was 14% of nephrologists ($n = 286$), representing 24% of all German centres. AHD was regarded as a highly meaningful option (>90% of all responding nephrologists). Fifty-five percent of the centres practice AHD (preferred peritoneal dialysis). The number of treated patients on AHD was small (77% of the centres treat no more than 10 patients). The nephrologists in centres that performed AHD were of older age and the number of dialysis patients treated in these centres was greater. AHD was offered in 57% of centres at chronic kidney disease Stage 4. Inadequate conventional dialysis and patient's request were reasons for choosing AHD. Barriers for offering AHD were lack of reimbursement, shortage of staff, lack of expertise and lack of team motivation.

Conclusions: In the view of German nephrologists, AHD is a meaningful method to provide home dialysis care. Inadequate funding and a lack of qualified staff were identified as severe barriers to implementation of AHD. To overcome these barriers and to achieve a higher penetration of AHD, dedicated actions have to be considered. Further studies are needed to prove the AHD concept with regard to outcome effects and cost efficacy.

Key words: assisted home dialysis, haemodialysis, outcome, peritoneal dialysis, reimbursement

Introduction

Home dialysis options worldwide are increasingly used, supported by the reported benefits of extended treatment schedules and patients' well-being in self-care treatment [1]. Home dialysis is suggested to be a care system rather than a treatment [2]. Critical aspects in this system are patient information and decision making, expertise and motivation of the team of the

caregivers and funding policy [2–5]. Taking into account the worldwide growth of the ageing population, older patients should not be excluded from the benefits of home dialysis [6–9]. Older chronic kidney disease (CKD) patients tend to present later for dialysis, have a higher number of comorbid conditions and are at higher risk of loss of cognitive function and most of them are dependent on professional care at home or in senior

Received: May 15, 2017. Editorial decision: August 28, 2017

© The Author 2017. Published by Oxford University Press on behalf of ERA-EDTA.

This is an Open Access article distributed under the terms of the Creative Commons Attribution Non-Commercial License (<http://creativecommons.org/licenses/by-nc/4.0/>), which permits non-commercial re-use, distribution, and reproduction in any medium, provided the original work is properly cited. For commercial re-use, please contact journals.permissions@oup.com

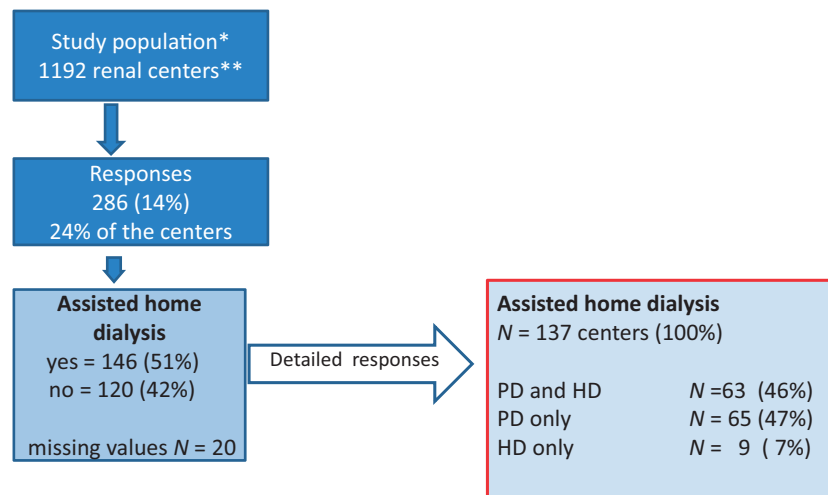


Fig. 1. Overview of the study population and responses. *, Members of the German Society of Nephrology (DGfN) in April 2016 ($N = 2060$). **, ISN 2014 (KH4L-Report) [20].

or nursing centres. These aspects are viewed by renal professionals as barriers to home dialysis treatment [9].

Assisted home dialysis (AHD) overcomes these barriers. AHD is suitable for (elderly) patients who are unable to perform treatment themselves [10]. This includes assistance by visiting caregivers (nurses and others) for several tasks to be performed at home [10]. To start and continue AHD with peritoneal dialysis (PD) is suggested to be a method of choice for the ageing dialysis population and provides a high quality of life [11–13]. In some cases, AHD closes the gap between active treatment to prolong life and the stage of palliative care where the main focus of treatment is best quality of life [12–14]. Remaining in the home setting is highly desired in the view of many affected patients [12].

AHD—PD and haemodialysis (HD)—has been initiated in many countries in Europe, the US, Canada and Australia [12]. In Germany, so far experience is limited and rarely published, although the age of the dialysis population has been continuously growing for 20 years, reaching a median age of 71 years in patients who started dialysis in 2014 [15]. While in some countries AHD is regularly reimbursed by public funding [16], in Germany, dialysis costs are reimbursed by a fixed payment per week with a small surcharge for PD and HD but no additional payment for professional assistance. For single cases where AHD is applied, special agreements need to be approved by the patient's health care insurance.

Taking into account the financial obstacle and the lack of current data in Germany, this survey was designed to explore the current practice of AHD in renal care, nephrologists' attitudes and presumed barriers for implementing AHD in routine dialysis care.

Materials and methods

Survey

The survey was developed with three sections adapted from the survey of Jayanti *et al.* [17]. The survey contains six questions on the structure of the dialysis center (Part 1), six questions on current practice patterns (Part 2) and two questions on presumed barriers to the implementation of AHD (Part 3). An option of additional remarks at the end of the questionnaire was provided. Parts 2 and 3 contained multiple choice questions with single or multiple answer options.

The survey was developed in LimeSurvey [18] and mailed to all 2060 members of the German Society of Nephrology (DGfN). Survey participation was voluntary and respondents remained anonymous. In the invitation letter, the members of the society were asked to report on the current details and practice of their individual centre. Ethical approval and formal consensus process was not considered. Survey responses were obtained between 13 April and 30 May 2016. Two reminders were sent to encourage participation.

Statistical analysis

All statistical analyses were performed using R statistical software (version 3.3.1; R Project for Statistical Computing, Vienna, Austria) [19]. Descriptive univariate analysis was performed for each question of the survey. All results were rounded off to the nearest whole number.

Regarding bivariate statistics, the dependence between answers to a pair of questions was tested using Fisher's exact test for count data. Tests were performed investigating the dependence between answers of centres offering or not offering AHD and for the different modalities of AHD (PD and HD).

Results

Demographics of the centres

A total of 286 members of the 2060 contacted members answered the survey (14%). Of the 1192 contacted centres in Germany [20], 286 (24%) answered the survey (Figure 1). Response rates for the different questions were between 255 (89%) and 278 (97%) answers.

Twenty-three percent of respondents were <45 years of age, 44% between 45 and 54 years and 33% were ≥ 55 years (Table 1). Sixteen percent of respondents have <50 patients in their overall dialysis program, 45% between 51 and 120 patients and 40% had >120 patients (Table 1).

Clinical practice patterns

Answers from all respondent centres provided details on assistance options as follows (multiple answers possible): preparation of dialysis machines ($n = 150$), connection/disconnection of the dialysis treatment ($n = 218$), documentation of treatment or

patient data such as blood pressure and body weight ($n = 104$), surveillance of treatment (i.e. blood pressure and ultrafiltration control) and at home ($n = 97$).

In 137 centres that practiced AHD treatment, 46% offered both PD and HD, 47% PD only and 7% HD only (Table 2). Currently 42% of the centres treated 1–10 patients with AHD, 13% treated >10 patients and 45% treated no patients.

In the view of the respondents ($n = 137$), AHD should be offered to all patients complaining of the high burden of home

dialysis (22%), at the request of the patient (33%) and to all home-treated patients with impaired capabilities (75%) [multiple answers possible (Table 2)].

AHD was routinely offered to all patients in CKD Stage 4 (57%), in patients who already undergo dialysis treatment (13%), in 15% if conventional dialysis is insufficient and in 14% when patients specifically asked for AHD treatment (Table 2).

Nephrologists' beliefs and attitudes towards assisted dialysis

AHD is suggested to be meaningful by 96% of the respondents. PD is the preferred method (93%). Nine (4%) respondents believed that AHD makes no sense at all (Table 1).

Most of the respondents (67%) work in an organization where new ideas are well appreciated (Table 3). Resistance to changing established procedures or rules that limit the consideration of new possibilities were less frequent (11% and 20%) (Table 3).

Forty percent of respondents try to convince their patients to choose the dialysis modality that offers the best option, even if the patients are doubtful about it. Fifty-two percent do this sometimes, 6% never try to persuade their patients and 2% are not sure about it.

Barriers to assisted dialysis

The ranking of barriers reported from centres ($N = 255$) was lack of funding [$n = 170$ (67%)], shortage of staff [$n = 133$ (52%)], lack of expertise or experience [$n = 71$ (28%)], lack of team motivation [$n = 66$ (26%)] and none of these [$n = 37$ (15%)] (Figure 2) (multiple answers possible).

Table 1. Features of the study population

Items	Number of responding centres (%)
Physician age (years)	267 (100)
<45	62 (23)
45–54	123 (44)
>55	82 (33)
Centre size (number of patients)	275 (100)
<51	44 (16)
51–120	122 (45)
>120	109 (40)
Patients treated by AHD	266 (100)
None	120 (45)
1–10	113 (42)
>10	33 (13)
Question ^a : '... which method is meaningful?'	256 (100)
PD	239 (93)
HD	175 (68)
None	9 (4)

^aMultiple answers possible.

Table 2. Comparison of responses of centres that offer AHD by different modalities

Characteristic	HD + PD	HD only	PD only	P-value
Number of centres ($n = 137$)	63 (46%)	9 (7%)	65 (47%)	
Assistance useful in				
Preparing dialysis machines	34	4	42	n.s.
Connecting to device	54	8	59	n.s.
Documentation of treatment parameters	20	1	33	0.02
Surveillance at home	27	2	24	n.s.
Financial disadvantages to take on more patients				n.s.
Yes	22	4	16	
No	24	1	24	
Not sure	17	4	25	
Barriers				
Lack of adequate funding	36	8	44	0.02
Lack of professional staff	25	4	42	n.s.
Lack of expertise	7	1	23	0.02
Lack of motivation	14	1	17	n.s.
None of them	20	0	6	<0.01
Time of offering AHD				n.s.
CKD Stage 4 routinely	37	3	38	
At stage of dialysis	8	1	9	
If dialysis is inadequate using conventional dialysis	12	3	6	
On patient's request at any time	6	2	11	
Offering of AHD option				n.s.
To all patients	19	1	10	
Patients who request AHD	21	3	21	
All patients with impaired intellectual or physical capacity	45	7	51	

n.s., not significant.

The most important barriers to expanding further AHD treatment reported by centres ($n=137$) who actively run assisted dialysis are lack of adequate funding [$n=88$ (64%)], lack of professional staff [$n=71$ (52%)], lack of expertise [$n=31$ (23%)] and presumed demotivation [$n=32$ (23%)] (multiple answers possible). Twenty-six (19%) stated none of these conditions (Table 2).

Centre differences

Between centres offering AHD and those who do not, significant differences are found in the following items (Table 3):

Table 3. Comparison of features in centres with and without option of AHD

AHD	Yes	No	P-value
Number of centres ($n=266$)	146 (55%)	120 (45%)	
Age of the respondent (years)			0.02
<45	21	34	
45–54	74	46	
>54	51	40	
Prevalent patients treated (n)			<0.01
<51	6	36	
51–120	67	53	
>120	73	31	
Fear of reimbursement problems ^a			0.04
Yes	42	43	
No	49	25	
Not sure	47	50	
Barriers (multiple answers possible)			
Inadequate funding	88	82	0.74
Lack of staff	71	62	0.41
Lack of expertise	31	40	0.15
Lack of team motivation	32	34	0.66
None of them	26	11	0.03
Motivation to start new treatment options ^a			<0.01
Very appreciated	109	67	
No because of resistance	14	15	
No because of restrictions and financial risks	18	35	
Not sure	4	2	

^aMissing responses.

respondents from active AHD centres are in the higher age group of >45 years (86% versus 71%; $P<0.05$) and are caring for a greater number of dialysis patients (51–120 and >120 patients; $P<0.001$). Suggestion of financial disadvantages was expressed in more centres that do not currently offer AHD ($P<0.05$). Motivation to start new treatment options was reported higher in active AHD centres compared with centres without AHD. A total of 109 of 145 active centres (75%) versus 67 of 120 inactive centres (56%) 'very appreciated' new treatment options (Table 3 and Figure 3). In both groups, the proportion of demotivation by resistance of team members was similar while fear of restrictions and financial risks were expressed more in inactive centres (for detailed numbers, see Table 3). Smaller differences were found with regard to the offered type of AHD and practice patterns (Table 2). Lack of expertise was less likely in centres that offer both HD and PD, compared with centres that provide PD only ($P<0.05$). No significant differences were found with regard to the method of the established treatment: centres that offer PD only compared with centres that offer HD only or both shared similar patterns in the offering and timing of AHD (Table 2)

Discussion

The primary goal of this survey was to gain information on the attitudes, beliefs and practices of nephrologists towards AHD in Germany. More than 90% of all respondents stated that AHD is a meaningful option. Fifty-five percent of the centres that responded to the survey practice this option with a small number of patients (75% with 1–10 patients). The preferred method is assisted PD, while about half of the centres offered both assisted PD and HD (Table 2). The majority of respondents (62%) consider AHD in those patients with limited intellectual or physical function. The timing of offering AHD varies: the majority of centres that responded to the survey provide this option at Stage 4 CKD (57%). A smaller group of centres (15%) considered this for patients when conventional dialysis is inadequate and the efficacy of treatment must be increased. Fourteen percent of the centres offered AD only at the request of dialysis patients (and their families) (Table 2).

The attitude of nephrologists concerning home dialysis is inconsistent [21]. Home dialysis is generally accepted to be a good treatment [1, 2]. But a gap between attitudes and reality remains: in Germany, only a small proportion of the total end-stage renal disease population is treated with home dialysis (HD

Table 4. Proposal for further actions to implement AHD as derived from results of the survey

Area	Further actions
Scientific society	Provide recommendations, guidelines and standards.
Community	Change focus of treatment from conventional in-centre care to home treatment.
Health care payers	Establish regular and adequate funding for professional assistance.
Industry	Provide safe and easily usable devices. Implement telemedicine.
Renal units	Change motivation to home treatment. Encounter all key persons. Establish networks to realize support of patients in different settings (at home, nursing homes, hospital and community care). Train staff and caregivers for home care assistance.
Kidney patients	Get timely information on treatment options. Request for home dialysis and support options. Be trained according to personal needs.
Family, partners and caregivers	Support patient to start and continue treatment at home. Claim for adequate funding of assistance.
Researchers	Design studies to prove the concept and the impact of significant endpoints (morbidity, treatment-related complications, quality of life, cost-effectiveness, etc.).

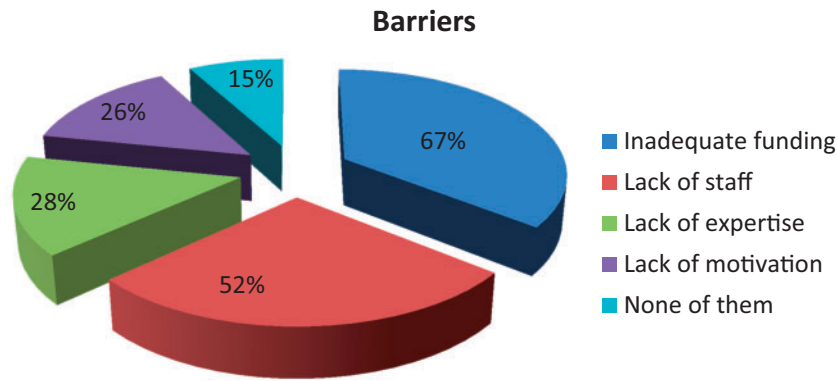


Fig. 2. Barriers to AHD (responses from $n = 255$ centres) (multiple answers possible).

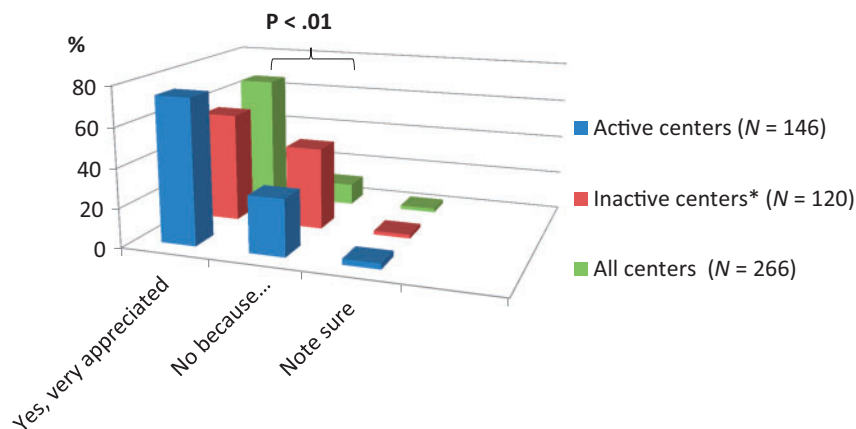


Fig. 3. Motivation to start new treatment options by centres (details see text). *, Centres with no patients on assisted dialysis.

~1%, PD 4–5%) [15]. Thus the positive attitude towards AHD in this report and the result that 55% of the responding members of the society actively practised this treatment is a surprise and strong indication of by reporting bias. No further data are published so far to control for this assumption.

In the survey, AHD is offered more in centres with physicians in the higher age group (Table 3). This could be explained by a greater level of expertise and experience in renal care. Furthermore, AHD seems to be offered more in centres with a larger dialysis population. Together with the significant finding that active AHD treatment is more prevalent in centres with highly motivated staff (Table 3), specific centre factors may exist that influence practice patterns. In contrast, a quarter of centres who do not offer AHD report a lower proportion of staff who are motivated to start new treatment options for different reasons (Table 3). More experienced physicians with highly motivated staff in bigger centres, as described in other reports [22], seems to be a prerequisite for AHD. Especially in the elderly, individualization of dialysis modalities with the option of AHD needs a motivated team, time and a consistent approach of shared decision making [23–26].

Only half of the centres in this report who practice AHD offered AHD before dialysis initiation (Table 2). Together with the attitude of offering AHD only on a patient's request seems to contradict the process of timely information and shared decision making. Results from different reports indicate that a fully informed (older) patient and pre-dialysis care significantly influence outcome parameters [23–26].

Both centres that offer AHD and those that do not suffer from a lack of qualified staff (Table 3). Staff qualification is critical in Germany: 20 years ago, two-thirds of nurses reported a shortage of registered nurses to provide high-quality care [27]. Due to demographic changes in the German population, today this situation is more aggravated. While professional staff in nursing homes can be qualified for AHD—in most cases for cyclor PD—trained nurses for home care are very rare. Although an oversupply of physicians is reported in some German regions [28], the situation in nephrology is quite similar to the situation in nursing care. Thus a shortage of professionals may influence the proliferation of innovation in patient care like AHD.

Reimbursement of AHD is a second barrier reported in this survey. Home dialysis itself is considered a cost-saving method compared with in-centre dialysis [3], although consideration of hidden costs should be taken into account [29]. For AHD, additional costs for staff assistance are to be calculated. Funding issues are identified in many reports as barriers to extend home dialysis [2–4]. Costs and reimbursement for (PD) home assistance vary widely in Europe and Canada [16]. AHD is suggested as a cost-effective treatment [3] not exceeding the costs of in-centre dialysis [16]. Arbitrary calculations from individual cases in our institution result in cost savings of ~€13 000/case/year, mostly resulting from avoiding transport to in-centre treatment.

Qualification of professional staff along with adequate funding remain key issues in the proliferation of AHD. 'Home dialysis first' [6] provokes a cultural change from the prevalent system of standard in-centre dialysis to a more patient-focused

approach [29]. Motivation of the renal team for new approaches in clinical practice remains a challenge [22, 30].

Limitations of our study may result from reporting bias of centres that advocate and successfully practice home dialysis. Further studies are needed to prove the concept of AHD.

So far, AHD seems to be an emerging field of renal replacement therapy in Germany. AHD is an option for patients whose quality of life is benefitted by home treatment [13, 28]. Life situations in these patients may be different, including patients who need more effective treatment or palliative care [13, 30–33]. Results from this survey indicate further actions in different areas to obtain sufficient information on the effects of a broader use of AHD (Table 4).

Conflict of interest statement

W.P. is a consultant on the project 'Network Assisted Dialysis' (PMC-Pflege Managed Care, Berlin) and received honoraries for lectures from FMC-Fresenius Medical Care, Germany. No conflicts of interest were stated by the other authors.

References

- Palmer SC, Palmer AR, Craig JC et al. Home versus in-centre haemodialysis for end-stage kidney disease. *Cochrane Database Syst Rev* 2014; 11: CD009535
- Piccoli GB, Salomone M. Home hemodialysis: a system and not only a treatment [letter]. *Kidney Int* 2010; 78: 819
- Walker RC, Howard K, Morton RL. Home hemodialysis: a comprehensive review of patient-centered and economic considerations. *ClinicoEcon Outcomes Res* 2017; 9: 149–161
- Komenda P, Copland M, Makwana J et al. The cost of starting and maintaining a large home hemodialysis program. *Kidney Int* 2010; 77: 1039–1045
- Robinson BM, Akizawa T, Jager KJ et al. Factors affecting outcomes in patients reaching end-stage kidney disease worldwide: differences in access to renal replacement therapy, modality use, and haemodialysis practices. *Lancet* 2016; 388: 294–306
- Thodis ED, Oreopoulos DG. Home dialysis first: a new paradigm for new patients. *J Nephrol* 2011; 24: 398–404
- Prakash S, O'Hare AM. Interacting of aging and CKD. *Semin Nephrol* 2009; 29: 497–503
- Tonelli M, Riella M. Chronic kidney disease and the ageing population. *Nephrol Clin Pract* 2014; 128: 319–322
- Tong A, Palmer S, Manns B et al. Clinicians beliefs and attitudes about hemodialysis: a multinational interview study. *BMJ Open* 2012; 2: e002146
- Dimkovic N, Aggarwal V, Khan S et al. Assisted peritoneal dialysis: what is it and who does it involve? *Adv Perit Dial* 2009; 25: 165–170
- Dimkovic N, Oreopoulos DG. Assisted peritoneal dialysis as a method of choice for elderly with end-stage renal disease. *Int J Urol* 2008; 40: 1143–1150
- Brown EA, Johansson L. Dialysis options for end-stage renal disease in older people. *Nephron Clin Pract* 2011; 119: c10–c13
- Iyasere OU, Brown EA, Johansson L et al. Quality of life and physical function in older patients on dialysis: a comparison of assisted peritoneal dialysis with hemodialysis. *Clin J Am Soc Nephrol* 2016; 11: 423–430
- Aydede SK, Komenda P, Djurdjev O et al. Chronic kidney disease and support provided by home care services: a systematic review. *BMC Nephrol* 2014; 15: 118
- MNC. Jahresbericht zur Qualität in der Dialyse. https://www.g-ba.de/downloads/17-98-4166/2016-09-15_QSD-RL_MNC-Jahresbericht-2015_Einleitung-und-Jahresbericht.pdf (13 March 2017, date last accessed)
- Dratwa M. Cost of home assistance for peritoneal dialysis: results of a European survey. *Kidney Int* 2008; 73: S72–S75
- Jayanti A, Morris J, Stenvinkel P et al. Home hemodialysis: beliefs, attitudes, and practice patterns. *Hemodial Int* 2014; 18: 767–776
- LimeSurvey Project Team/LimeSurvey. LimeSurvey: An Open Source Survey Tool. LimeSurvey Project, Hamburg, Germany, 2015. <http://www.limesurvey.org> (14 March 2017, date last accessed)
- R Core Team. R: A Language and Environment for Statistical Computing. Vienna, Austria: R Foundation for Statistical Computing, 2013. <http://www.R-project.org>
- Kidney Health for Life (KH4L). Chronic Kidney Disease Multinational Inventory (March 31, 2014). https://www.theisn.org/images/Initiatives/KH4L_-_CKD_Multinational_Inventory.pdf (14 March 2017, date last accessed)
- Fluck RJ, Fouque D, Lockridge RS Jr. Nephrologists' perspectives on dialysis treatment: results of an international survey. *BMC Nephrol* 2014; 15: 16
- Ishani A, Slinin Y, Greer N et al. Comparative effectiveness of home-based kidney dialysis versus in-center or outpatient kidney dialysis locations—a systematic review. VA ESP Project No. 09-009. Washington, DC: Department of Veterans Affairs, 2015
- Kooman JP, Cornelis T, van der Sande FM et al. Renal replacement therapy in geriatric end-stage renal disease patients. A clinical approach. *Blood Purif* 2012; 33: 171–176
- Chanouzas D, Ng KP, Fallouh B et al. What influences patient choice of treatment modality at the pre-dialysis stage? *Nephrol Dial Transplant* 2012; 27: 1542–1547
- Morton RL, Tong A, Howard K et al. The view of patients and carers in treatment decision making for chronic kidney disease: systematic review and thematic synthesis of qualitative studies. *BMJ* 2010; 340: c112
- Fischer MJ, Stroupe KT, Kaufman JS et al. Predialysis nephrology care and dialysis-related health outcomes among older adults initiating dialysis. *BMC Nephrol* 2016; 17: 103
- Aiken LH, Clarke SP, Sloane DM et al. Nurses' reports on hospital care in five countries. *Health Aff* 2001; 20: 43–53
- Kabene SM, Orchard C, Howard JM et al. The importance of human resources management in health care: a global context. *Hum Resour Health* 2006; 4: 20
- Laplante S, Krepel H, Simons B et al. Offering assisted peritoneal dialysis is a cost-effective alternative to the current care pathway in frail elderly patients. *Int J Healthc Manag* 2013; 6: 27–36
- Brown EA, Wilkie M. Assisted peritoneal dialysis as an alternative to in-center hemodialysis. *Clin J Am Soc Nephrol* 2016; 11: 1522–1524
- Brown EA. How to address barriers to peritoneal dialysis in the elderly. *Perit Dial Int* 2011; 31: S83–S85
- Querido S, Branco PQ, Costa E et al. Results in assisted peritoneal dialysis: a ten years experience. *Int J Nephrol* 2015; 2015: 712539
- Brown EA, Finkelstein FO, Ivasere OU et al. Peritoneal or hemodialysis for the frail elderly patient, the choice of 2 evils? *Kidney Int* 2017; 91: 294–303