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TREATMENT STANDARD

Treatment standard: CKD in the geriatric patient

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ABSTRACT

The number of older people with chronic kidney disease (CKD) is increasing globally. The vast majority of these patients will die before they even have the chance to start kidney replacement therapy. Nevertheless, this clientele of older patients with CKD is often characterized not only by several concomitant diseases but also by frailty. This constellation comes with a general vulnerability and very heterogeneous courses of disease that need to be considered when it comes to diagnosis and treatment. The main difference compared with younger patients is that therapy and therapy decisions are often preceded by the need for assessments. These can relate to frailty, but also to closely related areas such as cognition, depression or malnutrition among others. The basic therapeutic approaches for CKD treatment in a geriatric patient may not differ fundamentally though from those for younger patients. This also holds true for standard as well as more novel medication administered for nephroprotection. The difference however, lies in the fact that personalized approaches are more frequently required due to survival probability, a more complex mix of chronic conditions, and individual patient's needs and aims. This also applies to the difficult decision as to whether a very old person with CKD G5 should be dialyzed or treated conservatively. Information from different areas should be incorporated into a joint decision-making process, which often requires intensive, patient-centered communication about the patient's preferences and prioritized treatment goals, psychosocial factors and their home environment, as well as their medical needs and prognosis.

Keywords: assessment, decisions, frailty, GFR, prognosis

'In a nutshell'

1. Old adults are finally considered a special population in whom the disease can take very heterogeneous courses.
2. Diagnostic and treatment approaches have to incorporate an increased general complexity and vulnerability of the patient prompting personalized treatment approaches.
3. Assessment of frailty, nutrition, cognition and mood can help yield a more holistic evaluation of health and disease and contribute to estimation of prognosis.
4. Treatment aims should be defined in the context of a patient's preference and their overall survival probability.
5. Conservative care may be a more favorable option than dialysis in some older adults with chronic kidney failure.
6. Patient decision aids may be useful tools to find out a patient's preference. This needs careful communication.

INTRODUCTION

Older people make up the majority of the patient clientele in nephrology, and this trend is growing. The average age at which kidney replacement therapy is started is now >70 years, at least in the Western world. This inevitably entails changes in the way we approach old patients. The updated KDIGO Guideline for Evaluation and Management of CKD for the first time reflects the life-course idea, emphasizing the importance of factoring the patient's age into the overall approach of care [1]. The burden of CKD appears to be an especially heavy one in advanced age, as CKD itself must be considered as a condition of premature aging [2]. The reason why this is so important lies in the fact that old and very old patients differ from younger patients in many aspects that have a direct influence on diagnostics, therapy and decision-making. Against the background of finiteness, treatment goals may shift. Certain outcomes that are primary at a young age (e.g. mortality) may take a back seat to others (e.g. quality of life) in old age. The much-cited geriatric multidimensionality in old age is reflected in the need to record several areas in a standardized way in order to obtain a picture that captures the patient in all its complexity. In light of this complexity, therapeutic approaches should be directed by the three pillars of geriatric treatment goals: well-being, autonomy and dignity. Here, we review the current standards of an all-encompassing assessment and treatment approach discussing novel developments in pathophysiology, diagnosis, outcome prediction and management of geriatric patients with CKD.

ASSESSMENT STANDARDS

Cohort studies of older adults that have information on kidney function and frailty all show a strong association between CKD

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Table 1: Common assessment tools for chronic conditions in the geriatric patient with CKD.

Suspected condition	Validated assessment tool	Description
Frailty	CFS [10]	Brief, practical, provides first orientating assessment
	Fried frailty phenotype [7]	For more detail; needs more time
	Frailty Index (Rockwood) [8]	Needs more time
Cognitive decline	MMSE [12]	Screening tool, takes 10–15 min
	Clock-drawing [13]	Screening tool, simple
Depression	GDS [14]	Exists in long and short version
Malnutrition	7-Point Subjective Global Assessment [15]	Provides assessment points on weight change, dietary intake, digestive function, functional capacity and metabolic stress. Includes nutrition focused physical examination. Sensitive to short-term nutrition changes
	Malnutrition-Inflammation Score [16]	Uses 10 parameters including dietary intake, anthropometric measurements, laboratory indices and functional capacity
	Mini Nutrition Assessment [17]	Includes assessment of dietary intake, mobility, neuropsychology and some anthropometric measurements, including weight and calf circumference

and frailty but also a predictive value of frailty for survival [3, 4]. A holistic approach is needed for patients of old age and CKD due to the complex multidimensionality of concurrent chronic conditions and the advanced age itself. We highlight central conditions and their assessment in (very) old age that are crucial in order to enable informed decision making and adequate treatment. From the large number of existing assessment tools, some are described below and in Table 1 without claim to completeness.

The importance of frailty models and their assessments

Co-existence of CKD with frailty is present in 34% of advanced CKD and 40% of dialysis patients [5], numbers that are certainly much higher in patients over 65 years. Assessment of frailty is central as its presence reflects increased vulnerability and dependency placing the patient in a different risk category. Minor "hits" (such as a simple urinary tract infection) can lead to a sudden change in health status followed by a longer recovery period. The mechanisms involved in the pathophysiology of physical frailty in CKD are a mix of clinical and biologic factors, heavily intertwined [6].

Two models have become prominent: the physical frailty model (frailty phenotype by Fried) [7] and the cumulative deficit frailty model (Frailty Index by Rockwood) [8]. The frailty phenotype is composed of physical activity, muscle strength, energy level, walking speed and weight loss. The Frailty Index is composed of disability, cumulative medical conditions, functional and cognitive decline, and poor nutrition. Although differing in their underlying theories, the presence of frailty is highly associated with mortality using either model [9].

Standardized assessment assures comparability inter- and intra-individually. In addition to the frailty phenotype (certainly one of the best if time is no issue) and Frailty Index, the Clinical Frailty Scale (CFS) exists, which is a 9-point scale based on clinical evaluation on mobility, energy, physical activity and function [10]. It is a brief and practical screening tool and helps staff quickly calculate CFS scores. The bottom line is that mostly it does not matter which score is used, as long as one is used.

Cognition assessment

Cognitive decline is extremely frequent in persons with CKD [11] and the degree of frailty often corresponds to the degree of dementia. The Mini-Mental State Examination (MMSE) (30 items) [12] or a simple clock drawing test [13] are initial orientating tests of a global cognitive deficit which can also be done by a non-neurologist.

Depression assessment

Dementia is often accompanied and aggravated by depression. There is no depression assessment scale for older adults with CKD. However, the Geriatric Depression Scale (GDS) for older adults consists in a long and short form and has even been demonstrated to work well in hemodialysis patients [14].

Malnutrition assessment

Generally, malnutrition and protein energy wasting are key issues in the geriatric patient with CKD. Therefore, clinicians are encouraged to screen people with CKD G4–5, aged >65 years or symptoms such as involuntary weight loss, frailty or poor appetite twice annually for malnutrition using validated tools [15–17] listed in Table 1.

Geriatric assessment

A geriatric assessment can be carried out in great detail (comprehensive) [18] by a multidisciplinary team, by a geriatrician the patient gets referred to or in a modified way by a trained nurse [19]. While a comprehensive geriatric assessment (CGA) is primarily a geriatrician's domain, research has demonstrated that especially a modified version is feasible in nephrology services [19] (Box 1). Core assessments include the recording of comorbidities, medication review, nutritional questions, activities of daily living, mobility assessment, frailty score (including sarcopenia), questions on psychological well-being, cognition, as well as a patient's social and home environment. Social difficulties and needs constitute an important element of such CGA and reflect its multidimensionality. They may play a crucial role with regard to care needs and personalized healthcare plans (Box 2).

Box 1. Feasibility of assessments.

Feasibility: assessments, especially comprehensive geriatric assessments can be time-consuming. Good cooperation with geriatric colleagues is desirable in order to refer complex cases to geriatrics for a comprehensive assessment or to obtain help in interpreting the findings. Otherwise, most of the

core assessments or modified versions of the CGA can be carried out by the nephrologist or trained staff. Some of the core assessment questions can usually be easily integrated into a normal medical consultation.

In a busy clinic, it can sometimes be enough to check for the four Fs: Frail? Falls (and mobility)? Function? Forgetfulness (cognition)? It is often perfectly sufficient if only one or two of these Fs are assessed instead of all four.

Box 2. Strategies how to personalize treatments.

Due to the heterogeneity of CKD progression in old age and all other co-existing chronic conditions that define an old patient's state of health and prognosis, there is an increased need to personalize treatment. This should be based on:

1. A patient's preference
2. His/her medical needs
3. Psychosocial and environmental factors
4. His/her prognosis

Assessment and prediction tools are helpful to guide decisions and treatment. However, they are only tools that contribute to a process that has to factor in all of the above. Good communication in this context is irreplaceable and can be challenging and time-consuming. Patient decision aids can be used to optimize the process.

Older potential kidney transplant recipients are another population in which frailty assessment is recommended to be done routinely [20]. Here it also contributes to shared decision-making, as age alone is not always a reliable predictor that receiving a transplant with the associated immunosuppression will be a success for the recipient over time. This can be extended to other areas of nephrology where there are difficult decisions to be made, including whether to start renal replacement therapy at all or to choose the conservative route (as outlined below). To go primarily by an age threshold would indeed be age discrimination. Thus, a thorough assessment can help to avoid such ageism and deliver the basis for a well-founded shared decision and thus greatly benefit the patient.

Active symptom assessment and management

CKD is associated with a myriad of symptoms. The KDIGO guideline lists the most important ones such as fatigue, poor mobility, bone/joint pain, drowsiness, pain, poor sleep, sexual dysfunction, itching, heartburn, muscle cramps, leg swelling, decreased appetite and shortness of breath [1]. Many elderly patients with CKD suffer from at least one such symptom, but more often from several at the same time (up to 10). Some symptoms tend to occur in clusters similar to cancer patients. Top on all lists is fatigue with a prevalence of 70%, which may further complicate frailty assessment. As some symptoms begin gradually, patients do not necessarily associate them with kidney disease; others may be associated with shame (sexual dysfunction), further emphasizing the need to actively ask patients about them.

TREATMENT STANDARDS

Diet

Protein malnutrition is considered as an important mortality and morbidity risk factors in all CKD stages, and may thus hit with all its consequences (frailty, sarcopenia, inflammation, etc.) the elderly patients particularly hard [21]. Generally, the KDIGO recommendation for protein intake has thus become more liberal recommending to maintain a protein intake of 0.8 g/kg body weight/day in adults with CKD G3–5. Stricter restriction can be considered, but is always associated with the risk of malnutrition, especially in old age [1]. In case of malnutrition assessed using one of the validated tools, appropriate medical nutrition therapy should be enabled ideally under the supervision of renal dieticians.

Physical activity

For patients with CKD, international guidelines recommend engaging in moderate-intensity continuous training for at least 150 min per week, although the supporting evidence is quite weak [1]. A very recent randomized controlled trial in adults aged 70–77 years demonstrated that high-intensity interval training significantly reduced the risk of rapid estimated glomerular filtration rate (eGFR) decline in older adults in Norway [22]. Participants in this study however had no or only mild CKD. An ancillary analysis of another randomized trial demonstrated that structured moderate exercise can preserve kidney function in inactive older adults with moderately decreased eGFR. In light of frequent functional deficits training programs must be individually adapted.

Symptom management

Supplementary data, Table S1 from the KDIGO 2024 Clinical Practice Guideline for evaluation and management of CKD lists possible management strategies for some of these symptoms [1]. The main goal is to improve a patient's health-related quality of life (QoL).

Drug treatment of CKD

The decision-making for therapeutic drug choices again must consider the (personalized) expectations concerning longevity and QoL, with the ultimate three pillars of well-being, autonomy and dignity in geriatric medicine. Polypharmacy in the elderly with CKD is associated with a higher risk of all-cause mortality, kidney failure, faster GFR decline, lower QoL, adverse drug reaction and inappropriate medication [23]. So, the right choice, the right dosage and avoiding harmful interactions of medications are of key importance especially in CKD patients. Furthermore, a question to be individually asked before drug treatment initiation should be whether a patient will likely live long enough to experience its benefits. Among the most frequently applied kidney-directed drug classes in aging CKD patients are renin–angiotensin–aldosterone system (RAAS) blockers, sodium-glucose cotransporter 2 (SGLT2) inhibitors and diuretics, as addressed below and in Table 2.

RAAS blockage

The gold standard of nephroprotection are angiotensin-converting enzyme inhibitors or AT1-receptor blockers, which are as feasible treatment options in the elderly with CKD as they are in the young or middle-aged CKD populations. Because these drugs also possess cardioprotective properties, their use may even contribute to symptom reduction and improved physical resilience especially in the context of cardiorenal syndromes. Special care concerning kidney function declines must be taken though during episodes of acute or chronic dehydration (diarrhea, vomiting, diuretic overdose, etc.), for which old agers

Table 2: Drugs: nephroprotection/diuretics—dosing and precautions in old patients with CKD.

Drug	Dose	Markers of response	Precautions	toxicity
RAAS blockers	Careful titration; submaximum doses in the very old?	BP lowering; improved cardiac function; albuminuria reduction	eGFR and potassium monitoring	In states of hypovolemia/dehydration eGFR decline; hyperkalemia (in concert with MRAs)
SGLT2 inhibitors	Standard dose	Glucosuria; albuminuria reduction	eGFR monitoring	Intertriginous fungal and urinary tract infections in vulnerable patients
Diuretics	eGFR/CKD stage adjusted	Body weight; relief of clinical symptoms (edema, shortness of breath)	Body weight, BP, eGFR and electrolyte monitoring	eGFR rise in case of overdosing; hypokalemia, hyponatremia, magnesium losses

BP, blood pressure; MRA, mineralocorticoid receptor antagonists; NSAIDs, non-steroidal anti-inflammatory drugs.

may be more vulnerable. In contrast to younger CKD patients, there are suggestions not always targeting the maximum dose of these compounds. Combinations with mineralocorticoid receptor antagonists of course impose hyperkalemia risks, especially in patients with less stable kidney function.

SGLT2 inhibitors

The situation with SGLT2 inhibitors in old CKD patients is similar to that with RAAS blockers. They are usually tolerated well and address cardiovascular comorbidities with a potential for improving health-related QoL. In the EMPA-REG OUTCOME® trial, there were no differences concerning renal effects and safety issues over all age and CKD categories, while cardiovascular event protection showed a trend of highest efficacy in empagliflozin-treated subjects >75 years [24]. Similar data exist for dapagliflozin [25]. Nevertheless, in old CKD patients with a high risk of intertrigineous fungal or urinary tract infections, the benefits of SGLT2 inhibition may be outweighed by such manifestations. Finally, life expectancy should again be taken into account when answering the question of after what period a meaningful nephroprotective effect will be reached.

Diuretics

Especially loop, but also thiazide diuretics are frequently prescribed in elderly CKD patients in order to optimize volume management. In this context, electrolyte disturbances (hypokalemia, hyponatremia, magnesium deficiencies) represent the major culprit and should be monitored as well as eGFR movements, in order to adequately adjust this treatment approach to volume management demands.

Drug treatment of CKD-associated conditions

There are of course many more considerations with regard to drug use and dosage in the context of CKD in advanced age. Here, it appears however that most therapies addressing renal anemia, metabolic acidosis, hyperkalemia, hyperphosphatemia, CKD– mineral bone disorder (CKD-MBD), etc., can be applied in a fashion relatively independent of age. With regard to CKD-MBD though, elderly CKD patients carry an additional risk of developing osteoporosis and fractures, where classical antiresorptive or anabolic drugs may have to be considered in addition to treatments targeting secondary hyperparathyroidism and vitamin D deficiencies [26]. Bisphosphonates appear safe and effective down to a GFR of 30 mL/min, teriparatide is also limited to CKD stages 1–3b, while denusomab and romosozumab are approved in all CKD stages. Dual-energy X-ray absorptiometry (DXA) bone density measurements provide accurate fracture risk estimation in CKD and thus may serve well in treatment decision-making.

NEW DEVELOPMENTS

Pathophysiology of CKD in old age

It can be difficult to determine what proportion of the change in kidney structure can be attributed to healthy (physiological, without concomitant diseases) and what to unhealthy (unphysiological) aging as in old age the kidneys are often impaired by comorbidities such as diabetes, obesity and arterial hypertension. Nevertheless, distinct phenotypes of healthy and unhealthy kidney aging [27] as well as GFR decline and its reference values across age have been defined lately [28].

Phenotypes of physiological aging of the kidney

Changes include an increase in cysts (benign), cortical scars, fibromuscular dystrophy, renal artery calcification, arteriosclerosis and a generalized roughness of the renal surface. Studies from living donors show an increase in focal and global glomerulosclerosis. The number of healthy glomeruli decreases. A person loses 50% of their healthy aging glomeruli over 50 years [29]. In addition, studies show an increase in ischemic glomeruli, interstitial fibrosis, tubular atrophy and arterial hyalinosis. Even in minimal sclerosis, there is a significant decrease in GFR [29], suggesting an independent process [27].

Functional changes

Research shows a decline in measured GFR from age 40 years between 1 and 1.26 mL/min/1.73 m^2 per year. A recent analysis of four German population-based cohorts demonstrated an annual $eGFR_{(crea)}$ decline in the general population, in healthy individuals and individuals with diabetes [30] of –0.80, –0.79 and –1.20 mL/min/1.73 m^2, respectively. The eGFR decline was steeper when using cystatin C (–1.1, –1.09 and –1.29 mL/min/1.73 m^2, respectively) which indicates overestimated GFR and underestimated GFR decline by $eGFR_{(crea)}$ in older age due to muscle mass loss [31]. GFR decline was more pronounced in people with comorbidity than without, as shown before in a study of three European population-based cohorts [32].

Phenotypes of unphysiological aging of the kidney

Unlike GFR decline, albuminuria >30 mg/g does not per se occur more frequently with age and should always be investigated further, even in stage 3a of a >65 year old. In unphysiological kidney aging GFR is abnormal for the age. Also, GFR can be either very high (GFR >97.5th percentile), indicating hyperfiltration, or very low (<2.5th percentile), indicating CKD. True hyperfiltration is often associated with glomerular enlargement, obesity and albuminuria. Comorbidities common in old age, such as diabetes mellitus and obesity can cause microstructural changes affecting

Table 3: Prediction/prognosis tools for adverse outcomes in the geriatric patient with CKD.

Risk	Validated assessment tool	Description
Chronic kidney failure	KFRE [38]	Age, sex, GFR, ACR; online calculators available; not specific for the geriatric patient
Cardiovascular events	SCORE2/SCORE2-OP [39]	Calculates 10 year-risk of fatal or non-fatal CV-events; not specific for patients with CKD
Mortality	Surprise question [40]	"Would I be surprised if this person died within the next 12 months?"
	Charlson Comorbidity Index [41]	Considers 19 comorbidities including CKD and age; 1-year risk of dying
	Prognostic tool [42]	CKD G5; surprise question, Karnofsky Index, age

ACR, albumin–creatinine ratio.

GFR. Glomeruli can hypertrophy. Glomerulosclerosis is more rigid and "hardened."

Box 3. Increased susceptibility in old age.

Despite clear morphological and functional distinctions between senescence and disease, there is agreement that the susceptibility of older kidneys to various "hits" (infection, volume depletion, blood pressure fluctuations, pain killers etc.) is simply higher in old age, no matter if the aging is physiological or not.

Diagnosis

Recording kidney function as accurately as possible is particularly relevant in old age, as treatment decisions depending on GFR are frequent: the avoidance or dose adjustment of potentially nephrotoxic drugs, the cautious administration of contrast agents for imaging, suitability as a living kidney donor or the timing of the start of a kidney replacement therapy.

Certain biologic factors unrelated to kidney function can heavily influence the endogenous biomarkers. For instance, creatinine is dependent on muscle mass and diet. Cystatin C is influenced by inflammatory states, smoking and conditions of cell turnover, e.g. cancer and chemotherapy. The KDIGO guideline addresses these factors for doctor knowledge [1]. This is especially important for older adults as chronic conditions and medications aggravate the influence on creatinine and cystatin C. Key factors include sarcopenia and chronic inflammation.

In old age, where usually a multitude of influencing variables are present, it is now recommended to estimate the GFR using a "combined" equation (based on creatinine and cystatin C). A substantial body of research has demonstrated higher accuracy in GFR values using such combined formula when compared with a formula based on only one biomarker [33–35]. Clinicians are encouraged to scrutinize a GFR result of an elderly patient more critically and to interpret it in the light of the patient's characteristics.

Measuring GFR using exogenous markers such as iohexol is independent of any biologic influencing factors but requires expertise and appropriate laboratory infrastructure. A recent consensus paper by the European Kidney Function Consortium finally delivers standardization of the measurement of GFR using iohexol [36]. This will ensure higher quality and better comparability.

The search for the root cause of CKD is not something that should become less important in old age. If laboratory tests and imaging do not give a good explanation, a biopsy should not be ruled out on the basis of age alone [1].

Outcome prediction

The evaluation of prognosis has higher relevance in old age due to shorter life expectancy. The majority of CKD patients in old age will never experience the start of kidney replacement therapy due to so-called competing risks (e.g. death before dialysis) as age is a major effect modifier among patients with an eGFR of <60 mL/min/1.73 m^2 [37]. The well-known KDIGO heat map is not capable of risk prediction for an individual patient; such an absolute, individual risk can only be ascertained with the aid of prediction models as listed in Table 3. The move away from a GFR-based and towards a more risk-based approach is a new development and most relevant in old age.

ESKD risk prediction

The Kidney Failure Risk Equation (KFRE) [38], comprising age, sex, GFR and albumin–creatinine ratio predicts the 2- or 5-year risk of kidney replacement therapy for an individual patient. The KFRE has now been externally validated in >1 million individuals across almost all continents. Calculating prognosis can help to manage care, plan dialysis access in time and introduce and educate patients on the subject. Often, it can reduce anxiety by demonstrating that the need for dialysis is extremely unlikely.

Cardiovascular risk prediction

There is no specific prediction score for old patients with CKD. However, the Systematic Coronary Risk Evaluation 2-Older Persons (SCORE2-OP) for older persons [39] has been demonstrated to work well.

Mortality risk prediction and prognosis

Among the many existing mortality scores, the "surprise question" ("Would I be surprised if this person died within the next 12 months?") [40] has gained attraction. Originally developed for cancer patients, it has been suggested as a simple test to identify patients who might benefit from hospice and palliative care. The Charlson Comorbidity Index [41] evaluates a person's burden of disease to approximately assess the 1-year mortality of patients. It queries 19 underlying diseases. A recent prognostic model for estimating 1-year mortality for persons with CKD G5 who are faced with the decision of dialysis or conservative treatment identified the surprise question, the Karnofsky Index and age as most predictive [42].

Communication and management

The area where new development becomes noticeable in the management of old patients is the decision-making process for kidney replacement therapy. In recent years, there have been increasing attempts to break the automatism of putting old patients with CKD G5 on dialysis but offer them a conservative treatment

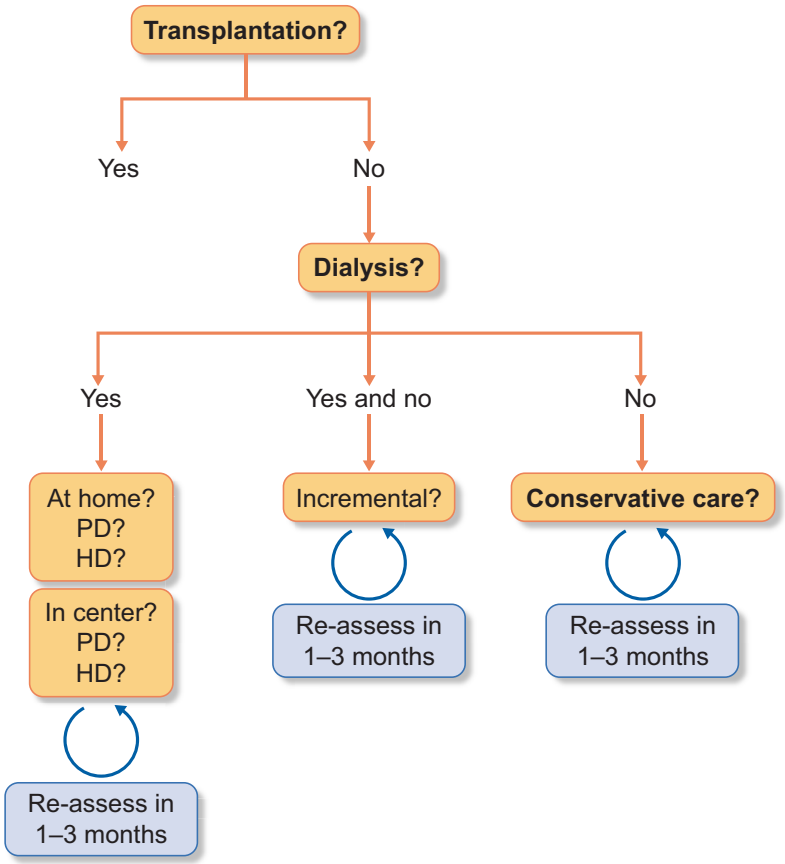

Figure 1: Treatment decision tree in old age and chronic kidney failure.

option instead (Figure 1). This is justified by the alarmingly high premature mortality after dialysis initiation in old age [43, 44]. Several observational studies [45, 46] including a recent emulated target trial [47] have shown that dialysis therapy is not associated with a significant prolongation of life, especially for very old people with several concomitant diseases and a higher degree of frailty, but with increased hospitalization and fewer days at home. Comprehensive conservative care has for a long time been misinterpreted as "no care" although the opposite is true. Comprehensive conservative care encompasses the broad spectrum of symptom management as well as the early integration of palliative care if needed [48]. It attempts to explicitly avoid hospitalization and invasive therapies. Some patients with advanced CKD remain stable for an astonishingly long time, sometimes for years, some for only a few weeks. Incremental dialysis as a kind of middle way for certain patients is being discussed more and more frequently in this context and seems to be safe procedure [49]. Efficacy trials however, are still lacking. The decisive factor should be what or which outcomes matter to the patient (patient-centeredness) and not how care works best for the provider.

Decision-making and communication

Making a treatment decision can be tough for patients, relatives and provider. Patient decision aids (PDAs) [50] can help in older patients with advanced CKD during the decision process and improve the quality of decision-making compared with the usual form of care and clarify treatment preferences [51]. Communication is key but challenging in old age, especially when it comes to discussing existential questions and end-of-life care. Principally, caution should be exercised when communicating risk score probabilities to patients, and it is generally better to give a range than an absolute number [52] in order to balance the necessary explanation and creating fear. A serious illness conversations guide [53] can offer solutions to overcome barriers as well as practical advice how to open, lead and end such conversation, also pointing out the necessity to listen to the patient instead of talking most of the time.

SUMMARY

Even if there is no specific "old-age pill," assessment and treatment approach of elderly patients in nephrology differ from that of younger ones. Patients are generally more susceptible to kidney function decline, or to an acute event grafted onto a chronic one. Patients have acquired risk factors and concomitant diseases in the course of their lives. Psychosocial parameters, such as declining autonomy or cognitive function, are central. The course of CKD is extremely variable, ranging from very stable (even at a very low GFR) to rapid loss of function. There is a possible shift in outcomes considered important by patients in old age. Longevity may be replaced by time at home and good QoL with the three key outcome goals individual well-being, autonomy and dignity. These are the reasons why "one size does not fit all," and personalized approaches are so important.

To do justice to such heterogeneity and in order to enable a shared decision, thorough evaluation beyond kidney parameters is needed but concerns other areas of physical and mental health such as frailty, cognition, depression, malnutrition, geriatric and

additional symptoms associated with CKD. Validated assessment tools are available. Not every old patient needs the whole assessment battery, this also is personalized. And finally, we need to acknowledge that dialysis is not for everyone in old age. Some will greatly benefit, others not at all. Careful assessments of the patient's own wish, prognosis, medical needs, and psychosocial and environmental factors are helpful pieces of information to make the decision. Age alone is not necessarily the decisive factor here—more important is that there is a plurality of options made understandable to the patient.

Treatment of CKD in elderly patients follows the principle "same but different:" It is not fundamentally different from younger patients, but is fundamentally different.

SUPPLEMENTARY DATA

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The authors conceived and wrote the article together

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